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(54)名稱

共有之 GATA3 相關之腫瘤特異性新抗原

(57)摘要

本文在一個態樣中揭示包含複數種新抗原肽及醫藥上可接受之載劑之醫藥組合物，各新抗原肽包含能結合至個體中之 HLA 蛋白質之腫瘤特異性新表位(neoepitope)，各腫瘤特異性新表位包含存於腫瘤中之腫瘤特異性突變，其中(a) 該組合物包含新抗原肽，該等新抗原肽包含存在於患有癌症之個體群體中至少 1%個體中之腫瘤特異性突變；(b) 該組合物包含新抗原肽，該等新抗原肽包含結合至存在於該群體中至少 5%個體中之 HLA 蛋白質之腫瘤特異性新表位；及(c) 該組合物包含至少一種新抗原肽，能引發抵抗存在於患有癌症之個體群體中至少 5%個體中之腫瘤之免疫反應。

Disclosed herein in one aspect is a pharmaceutical composition comprising a plurality of neoantigenic peptides and a pharmaceutically acceptable carrier, each neoantigenic peptide comprising a tumor-specific

neoepitope capable of binding to an HLA protein in a subject, each tumor-specific neoepitope comprising a tumor-specific mutation present in a tumor, wherein (a) the composition comprises neoantigenic peptides comprising tumor-specific mutations present in at least 1% of subjects in a population of subjects suffering from cancer;(b) the composition comprises neoantigenic peptides comprising tumor-specific neoepitopes which bind to HLA proteins present in at least 5% of subjects in the population; and (c) the composition comprises at least one neoantigenic peptide capable of eliciting an immune response against a tumor present in at least 5% of the subjects in the population of subjects suffering from cancer.

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【發明摘要】

【中文發明名稱】

共有之GATA3相關之腫瘤特異性新抗原

【英文發明名稱】

SHARED GATA3-RELATED TUMOR-SPECIFIC NEOANTIGENS

【中文】

本文在一個態樣中揭示包含複數種新抗原肽及醫藥上可接受之載劑之醫藥組合物，各新抗原肽包含能結合至個體中之HLA蛋白質之腫瘤特異性新表位(neoepitope)，各腫瘤特異性新表位包含存於腫瘤中之腫瘤特異性突變，其中(a) 該組合物包含新抗原肽，該等新抗原肽包含存在於患有癌症之個體群體中至少1%個體中之腫瘤特異性突變；(b) 該組合物包含新抗原肽，該等新抗原肽包含結合至存在於該群體中至少5%個體中之HLA蛋白質之腫瘤特異性新表位；及(c) 該組合物包含至少一種新抗原肽，能引發抵抗存在於患有癌症之個體群體中至少5%個體中之腫瘤之免疫反應。

【英文】

Disclosed herein in one aspect is a pharmaceutical composition comprising a plurality of neoantigenic peptides and a pharmaceutically acceptable carrier, each neoantigenic peptide comprising a tumor-specific neoepitope capable of binding to an HLA protein in a subject, each tumor-specific neoepitope comprising a tumor-specific mutation present in a tumor, wherein (a) the composition comprises neoantigenic peptides comprising tumor-specific mutations present in at least 1% of

subjects in a population of subjects suffering from cancer;(b) the composition comprises neoantigenic peptides comprising tumor-specific neoepitopes which bind to HLA proteins present in at least 5% of subjects in the population; and (c) the composition comprises at least one neoantigenic peptide capable of eliciting an immune response against a tumor present in at least 5% of the subjects in the population of subjects suffering from cancer.

【指定代表圖】

無

【代表圖之符號簡單說明】

無

【發明說明書】

【中文發明名稱】

共有之GATA3相關之腫瘤特異性新抗原

【英文發明名稱】

SHARED GATA3-RELATED TUMOR-SPECIFIC NEOANTIGENS

【技術領域】

本發明係關於用於治療贅瘤形成(例如腫瘤)之方法及組合物，其具體而言使用至少一種適於治療患有癌症之群體中之大部分個體之新抗原肽。

【先前技術】

每年約1.6百萬美國人經診斷患有贅瘤形成，且預期2013年美國有約580,000人死於該疾病。在過去數十年間，贅瘤形成之檢測、診斷及治療已出現顯著改良，此顯著提高多種類型之贅瘤形成之存活率。然而，僅約60%經診斷患有贅瘤形成者在治療開始後5年時仍存活，從而使贅瘤形成成為美國之第二大死因。

目前，存在多種不同的現有癌症療法，包括消融技術(例如，手術程序、低溫/加熱處理、超音波、射頻及輻射)及化學技術(例如，醫藥劑、細胞毒性/化學治療劑、單株抗體及其不同組合)。不幸的是，該等療法通常與嚴重風險、毒性副作用及極高成本以及不確定的效能相關。

業內對試圖用患者自身免疫系統靶向癌細胞之癌症療法(例如，癌症疫苗)的關注日益增加，此乃因該等療法可減輕/消除本文所述之一些缺點。癌症疫苗通常由腫瘤抗原及免疫刺激分子(例如，細胞介素或TLR 配體)組成，該等腫瘤抗原及免疫刺激分子一起作用以誘導靶向並破壞腫瘤細胞之抗原特異性細胞毒性T細胞。當前癌症疫苗可

含有共有之腫瘤抗原，該等抗原係在許多個體中發現之腫瘤中選擇性表現或過表現之天然蛋白質(即由個體中所有正常細胞之DNA編碼之蛋白質)。儘管該等共有之腫瘤抗原可用於鑑別特定類型之腫瘤，但其與用於將T細胞反應靶向特定腫瘤類型之免疫原不同，此乃因該等腫瘤抗原經受自身耐受性之免疫弱化效應。含有腫瘤特異性及患者特異性新抗原之疫苗可克服含有共有之腫瘤抗原之疫苗之一些缺點。然而，使用患者特異性新抗原需要對個別個體之基因體進行測序，以及產生包含存於該個別個體中之新抗原之組合之個人化組合物。因此，仍需要改良的用於遞送癌症疫苗之方法及組合物。

對於本申請案中任一文件之引用或確定並非承認該文件可用作本發明之先前技術。

【發明內容】

本發明之較佳陳述(特徵)及實施例闡述於下文中。除非明確指示相反含義，否則如此定義之本發明之每一陳述及實施例可與任何其他陳述及/或實施例組合。具體而言，指示為較佳或有利的任何特徵可與任何其他指示為較佳或有利的特徵或陳述組合。關於此，本發明具體而言體現為一或多個下文陳述及實施例中之任一者或其與任何其他陳述及/或實施例之任一組合。

本發明之一目標係提供用於藉由引發靶向癌症之免疫反應來治療癌症患者群體之方法及組合物。在一個態樣中，本發明係關於包含至少一種新抗原肽及醫藥上可接受之載劑之醫藥組合物，至少一種新抗原肽各自包含能結合至個體中之HLA蛋白質之腫瘤特異性新表位，每一腫瘤特異性新表位包含存於腫瘤中之腫瘤特異性突變。該組合物可包括一種新抗原肽。在其他實施例中，該組合物可包括多於100種新抗原肽。較佳地，該組合物包括約20種新抗原肽。至少一種新抗原

肽可包括腫瘤特異性突變。突變可係頻發突變。較佳地，突變存於群體之大部分中。頻發突變可係基於存在於患有癌症之個體的群體中至少1%之個體之腫瘤中之突變。該組合物可包括至少一種含有腫瘤特異性新表位之新抗原肽，該腫瘤特異性新表位結合至存在於患有癌症之個體的群體中至少5%之個體中之HLA蛋白質。另外，該組合物可含有至少一種新抗原肽，該新抗原肽能引發抵抗存在於患有癌症之個體的群體中至少5%之個體中之腫瘤之免疫反應。引發免疫反應之能力係指免疫系統將抗原呈遞至淋巴球之能力。為使免疫系統呈遞抗原，抗原需要由個體之HLA蛋白質來呈遞。為引發抵抗腫瘤之免疫反應，腫瘤需要含有導致表現抗原之突變。為使組合物向需要其之群體提供益處，群體必須包括表現能結合存於該組合物中之至少一種新抗原肽之HLA等位基因的個體，且群體必須包括含有具有產生存於新抗原肽中之新抗原性表位之突變之腫瘤的個體。

組合物可對共有一特徵之患有癌症之個體的群體具有特異性。該群體可患有癌症或可患有特定癌症。該群體可共有一組共同的HLA亞型。其可共有基於族群之HLA亞型。不受限於理論，群體中HLA類型之百分比可不經測試基於族群來預測。不受限於理論，不同群體表現能結合不同新抗原肽之不同HLA類型。因此，可調配組合物以向該群體之大部分提供益處，而該組合物將不向另一群體提供益處。不受限於理論，不同癌症含有不同突變，且因此與包括一種以上類型之癌症之群體相比，可使用針對特定癌症調整之組合物向患有一種類型之癌症的群體提供較大益處。在一個實施例中，群體患有腎上腺皮質癌(ACC)、膀胱尿路上皮癌(BLCA)、乳房侵襲性癌(BRCA)、子宮頸鱗狀細胞癌及子宮頸內腺癌(CESC)、結腸腺癌(COAD)、慢性淋巴球性白血病(CLL)、結腸直腸癌(CRC)、瀰漫性大B細胞淋巴瘤(DLBCL)、

多形性神經膠質母細胞瘤(GBM)、頭頸部鱗狀細胞癌(HNSC)、腎難染性(KICH)、腎透明細胞癌(KIRC)、腎乳頭狀細胞癌(KIRP)、急性骨髓性白血病(LAML)、肝細胞癌(LIHC)、肺腺癌(LUAD)、肺鱗狀細胞癌(LUSC)、多發性骨髓瘤(MM)、卵巢漿液性囊腺癌(OV)、胰臟腺癌(PAAD)、前列腺腺癌(PRAD)、直腸腺癌(READ)、皮膚黑色素瘤(SKCM)、胃腺癌(STAD)、睪丸生殖細胞瘤(TGCT)、甲狀腺腺癌(THCA)、子宮體子宮內膜樣癌(UCEC)或子宮癌肉瘤(UCS)。

在一個實施例中，個體之群體患有CLL；至少一個腫瘤特異性突變包含表8中具有「CLL」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之6個之組中之至少一者將發現於CLL群體中17.49%之個體中。個體之群體可患有BLCA，至少一個腫瘤特異性突變包含表8中具有「BLCA」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之6個之組中之至少一者將發現於該群體中26.92%之個體中。個體之群體可患有BRCA；至少一個腫瘤特異性突變包含表8中具有「BRCA」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之18個之組中之至少一者將發現於該群體中36.04%之個體中。個體之群體可患有COAD；至少一個腫瘤特異性突變包含表8中具有「COAD」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之3個之組中之至少一者將發現於該群體中27.14%之個體中。個體之群體可患有GBM；至少一個腫瘤特異性突變包含表8中具有「GBM」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之14個之組中之至少一者將發現於該群體中34.36%之個體中。個體之群體可患有HNSC；至少一個腫瘤特異性突變包含表8中具有「HNSC」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之10個之組中之至少一者將發現於該群體中

21.61%之個體中。個體之群體可患有KIRC；至少一個腫瘤特異性突變包含表8中具有「KIRC」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之4個之組中之至少一者將發現於該群體中6%之個體中。個體之群體可患有LAML；至少一個腫瘤特異性突變包含表8中具有「LAML」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之11個之組中之至少一者將發現於該群體中47.45%之個體中。個體之群體可患有LUAD；至少一個腫瘤特異性突變包含表8中具有「LUAD」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之11個之組中之至少一者將發現於該群體中33.42%之個體中。個體之群體可患有LUSC；至少一個腫瘤特異性突變包含表8中具有「LUSC」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之2個之組中之至少一者將發現於該群體中7.87%之個體中。個體之群體可患有OV；至少一個腫瘤特異性突變包含表8中具有「OV」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之10個之組中之至少一者將發現於該群體中22.78%之個體中。個體之群體可患有READ；至少一個腫瘤特異性突變包含表8中具有「READ」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之2個之組中之至少一者將發現於該群體中20.51%之個體中。個體之群體可患有SKCM；至少一個腫瘤特異性突變包含表8中具有「SKCM」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之64個之組中之至少一者將發現於該群體中90.91%之個體中。個體之群體可患有UCEC；至少一個腫瘤特異性突變包含表8中具有「UCEC」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之30個之組中之至少一者將發現於該群體中67.74%之個體中。個體之群體可患有ACC；至少一個腫瘤特異性突變包含表8中具有

「ACC」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之161個之組中之至少一者將發現於該群體中50%之個體中。個體之群體可患有CESC；至少一個腫瘤特異性突變包含表8中具有「CESC」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之4個之組中之至少一者將發現於該群體中23.71%之個體中。個體之群體可患有CRC；至少一個腫瘤特異性突變包含表8中具有「CRC」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之15個之組中之至少一者將發現於該群體中56.65%之個體中。個體之群體可患有DLBCL；至少一個腫瘤特異性突變包含表8中具有「DLBCL」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之2個之組中之至少一者將發現於該群體中13.79%之個體中。個體之群體可患有KICH；至少一個腫瘤特異性突變包含表8中具有「KICH」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之24個之組中之至少一者將發現於該群體中50%之個體中。個體之群體可患有KIRP；至少一個腫瘤特異性突變包含表8中具有「KIRP」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之9個之組中之至少一者將發現於該群體中42.24%之個體中。個體之群體可患有LIHC；至少一個腫瘤特異性突變包含表8中具有「LIHC」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之2個之組中之至少一者將發現於該群體中6.57%之個體中。個體之群體可患有MM；至少一個腫瘤特異性突變包含表8中具有「MM」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之6個之組中之至少一者將發現於該群體中23.9%之個體中。個體之群體可患有PRAD；至少一個腫瘤特異性突變包含表8中具有「PRAD」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性

突變中之24個之組中之至少一者將發現於該群體中39.85%之個體中。個體之群體可患有STAD；至少一個腫瘤特異性突變包含表8中具有「STAD」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之150個之組中之至少一者將發現於該群體中48.79%之個體中。個體之群體可患有TGCT；至少一個腫瘤特異性突變包含表8中具有「TGCT」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之14個之組中之至少一者將發現於該群體中51.61%之個體中。個體之群體可患有THCA；至少一個腫瘤特異性突變包含表8中具有「THCA」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之5個之組中之至少一者將發現於該群體中69.88%之個體中。個體之群體可患有UCS；至少一個腫瘤特異性突變包含表8中具有「UCS」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之2個之組中之至少一者將發現於該群體中16.07%之個體中。個體之群體可患有PAAD；至少一個腫瘤特異性突變包含表8中具有「PAAD」之實例性疾病之突變之任一組合；且至少一個腫瘤特異性突變中之53個之組中之至少一者將發現於該群體中50%之個體中。個體之群體亦可患有實體腫瘤。實體腫瘤可為透明細胞腎細胞癌(ccRCC)、黑色素瘤、肉瘤或膀胱、結腸、腦、乳房、頭頸部、子宮內膜、肺、卵巢、胰臟或前列腺之癌症。個體之群體可患有液體腫瘤。液體腫瘤可為非霍奇金氏淋巴瘤(Non-Hodgkin's lymphoma)或白血病。

在另一實施例中，在患有癌症之個體的群體中至少一個腫瘤特異性突變之發生率為一年至少500名患者，且其中至少一個突變可為表9中針對該群體列示之突變。至少一種新抗原肽可為表9中列示之至少一種肽。

在另一實施例中，患有癌症之群體正在用藥物或療法治療。患有癌症之群體可先前已經依魯替尼(ibrutinib)、厄洛替尼(erlotinib)、伊馬替尼(imatinib)、吉非替尼(gefitinib)、克唑替尼(crizotinib)、曲妥珠單抗(trastuzumab)、威羅菲尼(vemurafenib)、RAF/MEK或抗雌激素療法治療，或目前正在用其治療，或經選擇欲用其來治療。

在另一實施例中，組合物包含至少一種能引發抵抗腫瘤之免疫反應之新抗原肽，該腫瘤存在於患有癌症之個體群體中之至少5%、10%、20%、30%、40%、50%、60%、70%、80%、90%、95%或99%之個體中。

在另一實施例中，群體中至少5%、10%、20%、30%、40%、50%、60%、70%、80%、90%、95%或99%之個體具有存於組合物中之至少一個腫瘤特異性突變；且群體中至少5%、10%、20%、30%、40%、50%、60%、70%、80%、90%、95%或99%之個體具有至少一種結合至存於組合物中之腫瘤特異性新表位之HLA蛋白質。

在一個實施例中，腫瘤特異性突變包含剪接變體突變、點突變及/或框移突變。在另一實施例中，腫瘤特異性突變包含抗藥性突變。在一個實施例中，新抗原肽不僅包括所得突變新抗原蛋白質序列，且亦包括圍繞並包括突變之長肽區，且包括其內之所有鄰接區段(見表1-4)。在一個實施例中，腫瘤特異性突變存於一或多個編碼選自由以下組成之群之蛋白質之基因中：程式性死亡配體1 (PD-L1)、雄激素受體(AR)、布魯頓酪胺酸激酶(Bruton's Tyrosine Kinase，BTK)、表皮生長因子受體(EGFR)、BCR-Abl、c-kit、PIK3CA、HER2、EML4-ALK、KRAS、ALK、ROS1、AKT1、BRAF、MEK1、MEK2、NRAS、RAC1及ESR1。在一個實施例中，腫瘤特異性突變存於本文所呈現之表中任一者中列示之一或多個基因中。在一個實施例

中，至少一個腫瘤特異性突變源自PD-L1或AR之選擇式剪接。在一個實施例中，至少一個腫瘤特異性突變源自剪接變體sPD-L1、AR-V1或AR-V7。在一個實施例中，至少一個腫瘤特異性突變係選自由以下組成之群之抗藥性突變：BTK/C481S、EGFR/T790M、BCR-Abl/T315I、BCR-Abl/Y253H、BCR-Abl/E255K、BCR-Abl/E255V、c-kit/T670I、PIK3CA/E545K、PIK3CA/E542K、HER2/G776(YVMA)、HER2/E545K、EML4-ALK/G1269A、KRAS/G12V/D、ALK/L1196M、ALK/G1202R、ALK/S1206Y、ALK/1151T(ins)、ALK/F1174C、ROS1/G2032R、AKT1/E17K、BRAF/V600E、MEK1/Q56P、MEK1/E203K、MEK1/C121S、MEK1/V60E、MEK1/G128V、MEK1/V154I、MEK1/P124S、MEK1/P124L、NRAS/Q61K/L/R、NRAS/T58I、MEK2/C125S、RAC1/P29S、ESR1/S463P、AR/V534E、AR/P535H、AR/L536Q、AR/L536R、AR/Y537C、AR/Y537S、AR/Y537N、AR/D538G及AR/F876L。在一個實施例中，抗藥性突變係由使用依魯替尼、厄洛替尼、伊馬替尼、吉非替尼、克唑替尼、曲妥珠單抗、威羅菲尼、RAF/MEK或抗雌激素療法之治療所誘導。在另一實施例中，個體在治療前具有抗藥性突變。

在另一實施例中，組合物包含至少2、3、4、5、6、7、8、9、10、11、12、13、14、15、16、17、18、19或20種新抗原肽。該組合物可包括15至20種新抗原肽。該組合物可包括大於100、200或300種新抗原肽。每種新抗原肽之長度可為約5至約50個胺基酸。

在另一實施例中，醫藥組合物係免疫原性組合物或疫苗組合物。醫藥組合物可進一步包含免疫調節劑或佐劑。免疫調節劑或佐劑可選自由以下組成之群：聚-ICLC、1018 ISS、鋁鹽、Amplivax、AS15、BCG、CP-870,893、CpG7909、CyaA、環狀二核苷酸(例如

STING)、dSLIM、GM-CSF、IC30、IC31、咪喹莫特(Imiquimod)、ImuFact IMP321、IS貼片(Patch)、ISS、ISCOMATRIX、Juvlmmune、LipoVac、MF59、單磷醯脂質A、Montanide IMS 1312、Montanide ISA 206、Montanide ISA 50V、Montanide ISA-51、OK-432、OM-174、OM-197-MP-EC、ONTAK、PepTel®、載體系統、PLGA微粒、雷西莫特(resiquimod)、SRL172、病毒體及其他類病毒顆粒、YF-17D、VEGF trap、R848、β-葡聚糖、Pam3Cys及Aquila's QS21刺激子。

在另一實施例中，醫藥組合物包含如表1、2、3或4中所定義之一或多種新抗原肽。

在一個實施例中，每個腫瘤特異性新表位以小於500 nM之K_D結合至HLA-A、HLA-B或HLA-C或結合至HLADRB、HLADBM XXXXX。

在另一態樣中，本發明係關於治療或預防有需要之個體之腫瘤的方法，其係藉由向該個體投與如本文所述之任一醫藥組合物來實施。

在一個實施例中，提供治療或預防有需要之患者之腫瘤之方法，其包含向患者投與包含至少一種新抗原肽及醫藥上可接受之載劑之組合物，至少一種新抗原肽各自包含能結合至個體中之HLA蛋白質之腫瘤特異性新表位，每一腫瘤特異性新表位包含存於腫瘤中之腫瘤特異性突變，其中該組合物包含至少一種新抗原肽，該新抗原肽包含存在於患有癌症之個體群體中至少1%之個體之腫瘤中之腫瘤特異性突變；該組合物包含至少一種新抗原肽，該新抗原肽包含結合至存在於患有癌症之個體的群體中至少5%之個體中之HLA蛋白質之腫瘤特異性新表位；且該組合物包含至少一種新抗原肽，該新抗原肽能引發

抵抗存在於患有癌症之個體的群體中至少5%之個體中之腫瘤之免疫反應。

在一個實施例中，個體之群體患有腎上腺皮質癌(ACC)、膀胱尿路上皮癌(BLCA)、乳房侵襲性癌(BRCA)、子宮頸鱗狀細胞癌及子宮頸內腺癌(CESC)、結腸腺癌(COAD)、慢性淋巴球性白血病(CLL)、結腸直腸癌(CRC)、瀰漫性大B細胞淋巴瘤(DLBCL)、多形性神經膠質母細胞瘤(GBM)、頭頸部鱗狀細胞癌(HNSC)、腎難染性(KICH)、腎透明細胞癌(KIRC)、腎乳頭狀細胞癌(KIRP)、急性骨髓性白血病(LAML)、肝細胞癌(LIHC)、肺腺癌(LUAD)、肺鱗狀細胞癌(LUSC)、多發性骨髓瘤(MM)、卵巢漿液性囊腺癌(OV)、胰臟腺癌(PAAD)、前列腺腺癌(PRAD)、直腸腺癌(READ)、皮膚黑色素瘤(SKCM)、胃腺癌(STAD)、睪丸生殖細胞瘤(TGCT)、甲狀腺腺癌(THCA)、子宮體子宮內膜樣癌(UCEC)或子宮癌肉瘤(UCS)。在一個實施例中，個體之群體患有實體腫瘤。實體腫瘤可為透明細胞腎細胞癌(ccRCC)、黑色素瘤、肉瘤或膀胱、結腸、腦、乳房、頭頸部、子宮內膜、肺、卵巢、胰臟或前列腺之癌症。在一個實施例中，個體之群體患有液體腫瘤。液體腫瘤可為非霍奇金氏淋巴瘤或白血病。

在一個實施例中，患有癌症之群體曾用依魯替尼、厄洛替尼、伊馬替尼、吉非替尼、克唑替尼、曲妥珠單抗、威羅菲尼、RAF/MEK或抗雌激素療法治療，正用其治療或經選擇欲用其治療。

在一個實施例中，至少一種新抗原肽能引發抵抗存在於患有癌症之個體的群體中至少5%、10%、20%、30%、40%、50%、60%、70%、80%、90%、95%或99%之個體中之腫瘤的免疫反應。在一個實施例中，群體中至少5%、10%、20%、30%、40%、50%、60%、70%、80%、90%、95%或99%之個體具有存於組合物中之至少一個腫

瘤特異性突變，且群體中至少5%、10%、20%、30%、40%、50%、60%、70%、80%、90%、95%或99%之個體具有至少一種結合至存於組合物中之腫瘤特異性新表位之HLA蛋白質。

在另一實施例中，腫瘤特異性突變包含剪接變體突變、點突變及/或框移突變。腫瘤特異性突變可為抗藥性突變。腫瘤特異性突變可存於一或多個編碼選自由以下組成之群之蛋白質之基因中：程式性死亡配體1 (PD-L1)、雄激素受體(AR)、布魯頓酪胺酸激酶(BTK)、表皮生長因子受體(EGFR)、BCR-Abl、c-kit、PIK3CA、HER2、EML4-ALK、KRAS、ALK、ROS1、AKT1、BRAF、MEK1、MEK2、NRAS、RAC1及ESR1。腫瘤特異性突變可存於任一表中所列示之一或多個基因中。至少一個腫瘤特異性突變可源自PD-L1或AR之選擇式剪接。至少一個腫瘤特異性突變可源自剪接變體sPD-L1、AR-V1或AR-V7。

在一個實施例中，至少一個腫瘤特異性突變係選自由以下組成之群之抗藥性突變：BTK/C481S、EGFR/T790M、BCR-Abl/T315I、BCR-Abl/Y253H、BCR-Abl/E255K、BCR-Abl/E255V、c-kit/T670I、PIK3CA/E545K、PIK3CA/E542K、HER2/G776(YVMA)、HER2/E545K、EML4-ALK/G1269A、KRAS/G12V/D、ALK/L1196M、ALK/G1202R、ALK/S1206Y、ALK/1151T(ins)、ALK/F1174C、ROS1/G2032R、AKT1/E17K、BRAF/V600E、MEK1/Q56P、MEK1/E203K、MEK1/C121S、MEK1/V60E、MEK1/G128V、MEK1/V154I、MEK1/P124S、MEK1/P124L、NRAS/Q61K/L/R、NRAS/T58I、MEK2/C125S、RAC1/P29S、ESR1/S463P、AR/V534E、AR/P535H、AR/L536Q、AR/L536R、AR/Y537C、AR/Y537S、AR/Y537N、AR/D538G及AR/F876L。抗藥性突變可由依魯替尼、厄

洛替尼、伊馬替尼、吉非替尼、克唑替尼、曲妥珠單抗、威羅菲尼、RAF/MEK或抗雌激素療法之治療誘導。

在另一實施例中，組合物包含至少2、3、4、5、6、7、8、9、10、11、12、13、14、15、16、17、18、19或20種新抗原肽。在較佳實施例中，組合物包含15至20種新抗原肽。

在另一實施例中，每種新抗原肽之長度為約5至約50個胺基酸。

在另一實施例中，組合物係免疫原性組合物或疫苗組合物。例如，免疫原性組合物或疫苗組合物可包含免疫調節劑或佐劑。免疫調節劑或佐劑可選自由以下組成之群：聚-ICLC、1018 ISS、鋁鹽、Amplivax、AS15、BCG、CP-870,893、CpG7909、CyaA、環狀二核苷酸(例如STING)、dSLIM、GM-CSF、IC30、IC31、咪喹莫特、ImuFact IMP321、IS貼片(Patch)、ISS、ISCOMATRIX、Juvlmmune、LipoVac、MF59、單磷醯脂質A、Montanide IMS 1312、Montanide ISA 206、Montanide ISA 50V、Montanide ISA-51、OK-432、OM-174、OM-197-MP-EC、ONTAK、PepTel®、載體系統、PLGA微粒、雷西莫特、SRL172、病毒體及其他類病毒顆粒、YF-17D、VEGF trap、R848、β-葡聚糖、Pam3Cys及Aquila's QS21刺激子。

在一個實施例中，組合物包含如表1、2、3或4中所定義之一或多種新抗原肽。

在一個實施例中，每個腫瘤特異性新表位以小於500 nM之K_D結合至HLA-A、HLA-B或HLA-C或結合至HLADRB、HLADBMXXXXX。

在另一態樣中，本發明提供預防性癌症治療方法，其包含選擇用於有需要之患者之癌症藥物，該藥物選自由以下組成之群：依魯替尼、厄洛替尼、伊馬替尼、吉非替尼、克唑替尼、曲妥珠單抗、威羅

菲尼、RAF/MEK及抗雌激素療法；及在可檢測到抗藥性突變之前向個體預防性投與包含新抗原肽之醫藥組合物，該等新抗原肽源自與所選癌症藥物相關之抗藥性突變。

共有之新抗原免疫原性組合物可經由各自含有一部分新抗原之子組合物投與，且子組合物可投與個體或患者上之不同位置；例如，包含20種不同新抗原之組合物可以四個(4)子組合物投與，每一子組合物含有該20種不同新抗原中之5種，且可投與該四個(4)子組合物以努力將每一子組合物遞送至患者之一組單獨的引流淋巴結，例如投與每一手臂及腿(例如，患者每一側上之大腿或大腿上部或近臀部或腰部)以努力將較少新抗原遞送至患者或個體之每組引流淋巴結且由此限制新抗原之間之競爭。當然，位置數目及因此子組合物數目可變，例如熟練開業醫師可考慮在脾處或在脾附近投與以具有第五投與點，且熟練開業醫師可改變位置，使得僅使用一個、兩個或三個(例如，每一手臂及腿、每一腿及一條手臂、每一腿且無手臂或僅兩條手臂)。以上文所提及之不同間隔投與之共有之新抗原免疫原性組合物可為不同調配物，且在單一投與期間在個體或患者上之不同位置投與之子組合物可為不同組合物。例如，第一次投與可為完整的共有之新抗原免疫原性組合物且下一次或後一次投與可為在活體內具有抗原表現之載體(例如，病毒載體或質體)。同樣，在將不同子組合物投與至患者或個體上之不同位置中，一些子組合物可包含完整抗原且一些子組合物可包含在活體內具有抗原表現之載體(例如，病毒載體或質體)。且一些組合物及子組合物可包含在活體內具有抗原表現之載體(例如，病毒載體或質體)及完整抗原二者。一些在活體內具有抗原表現之載體(例如，痘病毒)可具有免疫刺激或輔助效應，且因此含有該等載體之組合物或子組合物可具有自輔助性。同樣，藉由改變如何將

抗原呈遞至免疫系統之性質，投與可「啟始」且然後「加強」免疫系統。且在本文中，在提及「疫苗」時，本發明意欲包括免疫原性組合物，且在提及患者或個體時，此一個體意欲係需要本文所揭示治療、投與、組合物及概言之標的發明之患者或個體。

此外，本發明適用於使用任一類型之表現載體，例如病毒表現載體，例如痘病毒(例如，正痘病毒或禽痘病毒，例如牛痘病毒，包括改良型安卡拉(Ankara)牛痘或MVA、MVA-BN、根據WO-A-92/15672之NYVAC、雞痘(例如TROVAX)、金絲雀痘(例如ALVAC(WO-A-95/27780及WO-A-92/15672))、鴿痘、豬痘及諸如此類)、腺病毒、AAV、皰疹病毒及慢病毒；或質體或DNA或核酸分子載體。一些細胞質載體、例如痘病毒載體可係有利的。然而，腺病毒、AAV及慢病毒亦可有利的用於實踐本發明。

在即用型(尤其經復原)共有之新抗原免疫原性組合物中，載體(例如病毒載體)之存在量在熟習此項技術者根據本揭示內容及業內(例如本文引用之專利及科學文獻中)知識之範圍內。

完整抗原或載體(例如重組活疫苗)可以容許其儲存之冷凍乾燥形式存在，且在即將用於溶劑或賦形劑(其可包括如本文所論述之佐劑)中之前經復原。

因此，本發明標的亦係疫苗接種或免疫組或套組，其包含單獨包裝之冷凍乾燥疫苗及溶液，有利地包括如本文所論述用於復原冷凍乾燥疫苗之佐劑化合物。

本發明標的亦係疫苗接種或免疫之方法，其包含例如藉由非經腸(較佳皮下、肌內或真皮內)途徑或藉由經黏膜途徑以一或多次投與之速率投與本發明之疫苗或免疫原性組合物。視情況，此方法包括在有利地亦包括佐劑之溶液中復原冷凍乾燥之共有之新抗原免疫原性組

合物(例如，若為凍乾完整抗原或載體)之初步步驟。

在一個實施例中，共有之新抗原免疫原性組合物係關於每種新抗原肽以約10 μg至1 mg/70 kg個體之劑量投與。在另一實施例中，共有之新抗原免疫原性組合物係關於每種新抗原肽以約10 μg至2000 μg/70 kg個體之平均週劑量投與。在另一相關實施例中，投與係靜脈內投與。在一個實施例中，共有之新抗原免疫原性組合物係靜脈內或皮下投與。

在另一實施例中，該方法進一步包含(a) 自每一個體獲得腫瘤組織樣品；(b) 檢測樣品中之一或多種腫瘤特異性突變；及(c) 自個體之群體選擇個體，以供在該個體之樣品中檢測到至少一種腫瘤特異性突變時用至少一種新抗原肽治療。

在另一實施例中，該方法進一步包含(a) 測定每一個體中存在之HLA異型；及(b) 自個體之群體選擇個體，以供在存於該個體中之一或多種HLA異型結合至存於至少一種新抗原肽中之一或多個腫瘤特異性新表位時用至少一種新抗原肽治療。

本發明實施例係關於使用共有之新抗原之組合物及方法，該共有之新抗原(與源自在腫瘤中差異性表現之基因之共有之天然(未突變)抗原不同)具有期望性質，例如不經受中樞耐受性之免疫弱化效應及高腫瘤特異性。此係由於新抗原僅在腫瘤組織中表現，例如由腫瘤特異性突變或剪接缺陷生成。該等剪接變體或突變可生成橫跨多個HLA等位基因之免疫原性表位，由此覆蓋群體之大部分。此外，由於該等突變可存於大多梳患有癌症之個體中，故本文所述之組合物不需要對個體之全基因體測序且可作為「現成(off-the-shelf)」產品用於治療多個個體。例如，該方法可僅包括在來自個體之腫瘤樣品中檢測存於組合物中之一或多種特定突變，且將該組合物投與其中存在至少一個突

變之個體。此與使用患者特異性新抗原混合物之方法相反，其需要對每一個體之全基因體或全外顯子體測序並產生個人化治療組合物。

其他實施例係關於組合療法，其中使用本發明共有之新抗原組合物之治療方法係與當前藥物方案協作使用。共有之新抗原組合物可預防性投與。在一個實施例中，在可檢測到抗藥性突變之前，有需要之患者係用與共有之新抗原免疫原性組合物組合之化學療法及/或靶向療法治療。共有之新抗原免疫原性組合物可經調整以包括對與所選療法相關之抗性突變具有特異性之新抗原肽。在另一實施例中，共有之新抗原組合物係在用化學療法及/或靶向療法治療個體之前投與，以在具有抗藥性突變之細胞產生前生成對該等細胞之免疫反應。投與可係連續或依序或在實質上同一時間或實質上同時的。舉例而言，共有之新抗原免疫原性組合物之投與及癌症療法之投與可大致同時或實質上同時的。或者，共有之新抗原免疫原性組合物之投與可按照一個時間表，例如每週、每兩週、每三週、每個月、每兩個月、每四分之一年(每三個月)、每三分之一年(每四個月)、每五個月、每年兩次(每六個月)、每七個月、每八個月、每九個月、每十個月、每十一個月、每年或諸如此類，且癌症療法之投與可按通常用於該療法之不同時間表，使得個體或患者具有兩個並行運行之不同治療時間表，且共有之新抗原免疫原性組合物之投與及癌症療法之投與可為依序或連續的。在較佳實施例中，可用依魯替尼、厄洛替尼、伊馬替尼、吉非替尼、克唑替尼、曲妥珠單抗、威羅菲尼、RAF/MEK或抗雌激素療法治療個體。

在另一態樣中，本發明提供癌症進展之早期監測及追蹤之診斷方法，其係藉由測定本發明之至少一種新抗原肽在患者樣品中之存在來實施。患者樣品可源自血液、痰、唾液、尿液、腫瘤組織、淋巴

液、精液或糞便。

在一個實施例中，診斷方法係在投與如本文所述之共有之新抗原組合物之前使用。診斷方法可包括比較在用癌症療法及/或共有之新抗原組合物治療期間所取之一系列至少兩個樣品中共有之新抗原突變之量。不受限於理論，共有之新抗原突變之增加或減少可用於測定治療效能。

在一個實施例中，經突變基因可使用基於PCR之方法或測序來檢測。反轉錄PCR (RT-PCR)可用於檢測經轉錄新抗原基因中之突變。另外，可使用任何測序技術來測定突變之存在。在較佳實施例中，使用焦磷酸測序。本發明亦提供套組，其包括對涵蓋新抗原突變之序列具有特異性之引子。

在另一實施例中，藉由免疫檢測方法檢測經突變基因。可使用對共有之新抗原突變具有特異性之抗體檢測突變。抗體可結合至陣列。陣列可包括抗體以檢測一種以上本發明之共有之新抗原突變。抗體可經構形用於ELISA分析。因此，可提供組合物或套組，其包括特異性識別本發明之共有之新抗原之抗體。

在另一態樣中，本發明提供治療或預防有需要之個體群體之腫瘤之方法，其包含向個體投與包含細胞外配體結合結構域之藥劑，該細胞外配體結合結構域識別腫瘤特異性新表位，該腫瘤特異性新表位包含發生率為該群體中至少1%之個體之腫瘤特異性突變。該藥劑可為抗體、抗體片段、抗體藥物偶聯物、適配體、CAR或T細胞受體。抗體或抗體片段可為人類化、完全人類化或嵌合的。抗體片段可為奈米抗體、Fab、Fab'、(Fab')2、Fv、ScFv、雙價抗體、三價抗體、四價抗體、雙-scFv、微小抗體、Fab2或Fab3片段。腫瘤特異性突變可為表9中針對任一群體所列示之突變。腫瘤特異性突變可在含有細胞

外結構域之基因內。腫瘤特異性突變可為FGFR3 S249C、ERBB3 V104M、EGFR L858R、MUC4 H4205Q、PDGFRA R483fs、TMEM52 23_26LLPL>L或PODXL 28_30PSP>P。腫瘤特異性突變可在細胞外結構域內。腫瘤特異性突變包含FGFR3 S249C或ERBB3 V104M。不受限於理論，新表位在具有細胞外結構域之蛋白質中之存在使得可在細胞表面上呈現新表位。不受限於理論，新表位在細胞外結構域中之存在使得可在細胞表面上呈現新表位。

本發明進一步藉由下列編號之段落進行闡述：

1. 一種新抗原肽，其包含表1-9中定義之腫瘤特異性新表位，其中該經分離新抗原肽並非天然多肽。

2. 一種長度為100個胺基酸或更短之經分離新抗原肽，其包含表1-9中定義之腫瘤特異性新表位。

3. 如段落1或2之經分離新抗原肽，其長度介於約5個至約50個胺基酸之間。

4. 如段落1至3中任一段落之經分離新抗原肽，其長度介於約15個至約35個胺基酸之間。

5. 如段落4之經分離新抗原肽，其長度為約15個胺基酸或更短。

6. 如段落5之經分離新抗原肽，其長度介於約8個與約11個胺基酸之間。

7. 如段落6之經分離新抗原肽，其長度為9或10個胺基酸。

8. 如段落1至7中任一段落之經分離新抗原肽，其結合I類主要組織相容性複合體(MHC)。

9. 如段落8之經分離新抗原肽，其以小於約500 nM之結合親和性結合I類MHC。

10. 如段落1至3中任一段落之經分離新抗原肽，其長度為約30個胺基酸或更短。

11. 如段落10之經分離新抗原肽，其長度介於約6個與約25個胺基酸之間。

12. 如段落11之經分離新抗原肽，其長度介於約15個與約24個胺基酸之間。

13. 如段落11之經分離新抗原肽，其長度介於約9個與約15個胺基酸之間。

14. 如段落1至3及10至13中任一段落之經分離新抗原肽，其結合II類MHC。

15. 如段落14之經分離新抗原肽，其以小於約1000 nM之結合親和性結合II類MHC。

16. 如段落1至15中任一段落之經分離新抗原肽，其進一步包含側翼胺基酸。

17. 如段落16之經分離新抗原肽，其中該等側翼胺基酸並非天然側翼胺基酸。

18. 如段落1至17中任一段落之經分離新抗原肽，其連接至至少第二新抗原肽。

19. 如段落18之經分離新抗原肽，其中肽係使用聚-甘胺酸或聚-絲胺酸連接體連接。

20. 如段落18或19之經分離新抗原肽，其中第二新抗原肽以小於約1000 nM之結合親和性結合I類或II類MHC。

21. 如段落20之經分離新抗原肽，其中第二新抗原肽以小於約500 nM之結合親和性結合I類或II類MHC。

22. 如段落20或21之經分離新抗原肽，其中該等新表位中之二

者結合至人類白血球抗原(HLA) -A、-B、-C、-DP、-DQ或-DR。

23. 如段落20至22中任一段落之經分離新抗原肽，其中該經分離新抗原肽及該第二新抗原肽結合I類HLA或該經分離新抗原肽及該第二新抗原肽結合II類HLA。

24. 如段落20至22中任一段落之經分離新抗原肽，其中該經分離新抗原肽結合II類HLA且該第二新抗原肽結合I類HLA或該經分離新抗原肽結合I類HLA且該第二新抗原肽結合II類HLA。

25. 如段落1至24中任一段落之經分離新抗原肽，其進一步包含增加活體內半衰期、細胞靶向、抗原攝取、抗原處理、MHC親和性、MHC穩定性或抗原呈遞。

26. 如段落25之經分離新抗原肽，其中該修飾係偶聯至載體蛋白、偶聯至配體、偶聯至抗體、聚乙二醇化、聚唾液酸化羥乙基澱粉化、重組PEG模擬物、Fc融合、白蛋白融合、奈米顆粒附接、奈米粒子囊封、膽固醇融合、鐵融合、醯化、醯胺化、糖基化、側鏈氧化、磷酸化、生物素化、添加表面活性物質、添加胺基酸模擬物或添加非天然胺基酸。

27. 如段落25之經分離新抗原肽，其中該等經靶向細胞為抗原呈遞細胞。

28. 如段落27之經分離新抗原肽，其中該等抗原呈遞細胞係樹突細胞。

29. 如段落29之經分離新抗原肽，其中該等樹突細胞係使用CD141、DEC205或XCR1標記來靶向。

30. 一種包含至少一種新抗原肽及醫藥上可接受之載劑之醫藥組合物，至少一種新抗原肽各自包含能結合至個體中之HLA蛋白質之腫瘤特異性新表位，每一腫瘤特異性新表位包含存於腫瘤中之腫瘤特

異性突變，其中：

(a) 該組合物包含至少一種新抗原肽，該新抗原肽包含存在於患有癌症之個體群體中至少1%之個體之腫瘤中之腫瘤特異性突變；

(b) 該組合物包含至少一種新抗原肽，該新抗原肽包含腫瘤特異性新表位，該腫瘤特異性新表位結合至存在於患有癌症之個體的群體中至少5%之個體中之HLA蛋白質；或

(c) 該組合物包含至少一種新抗原肽，該新抗原肽能引發抵抗存在於患有癌症之個體的群體中至少5%之個體中之腫瘤之免疫反應。

31. 如段落30之醫藥組合物，其中該個體群體患有腎上腺皮質癌(ACC)、膀胱尿路上皮癌(BLCA)、乳房侵襲性癌(BRCA)、子宮頸鱗狀細胞癌及子宮頸內腺癌(CESC)、結腸腺癌(COAD)、慢性淋巴球性白血病(CLL)、結腸直腸癌(CRC)、瀰漫性大B細胞淋巴瘤(DLBCL)、多形性神經膠質母細胞瘤(GBM)、頭頸部鱗狀細胞癌(HNSC)、腎嫌染性(KICH)、腎透明細胞癌(KIRC)、腎乳頭狀細胞癌(KIRP)、急性骨髓性白血病(LAML)、肝細胞癌(LIHC)、肺腺癌(LUAD)、肺鱗狀細胞癌(LUSC)、多發性骨髓瘤(MM)、卵巢漿液性囊腺癌(OV)、胰臟腺癌(PAAD)、前列腺腺癌(PRAD)、直腸腺癌(READ)、皮膚黑色素瘤(SKCM)、胃腺癌(STAD)、睪丸生殖細胞瘤(TGCT)、甲狀腺腺癌(THCA)、子宮體子宮內膜樣癌(UCEC)或子宮癌肉瘤(UCS)。

32. 如段落30或31之醫藥組合物，其中患有癌症之該群體曾用癌症治療劑、視情況依魯替尼、厄洛替尼、伊馬替尼、吉非替尼、克唑替尼、曲妥珠單抗、威羅菲尼、RAF/MEK抑制劑或抗雌激素療法治療，正在用其治療，或經選擇欲用其治療。

33. 如段落30至33中任一段落之醫藥組合物，其中該等腫瘤特異性突變包含剪接變體突變、點突變及/或框移突變。

34. 如段落30至33中任一段落之醫藥組合物，其中該至少一種新抗原肽包含至少一種源自側接並包括該腫瘤特異性突變之長肽區的新抗原肽，且其中包括該長肽內之所有鄰接區段。

35. 如段落30至34中任一段落之醫藥組合物，其中該等腫瘤特異性突變存於表1-9中列示之一或多個基因中。

36. 如段落30至35中任一段落之醫藥組合物，其中該組合物包含至少一種如表1-9中之任一者所定義之新抗原肽。

37. 如段落30至36中任一段落之醫藥組合物，其中該等腫瘤特異性突變存於一或多個編碼選自由以下組成之群之蛋白質之基因中：程式性死亡配體1 (PD-L1)、雄激素受體(AR)、布魯頓酪胺酸激酶(BTK)、表皮生長因子受體(EGFR)、BCR-Abl、c-kit、PIK3CA、HER2、EML4-ALK、KRAS、ALK、ROS1、AKT1、BRAF、MEK1、MEK2、NRAS、RAC1及ESR1。

38. 如段落37之醫藥組合物，其中至少一個腫瘤特異性突變源自PD-L1或AR之選擇式剪接。

39. 如段落38之醫藥組合物，其中至少一個腫瘤特異性突變源自剪接變體sPD-L1、AR-V1或AR-V7。

40. 如段落30至39中任一段落之醫藥組合物，其中該等腫瘤特異性突變包含抗藥性突變。

41. 如段落40之醫藥組合物，其中至少一個腫瘤特異性突變係選自由以下組成之群之抗藥性突變：BTK/C481S、EGFR/T790M、BCR-Abl/T315I、BCR-Abl/Y253H、BCR-Abl/E255K、BCR-Abl/E255V、c-kit/T670I、PIK3CA/E545K、PIK3CA/E542K、

HER2/G776(YVMA)、HER2/E545K、EML4-ALK/G1269A、KRAS/G12V/D、ALK/L1196M、ALK/G1202R、ALK/S1206Y、ALK/1151T(ins)、ALK/F1174C、ROS1/G2032R、AKT1/E17K、BRAF/V600E、MEK1/Q56P、MEK1/E203K、MEK1/C121S、MEK1/V60E、MEK1/G128V、MEK1/V154I、MEK1/P124S、MEK1/P124L、NRAS/Q61K/L/R、NRAS/T58I、MEK2/C125S、RAC1/P29S、ESR1/S463P、AR/V534E、AR/P535H、AR/L536Q、AR/L536R、AR/Y537C、AR/Y537S、AR/Y537N、AR/D538G及AR/F876L。

42. 如段落30至41中任一段落之醫藥組合物，其中在患有癌症之該個體群體中該至少一個腫瘤特異性突變之發生率為一年至少500名患者，且其中該至少一個突變包含表9中針對該群體所列示之突變。

43. 如段落42之醫藥組合物，其中該至少一種新抗原肽包含表9中列示之至少一種肽。

44. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有CLL；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：SF3B1:p.K700E、MYD88:p.L273P、NOTCH1:p.P2514fs、ABCA11P:p.E901D、AHNAK:p.D3823E、ZNF814:p.E348D、AHNAK:p.V1220I、AHNAK:p.H1203N、ANKRD30A:p.A232V、APOOL:p.I138L、EGR2:p.H397N、MKI67:p.H2213D、NRAS:p.Q61R、PLIN4:p.M691V、XPO1:p.E571K、ZCRB1:p.L76F、ZNF700:p.N652H、ZNF700:p.Q654R、ZNF844:p.D458H、AHNAK:p.A4046V、

ANKRD36:p.P337R、C1orf170:p.T203I、CAST:p.D639E、EGR2:p.E369K、GPR123:p.L630P、IKZF3:p.L162R、MUC4:p.P4224R、OR9Q1:p.M34L、PKD2:p.Y486F、PRAMEF11:p.R104Q、SYNJ1:p.I681F、TP53:p.R248Q、TP53:p.R248W、TRPV2:p.L627del、ZNF254:p.S498A、ZNF732:p.A459T、ZNF749:p.E530Q、ZNF845:p.M423I、ABCA11P:p.G900E、ACRC:p.E243D、ACRC:p.A244V、ACSL3:p.T188S、ADAMTS2:p.D948N、AGAP6:p.S127I、AHNAK:p.A2114G、ANKRD36:p.D1014Y、ARID3A:p.G550fs、ARID4A:p.D1154E、ATP2B4:p.R183H、ATRNL1:p.L1244F、BNC1:p.Y937N、BRAF:p.K601N、BTLA:p.Q86K、C14orf177:p.G90V、C2orf44:p.N456K、C3orf15:p.R552Q、CACNA2D1:p.Y376N、CALD1:p.E340K、CCDC15:p.P488H、CCDC79:p.N440T、CCNB3:p.A932T、CD109:p.L470Q、CD209:p.Q189L、CKAP2:p.*684K、CMA1:p.I81K、CMIP:p.A230T、CNTNAP4:p.I12F、CRYM:p.*315K、DICER1:p.E1705K、DPCR1:p.L716P、EIF3A:p.M1093L、EIF4G3:p.R8H、ETFDH:p.I281F、EWSR1:p.Y656C、F5:p.L1332P、F5:p.L1253F、FAM50A:p.H317R、FBXL13:p.S102R、FBXW7:p.R465H、FHL1:p.D184E、FILIP1:p.I522K、FRG1B:p.Q39K、GNB1:p.I80T、GPR110:p.R443G、GPR98:p.Y6152F、HDGFL1:p.188_189insA、IGF2BP2:p.T186S、IL1R2:p.L364fs、KIAA1109:p.L4680P、KRAS:p.G13D、KRTAP19-1:p.G61S、MAF:p.G53fs、MAGEC1:p.L609H、MAP2K1:p.K57N、MED12:p.L36R、MED12:p.G44S、METAP2:p.Y137N、METTL9:p.Y57F、

MGP:p.V15L、MKI67:p.R2222K、MUC16:p.T11005I、MUC4:p.S3941N、MUC4:p.S3941G、MUC4:p.V3091L、MUC4:p.S2951Y、MUC4:p.A2841S、MUC4:p.S2760A、MUC4:p.T2335M、MUC4:p.T1627K、MUC4:p.T1547S、MUC4:p.H1133Q、MYD88:p.M240T、NEDD4L:p.P194del、NEFH:p.S704T、NRG4:p.G21fs、OR2A25:p.S105C、OR4C16:p.Y63F、OR4N4:p.L150fs、PABPC1:p.K254fs、PIWIL1:p.P372fs、PLCD3:p.E499fs、PLEKHB1:p.S146P、PPIL4:p.S382R、PRDM4:p.*802K、PRG4:p.N675H、PRKAB1:p.P104H、R3HDM2:p.S592G、R3HDM2:p.S588N、R3HDM2:p.R206W、RPS2:p.R200G、RPTN:p.G364S、SF3B1:p.K666E、SF3B1:p.N626Y、SF3B1:p.Y623C、SIX3:p.I27L、SLC39A7:p.L456fs、SLC6A9:p.R94K、TFG:p.A382V、TGOLN2:p.K83R、TGOLN2:p.T80S、TLR2:p.D327V、TNKS2:p.T619fs、TP53:p.R273H、TP53:p.C242F、TP53:p.R175H、TWISTNB:p.H306Q、UBXN7:p.A276V、WDR78:p.N110K、XIRP2:p.V3008E、ZNF382:p.H186Q、ZNF578:p.R306H、ZNF578:p.G311S、ZNF578:p.H334R、ZNF700:p.S649C、ZNF705A:p.D298N、ZNF836:p.K608Q及ZNF836:p.I571N。

45. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有BLCA；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：PIK3CA:p.E545K、FGFR3:p.S249C、TP53:p.R248Q、PIK3CA:p.E542K、RXRA:p.S427F、ZNF814:p.D404E、FBXW7:p.R505G、NOTCH2:p.P6fs、TP53:p.E285K、

ANKRD30A:p.A353P、C3orf70:p.S6L、EFCAB6:p.R379K、ERCC2:p.N238S、FAM47C:p.Q225E、FOXQ1:p.S135L、HLA-A:p.Q78R、MUC4:p.H4205Q、OTUD4:p.T909I、SLAMF1:p.S277fs、SPRED3:p.S128del、TMCO2:p.S15fs、TP53:p.R280T、TP53:p.E271K、TP53:p.A159V、ZNF706:p.I8N、ZNF706:p.R3P、ACACB:p.E2318Q、ACPP:p.E321K、ACRC:p.A264V、ADAMTS2:p.23_24insL、AFF3:p.E919K、AHNAK:p.S4150F、AHNAK:p.D2889H、AHNAK:p.V1940A、ALX4:p.R126Q、ANKRD12:p.E627K、ANKRD32:p.T999N、ARID1A:p.S614L、ASXL2:p.117_118SS>S、ATP12A:p.R858C、ATP9A:p.R519Q、BCAS3:p.T214M、BPI:p.M255I、CACNG8:p.V146G、CAMSAP1:p.T466fs、CDC27:p.I91fs、CDKN1A:p.E44fs、CEP192:p.S2058L、CGB8:p.T18A、CHRNA3:p.L23del、CHST4:p.D352N、CLIP1:p.S1018fs、COX6A1:p.S8L、CREBBP:p.D1435H、CRIPAK:p.M48fs、CSPG5:p.D119N、CUL1:p.E485K、DLC1:p.S741T、DLL3:p.D318H、DOPEY2:p.E1196K、ECM1:p.E266K、EEF1A2:p.Y418S、EEF2K:p.E673K、EMILIN1:p.R27G、ERBB2:p.S310F、ERBB3:p.M91I、ERBB3:p.V104L、ERBB3:p.D297Y、ERCC2:p.Y14C、FAM155A:p.Q86del、FAM43B:p.E272del、FASTKD3:p.Q625E、FBXW7:p.S546L、FGFR3:p.R248C、FGFR3:p.G380R、FGFRL1:p.H479fs、GBE1:p.M587I、GIMAP1-GIMAP5:p.S311C、GNA13:p.R200G、H1FOO:p.A214fs、HEATR7B2:p.E1109K、HIST1H1D:p.I81M、HRAS:p.G12D、HRCT1:p.H92P、ILF3:p.E484K、KCNK2:p.S6W、

KIAA0907:p.Q446P、KIF23:p.E350K、KLF5:p.S118L、KLHL15:p.D185G、LAMA4:p.E639K、LILRA1:p.H410Y、LILRB1:p.L479del、LLGL2:p.P955fs、LPIN1:p.S974L、LRRC16A:p.D227N、LRTM2:p.S139L、LURAP1L:p.55_56insGGG、MAGEC1:p.P553del、MCL1:p.E171del、MN1:p.S472L、MUC7:p.A191V、MVP:p.E412K、NBPF10:p.E3455K、NFE2L2:p.E79K、NFE2L2:p.R34G、NOS1AP:p.Q306del、OR2T35:p.V319fs、OR4N2:p.L150fs、PABPC3:p.K333fs、PAX3:p.S197L、PBX2:p.E70K、PBXIP1:p.H729del、PCDP1:p.E537K、PEX1:p.I370fs、PHLDA3:p.E82K、PLEKHM2:p.S459L、PLVAP:p.A321V、POLR3B:p.L372F、POTEC:p.R477Q、PPL:p.H326Y、PPP1R15A:p.E196K、PRDM16:p.E271Q、PRIC285:p.E1289Q、PRMT8:p.S31P、PUF60:p.S396L、RAB11FIP4:p.S596L、RAD51C:p.D167N、RAD51C:p.Y224H、RALGPS1:p.R381Q、RARS2:p.R6C、RBM26:p.P644A、RERE:p.K176N、RXRA:p.S427Y、SERPINA12:p.R211G、SF3B1:p.E902K、SLC6A9:p.R243W、SLC9A5:p.L447F、SPESP1:p.F121L、SRPRB:p.G14S、SYN2:p.A34del、SYTL2:p.I440M、TAB3:p.R211T、TAF1B:p.R292C、TAOK2:p.L981del、TAS1R3:p.E525K、TAS2R9:p.E163Q、TBC1D1:p.S71F、TBC1D2B:p.R920Q、TFPI2:p.R222C、TM6SF1:p.S15W、TMEM131:p.K640fs、TMEM19:p.G331fs、TP53:p.R273C、TP53:p.R248W、TP53:p.R175H、TP53:p.K132N、TRAM1:p.E41Q、TSKS:p.E513K、TTN:p.C20935G、UBOX5:p.S417L、UGP2:p.D262H、VGF:p.E433K、

XAB2:p.E782K、XYLB:p.S87F、ZC3H4:p.E798K、ZNF208:p.K852E、ZNF208:p.I647S、ZNF626:p.G198E、ZNF749:p.Q457E、ZNF761:p.H373R、ZNF799:p.T43A、ZNF799:p.W41G、ZNF799:p.E589G、ZNF844:p.P503R、ZNF845:p.M423T、ZNF845:p.T479M、ZNF860:p.H464R、ZNF878:p.S181R、ZNF91:p.R333H及ZNF91:p.H305R。

46. 如段落30至43中任一段落之醫藥組合物，其中：

(a) 個體之群體患有BRCA；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之框移突變之任一組合：GATA3:p.L328fs、GATA3:p.N334fs、GATA3:p.L344fs、GATA3:p.H400fs、GATA3:p.S408fs、GATA3:p.S430fs、GATA3:p.H434fs、GATA3:p.H435fs及GATA3:p.S408fs。

47. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有BRCA；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：PIK3CA:p.H1047R、PIK3CA:p.E545K、PIK3CA:p.E542K、AKT1:p.E17K、TP53:p.R175H、PIK3CA:p.N345K、PIK3CA:p.H1047L、SF3B1:p.K700E、GATA3:p.S408fs、PIK3CA:p.E726K、TP53:p.Y220C、TP53:p.H193R、PIK3CA:p.Q546R、TP53:p.R273C、TP53:p.R248W、TP53:p.R273H、TP53:p.I195T、TP53:p.H179R、FGFR2:p.N549K、NUP93:p.E14K、PIK3CA:p.C420R、PIK3CA:p.E453K、PIK3CA:p.Q546K、TP53:p.V216M、TP53:p.C176F、CDH1:p.E243K、ERBB2:p.L755S、KRAS:p.G12V、PIK3CA:p.E545A、

TBL1XR1:p.I141fs、TP53:p.G266E、TP53:p.R248Q、TP53:p.Y163C、TP53:p.C141Y、TP53:p.G108fs、ACPP:p.R43W、AKT2:p.I289M、ARHGAP9:p.R137C、C9orf174:p.R136W、CDC42BPA:p.P675T、COL12A1:p.S395L、CRISPLD1:p.R222W、CT47B1:p.234_243EKLTEEATEE>E、CYP1A2:p.V483M、DAB2IP:p.E161K、DGKB:p.S13L、DMD:p.K1772N、DPEP1:p.V11L、ERBB2:p.S310F、ERBB2:p.D769Y、ERBB3:p.E928G、ESYT1:p.R816W、FAM179A:p.A831T、FAM58BP:p.A70T、FMN2:p.S751F、GALNTL6:p.K567del、GATA3:p.L328fs、GATA3:p.N334fs、GATA3:p.L344fs、GATA3:p.H400fs、GATA3:p.S408fs、GATA3:p.S430fs、GATA3:p.H434fs、GATA3:p.H435fs、GDAP1:p.T307A、GRB14:p.A300T、GUCY2C:p.G549C、IL17B:p.R34W、KCNB2:p.R231H、KIF1B:p.R1320W、KIF26B:p.V1113M、KLF4:p.K434Q、LY9:p.I69L、MAP2K4:p.S184L、MAP2K4:p.S251I、MAP2K4:p.T261fs、MAP3K1:p.L318fs、MAP3K1:p.I761fs、MAP3K1:p.V1346del、MAP3K1:p.L1384fs、MAPK13:p.E315K、MAPK4:p.V100M、MARCH5:p.R170C、MBP:p.E120K、MEFV:p.R377H、METTL15:p.Q53E、MS4A4A:p.V99M、MUC17:p.R4415H、MYH6:p.T847M、MYO5B:p.A405V、NARS2:p.P240R、NLGN4X:p.D382N、NLRC4:p.R288W、OR13G1:p.R258H、OR2AK2:p.V45I、OTOF:p.T388M、PACSIN2:p.Q331H、PALM2-AKAP2:p.A299T、PCDH19:p.R286C、PCDHGC5:p.D664N、PIK3CA:p.R88Q、PIK3CA:p.E110del、PIK3CA:p.K111del、PIK3CA:p.PVPHGLEDL447del、

PIK3CA:p.L455fs、PIK3CA:p.M1004I、PIK3CA:p.M1043I、PIK3CA:p.N1044Y、PIK3R1:p.KPDL567del、PREX2:p.R363Q、PRRX1:p.A196V、PTEN:p.V317fs、RGSL1:p.V222I、RUNX1:p.R142fs、RUNX1:p.D96fs、SCN2A:p.R36K、SLC25A32:p.Q83E、SLC25A45:p.G106C、STRA6:p.Q68R、STX6:p.H153D、TBX3:p.H187Y、TFPT:p.S252C、TINAG:p.R332W、TMEM71:p.R63Q、TP53:p.E286K、TP53:p.R282W、TP53:p.V272M、TP53:p.S241fs、TP53:p.C238fs、TP53:p.C238F、TP53:p.C238Y、TP53:p.Y234C、TP53:p.Y220S、TP53:p.R209fs、TP53:p.G199V、TP53:p.L194R、TP53:p.H193L、TP53:p.H193Y、TP53:p.V173L、TP53:p.V173M、TP53:p.K132N、TP53:p.R110fs、TUBD1:p.A200V、VLDLR:p.R231H、VWA3A:p.V955I、VWF:p.K1720N、XPO1:p.E571K及ZNF268:p.F901del。

48. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有COAD；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：KRAS:p.G12D、BRAF:p.V600E、KRAS:p.G12V、ACVR2A:p.K435fs、GRB14:p.KKK295del、SEC63:p.L532fs、TGFBR2:p.E125fs、ATR:p.K771fs、ICA1:p.N204fs、KRAS:p.G12C、TP53:p.R175H、ABCA8:p.R842Q、ACTL7B:p.R354H、ACVR2A:p.K435fs、AIM2:p.K340fs、ALG2:p.S302Y、ANKIB1:p.K144fs、ARSG:p.V131I、ATP10D:p.R311H、AXIN2:p.W663fs、C5orf30:p.D4N、CACNG3:p.V134I、CASP5:p.K78fs、CC2D2A:p.R1284C、CDH10:p.E349K、DNMT1:p.E432K、DOCK2:p.G170R、DOCK5:p.E177K、

EGR2:p.R390H、ERBB3:p.V104M、FAM135B:p.R884H、FBXW7:p.R505C、FBXW7:p.R465H、FHDC1:p.R254W、FOXL1:p.N89K、HCN4:p.R525H、HLA-DMA:p.E84K、HTR3B:p.R236C、ITGA4:p.T673M、KIF18A:p.R17C、KIF20B:p.E991K、KLHL5:p.R326C、KRAS:p.A146T、KRAS:p.G13D、LPHN3:p.R1183Q、MAP2K4:p.R287H、MAPK8IP1:p.L217fs、MFSD5:p.R280Q、MUC16:p.R8606H、MYO6:p.D1180N、NAA25:p.S807Y、NBPF14:p.V44L、NRAS:p.Q61K、NRAS:p.G13R、PAX3:p.T424M、PGAM1:p.R240H、PHF3:p.R1410I、PIK3CA:p.R88Q、PIK3CA:p.E545K、PIK3CA:p.H1047R、PLXNA3:p.V14fs、POSTN:p.R508C、PTPRU:p.D1434N、PYGO2:p.Q150fs、RBBP7:p.E274K、SFPQ:p.R611Q、SGSM1:p.F1117L、SLC25A40:p.R96Q、SLC8A1:p.R431H、SLITRK3:p.S298L、SPATA22:p.S150L、SUN3:p.E128K、TGFBR1:p.S241L、TP53:p.R273H、TP53:p.R273C、TP53:p.R248W、TRPV5:p.R492H、USP40:p.S851L、VPS13C:p.D1359Y、ZBTB24:p.L607I、ZNF434:p.R306C、ZNF443:p.R301I、ZNF484:p.R138C及ZNF770:p.S441P。

49. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有GBM；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：HSD17B7P2:p.N175S、IDH1:p.R132H、EGFR:p.A289V、EGFR:p.G598V、WASH3P:p.G175S、ZNF814:p.D404E、RPSA:p.Q111E、NBPF10:p.E3455K、TP53:p.R248Q、BRAF:p.V600E、EGFR:p.A289T、PRB2:p.N230del、

RGPD5:p.P1760A、TP53:p.R175H、CHEK2:p.K373E、EGFR:p.R108K、EGFR:p.R222C、PIK3CA:p.E545K、PIK3R1:p.G376R、POTEC:p.K507E、SDHAP2:p.V195E、SLC6A10P:p.K88N、TP53:p.R282W、TP53:p.R273H、CD3EAP:p.K219del、DST:p.R146C、EGFR:p.A289D、EGFR:p.H304Y、FRG1B:p.S71N、GOLGA8DP:p.A116E、KRTAP4-11:p.R121K、KRTAP4-11:p.S48R、MAP3K1:p.P324L、OGDH:p.I78fs、PODXL:p.S162fs、PSPH:p.V145I、SPINT1:p.A316V、TP53:p.R248W、TP53:p.G245S、TP53:p.Y220C、TP53:p.R158H、TSHZ2:p.A222T、UBC:p.L149R、ZDHHC4:p.R300H、ZNF844:p.R447P、AASS:p.T878fs、ABCC10:p.R570W、ADAM29:p.V205I、ADAMTS8:p.V524M、AGAP3:p.R766W、AICDA:p.Y144F、AK7:p.A159V、AK8:p.D243A、ANO2:p.R334C、AOX1:p.A507V、ARHGAP5:p.M691L、CALN1:p.V231I、CARM1:p.A202V、CD163L1:p.V721M、CD1D:p.L25fs、CD209:p.A283T、CDH18:p.A195T、CILP2:p.V553M、CIZ1:p.L89P、CLOCK:p.L123fs、COL6A5:p.T2224M、CSF2RB:p.G298S、CSMD3:p.E171K、CYP2D6:p.H352R、DCAF12L1:p.R335H、DCAF12L2:p.R246H、DPP10:p.V183I、DPY19L2P1:p.R378Q、DQX1:p.R505H、DRD5:p.S275R、DVL2:p.V66G、EFCAB6:p.R379K、EGFR:p.L62R、EGFR:p.R252C、EGFR:p.P596S、EGFR:p.P596L、EGFR:p.G598A、EGFR:p.E709K、EPHA1:p.A184T、ERC2:p.R20H、ESPNP:p.R627Q、FAM126B:p.R382H、FBN3:p.V886I、FGF14:p.T229M、FLG2:p.H1901fs、FLG:p.R2886H、FLNA:p.V1240M、

FOXG1:p.H57del、FPR2:p.R54Q、FRG1B:p.K13N、FRG1B:p.A53T、GABRA6:p.V314I、GJB3:p.R160H、GLT8D2:p.A178V、GRM3:p.R183C、HERC1:p.R2330H、HNF1B:p.T417M、HTRA3:p.Q403R、IDH1:p.R132G、IFNA10:p.L80F、IFNA10:p.V79A、JHDM1D:p.R313H、JPH1:p.A395T、KEL:p.V411M、KIAA0907:p.R516fs、KIAA1704:p.D88del、KLK6:p.R120H、KRAS:p.G12D、KRTAP4-7:p.L121V、KRTAP4-7:p.L148V、KRTAP5-4:p.S131C、LAT2:p.L18W、LIMK2:p.R203H、LUM:p.R330C、MCOLN3:p.V141I、MGAT4B:p.T444P、MUC17:p.V77M、MUC17:p.3204_3205insP、MYO1D:p.T109M、MYO6:p.Q914fs、NAP1L5:p.140_141EE>E、NF1:p.F1658fs、NHP2L1:p.R84C、NLRP5:p.R737W、NPTX1:p.A263T、NUFIP2:p.Q29del、ODF4:p.R61C、OR11H12:p.H154P、OR2A7:p.V18I、OR2H1:p.V287I、OR2T12:p.R184H、OR5D13:p.R236C、OR5P2:p.A100V、OR6N2:p.R293C、PASD1:p.A236del、PCDH11X:p.T486M、PCDHB13:p.P221L、PDGFRA:p.E229K、PDGFRB:p.S650L、PHC3:p.T35del、PIK3C2B:p.R287fs、PIK3CA:p.M1V、PIK3CA:p.R88Q、PIK3CA:p.M1043V、PIK3CA:p.H1047R、PIK3R1:p.K379N、PODNL1:p.A150V、POTEE:p.V166M、POTEG:p.R136H、PRKCD:p.G432fs、PROKR2:p.V297I、PTEN:p.C136Y、PTEN:p.S170N、PTEN:p.R173H、PTEN:p.T277I、PTEN:p.V317fs、PTPN14:p.E716del、R3HDM2:p.412_413QQ>Q、RAB11FIP5:p.R170H、RASAL3:p.R82H、RB1:p.N316fs、RDH8:p.A198V、REN:p.15_16LL>L、RIMBP2:p.R830H、

SCAF11:p.E926fs、SCN7A:p.R1358H、SCNN1G:p.R564H、SDHAP2:p.R31C、SDHAP3:p.A66T、SEMG2:p.R292C、SH3RF2:p.R318C、SHB:p.A460T、SIGLEC10:p.T250M、SLC13A5:p.Q273P、SLC17A9:p.V324I、SLC22A9:p.R407Q、SLC26A3:p.V88I、SLC5A3:p.A302fs、SLC9A4:p.R631H、SPAM1:p.R346Q、SPEN:p.E803fs、SPTA1:p.A2011V、SUSD5:p.T513M、SYNE1:p.R8468H、TARSL2:p.G366D、TAS2R41:p.A255T、TAT:p.R367H、TFPI2:p.R206C、THSD7B:p.R90C、TMEM147:p.A92V、TMEM156:p.R81C、TMPRSS6:p.V302I、TNFSF9:p.A232T、TP53:p.C238F、TP53:p.C238Y、TP53:p.Y234C、TP53:p.V216M、TP53:p.H179R、TP53:p.T155N、TRAPPC10:p.K133fs、TTN:p.R21402W、TTN:p.V16403M、TUBBP5:p.V102M、TYRP1:p.T352fs、UBC:p.R73L、UGT2B28:p.P289H、USH2A:p.R3719H、WASH6P:p.L211V、ZFP42:p.V227I、ZFP42:p.T264M、ZNF181:p.V305G、ZNF280B:p.E400K、ZNF534:p.N583K、ZNF563:p.W208fs、ZNF844:p.F487L及ZPBP:p.R154C。

50. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有HNSC；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：PIK3CA:p.E545K、PIK3CA:p.E542K、TP53:p.R175H、PIK3CA:p.H1047R、TP53:p.R282W、TP53:p.R248Q、TP53:p.R273H、TP53:p.R248W、TP53:p.G245S、RHOA:p.E40Q、EP300:p.D1399N、HRAS:p.G13V、MB21D2:p.Q311E、NFE2L2:p.E79Q、TP53:p.H179Y、

FBXW7:p.R505G、HIST1H2BF:p.E77K、HRAS:p.G12D、MAPK1:p.E322K、NFE2L2:p.D29H、TP53:p.P278S、TP53:p.C242F、TP53:p.Y220C、TP53:p.H193L、TP53:p.H179R、TP53:p.V157F、TP53:p.R110L、AKNAD1:p.K620R、ANXA6:p.R231Q、AP1G2:p.D243N、ATAD5:p.D441N、ATP6AP2:p.E119Q、B2M:p.M1I、BCL11A:p.E579K、C1orf172:p.Y30fs、C7orf57:p.E30K、CCDC135:p.E313K、CDH12:p.P706T、CDH7:p.Q225K、CDK11B:p.E79del、CDKN2A:p.H83Y、CHCHD4:p.T79M、CIRH1A:p.S250I、CLSTN2:p.P759L、CRB1:p.L628fs、DENND5B:p.G1023E、DNAH5:p.Q1797E、DSP:p.R160G、EDA:p.L58F、EFCAB6:p.E1002K、ELF4:p.S415L、EP300:p.C1164Y、EPHA3:p.T802R、EPHA6:p.D952H、ERBB2:p.M916I、ESRRA:p.D219N、FAM101A:p.I89del、FBXO24:p.M553V、FCAR:p.V233M、GPANK1:p.Y351fs、GPR20:p.V300I、GPRASP1:p.S706L、GPRIN3:p.R633fs、GRID2:p.T649fs、GRM3:p.F682L、GUCY2F:p.S404L、HCRTR2:p.D100Y、HIST1H3C:p.K37M、HIST1H4C:p.R68P、HLX:p.S12T、HOXD10:p.Y151C、HPS3:p.K812N、HRAS:p.G12A、HRAS:p.G12S、IFT140:p.E664K、INPPL1:p.T493M、ITGA10:p.R669Q、ITGB1:p.D158N、KIAA1429:p.D1526N、KIAA1429:p.S138F、KPRP:p.E553fs、KSR2:p.T555M、LINGO2:p.P410T、LPCAT1:p.V187del、MAGEB3:p.V75A、MAP3K7:p.E524Q、MAP4K3:p.P657fs、MAP9:p.K485N、MARS2:p.R481Q、MBOAT7:p.R424W、MUC16:p.R12774H、MUC5B:p.T4388M、MYH11:p.E993K、MYOCD:p.T493M、

MYOM1:p.R63Q、NANOS3:p.S183L、NCOR1:p.R1561Q、NCOR1:p.Q169E、NCR1:p.D213N、NFE2L2:p.E79K、ODZ1:p.R366M、OPN1MW:p.A285T、OR2M2:p.A95fs、OR2M3:p.M273I、OR2T33:p.R120S、OR6V1:p.I248fs、PABPC5:p.P58L、PACSIN1:p.E359K、PIK3CA:p.M1043V、PIK3CA:p.H1047L、PIWIL1:p.V699M、PLIN5:p.430_431insNG、PLXNA3:p.P58S、PRB1:p.R274fs、PRSS1:p.D107N、RAC1:p.A159V、RGS7:p.L21fs、RPA1:p.R31H、RPL18:p.R178fs、SFI1:p.R821Q、SLC35D3:p.*417S、SLC5A7:p.G336C、SMARCA4:p.P913L、STAT3:p.D661V、SYCP2:p.K474N、SYT6:p.R249H、TBX21:p.E494K、THSD7A:p.R1046C、THSD7A:p.C728F、TMC3:p.R934S、TMTC2:p.T409R、TP53:p.E285K、TP53:p.C275F、TP53:p.R273C、TP53:p.G266E、TP53:p.G262V、TP53:p.R249S、TP53:p.G245V、TP53:p.C238F、TP53:p.M237I、TP53:p.Y236C、TP53:p.Y236D、TP53:p.R196P、TP53:p.PHHERC177del、TP53:p.V173L、TP53:p.V173M、TP53:p.Y163C、TP53:p.P151T、TP53:p.V143M、TP53:p.P58fs、URI1:p.S13fs、ZNF177:p.K384N、ZNF750:p.S96fs及ZZZ3:p.R5Q。

51. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有KIRC；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：WASH3P:p.G175S、VHL:p.L89H、VHL:p.S111N、WDR52:p.V1227G、KRT1:p.552_559YGSGGSSY>Y、KRTAP1-1:p.S34C、PALM2-AKAP2:p.1075_1076insEA、ZNF814:p.D404E、DOPEY2:p.Y2048S、KAT2B:p.W111fs、PABPC1:p.E156fs、

PCDHGC5:p.G599V、PIK3CA:p.E545K、RRAD:p.A278E、SIRPA:p.D131del、UQCRFS1:p.I83V、VHL:p.P45L、VHL:p.V74D、VHL:p.R82P、VHL:p.L116fs、VHL:p.L158V、VHL:p.L169P、WDR73:p.DGTRSQ315del、ABCA3:p.E95D、ABCC5:p.L1090fs、ACADS:p.R330H、ACAN:p.G952E、ACSM2A:p.L402fs、ADAM23:p.K380M、ADH1A:p.D154V、AFF3:p.SA620del、AGAP6:p.D69fs、AGAP7:p.E71fs、AHNAK:p.5_6insE、AIDA:p.K247M、ALAS1:p.G302R、ANAPC16:p.R95fs、ANK2:p.N453S、ANKRD36:p.K378R、ARHGEF5:p.E487G、ARSD:p.AGV234del、ARSD:p.A234G、ATP2A1:p.G704C、ATP7A:p.Q990fs、AVIL:p.G299fs、AXDND1:p.EQ991del、BAP1:p.N78S、BAP1:p.M1I、BLM:p.H660Q、BMPER:p.RIAL444del、BRK1:p.K70Q、BTRC:p.I416M、C16orf55:p.D118A、C19orf33:p.K102E、C20orf132:p.E382D、C2orf71:p.1225_1226insS、C6orf132:p.173_182PPPLLLEPPP>P、CASP5:p.R23fs、CATSPER4:p.T425M、CCDC120:p.I8V、CCR5:p.S185I、CCZ1:p.E214D、CD7:p.P174fs、CDAN1:p.L646fs、CDH23:p.F1132Y、CDK5RAP2:p.H1592Q、CENPB:p.E410V、CERCAM:p.A85fs、CHEK2:p.K373E、CHIT1:p.P284fs、CLCN2:p.645_645R>RR、CLUL1:p.G463R、CNTNAP4:p.Y436S、CUL9:p.D1726E、CWC25:p.K364E、CXorf51B:p.V43I、DDX39B:p.F149fs、DIRAS1:p.G79C、DISP2:p.F1021S、DNMBP:p.T78P、DOCK8:p.A177fs、DPCR1:p.H383N、DPCR1:p.L768del、EGFR:p.L838M、ENPEP:p.F289C、ESPNP:p.W122fs、FAM105A:p.H126N、

FAM186A:p.IPPQAQELEIPL1556del、FAM194B:p.EEEEYL135del、FAM22F:p.S691del、FAM22F:p.P690fs、FAM47A:p.LRPEPPETGVSH235del、FAM47C:p.P388S、FAM78A:p.W192L、FBXO34:p.Q294fs、FGFR3:p.R571fs、FGFR3:p.P716H、FMN2:p.AIPPPPPLPGA956del、FOXD4L4:p.C405fs、FUT6:p.S140fs、GJA1:p.A311fs、GOLGA5:p.L492I、GPM6A:p.A50V、GPRIN1:p.231_239RKEDPGSLR>R、GRAMD1B:p.P356H、GREB1:p.S344Y、GRM6:p.A718fs、GUSB:p.L501V、GUSB:p.C500R、HBB:p.F86C、HDAC6:p.G977D、HEXDC:p.T482P、HNF1B:p.N302K、HNRPLL:p.M327V、HRC:p.P439fs、HSFX2:p.D92E、IL1RAP:p.F50C、IVL:p.EQQEGQLKHP167del、KANK4:p.S253P、KCNJ18:p.E378K、KIAA1751:p.K97N、KRT1:p.SSYGSGG557del、KRT2:p.L299W、KRT4:p.F154fs、KRTAP10-6:p.49_49P>PSCCAP、KRTAP5-7:p.C120Y、KRTAP9-2:p.CCQP140del、LARS:p.P185fs、LCP1:p.P445fs、LOC338651:p.PHRSHSPPWS102del、LRCH2:p.D717G、LTA4H:p.F107L、LYST:p.Q710H、MAFA:p.207_208HH>H、MAGEC1:p.P239del、MAP2K5:p.Q445R、MAPKAPK2:p.T214fs、MARCKS:p.K152fs、MED12L:p.P2071S、MEGF6:p.A582fs、MGST3:p.G143fs、MLXIPL:p.S790R、MOCOS:p.S849P、MST1R:p.M464V、MTOR:p.C1483F、MTOR:p.L1460P、MUC16:p.P11260A、MUC17:p.R1227fs、MUC17:p.H1228fs、MUC2:p.1480_1481insI、MUC6:p.P1569fs、MYO3A:p.N525S、NBPF3:p.D491V、NCOR1P1:p.L52P、NDUFA4L2:p.G3fs、

NEFH:p.651_651K>KAKSPEK、NES:p.V611L、NFAT5:p.Q906E、NOXO1:p.G3fs、NR2C1:p.S270I、NSMCE2:p.Q31fs、NUDT21:p.W13fs、ODZ2:p.W628fs、ONECUT1:p.L424M、OR10A3:p.F73V、OR4F4:p.E15G、OR4N2:p.L150fs、OR51B5:p.A66fs、OR7C1:p.F104fs、PABPC1:p.Y408F、PABPC1:p.K333fs、PABPC1:p.A181T、PABPC3:p.P191T、PALLD:p.A996T、PALM2-AKAP2:p.G1118fs、PARD6A:p.G84fs、PASK:p.T62I、PCDH15:p.C1713F、PCNT:p.G136S、PGM5:p.G426fs、PGPEP1L:p.R164fs、PIK3C2B:p.F1473L、PIK3CA:p.N1044K、PIK3R5:p.L371R、PITRM1:p.P816T、PLIN4:p.T347I、PODXL:p.28_30PSP>P、POLR1C:p.K332Q、POTED:p.I214V、PPM1E:p.R311W、PRKCE:p.Q157fs、PROX1:p.V225D、PRRC2C:p.P1883T、PRX:p.P549L、PSD3:p.T563P、PTCH1:p.P689H、RANBP3:p.L386W、RASGEF1C:p.A188T、RGPD6:p.F946L、RHEB:p.Y35N、RIMBP3:p.A396del、RIN3:p.L449V、RLIM:p.S501L、RNF17:p.S351C、RUNX2:p.P466H、SCAF1:p.P208fs、SDK1:p.K508fs、SECISBP2:p.D608E、SERPINB3:p.S209C、SESTD1:p.I306M、SFRP4:p.P325fs、SH3KBP1:p.P563fs、SIPA1L3:p.G777A、SLC13A2:p.L493fs、SLC16A9:p.CVLLGG470del、SLC25A5:p.A118T、SLC44A5:p.V70F、SLC4A8:p.N229K、SLC52A1:p.G370del、SLC52A2:p.G399fs、SLC6A10P:p.K88N、SLC6A14:p.A85fs、SLC9B1:p.V446fs、SON:p.VLESSAVT1359del、SP8:p.G165del、SPAG1:p.353_354insD、SPATA9:p.C189F、SPEG:p.A992fs、SPTB:p.T1864I、

SRA1:p.V110L、STAT6:p.P354fs、STK11IP:p.A155E、STXBP3:p.E279G、SVIL:p.M93T、SYNE1:p.R8468S、SYNJ2:p.K832T、SYNPO:p.G619fs、TAOK2:p.Q899fs、TAS2R38:p.I311T、TBC1D12:p.F608Y、TBC1D1:p.H277R、TBC1D3:p.A556fs、TBC1D3C:p.A495fs、TBC1D3F:p.A556fs、TCF7:p.H140P、TDRD10:p.W276C、THRAP3:p.K551R、TMEM102:p.A110P、TMEM161B:p.L142P、TMEM230:p.D140G、TMEM47:p.G87S、TRDN:p.*730Y、TTBK1:p.T1065S、UBE2O:p.R1118fs、UBR5:p.T1306fs、UPK3A:p.G272fs、VHL:p.G39S、VHL:p.S65L、VHL:p.N78D、VHL:p.R79P、VHL:p.W88L、VHL:p.L89P、VHL:p.R107P、VHL:p.S111R、VHL:p.H115N、VHL:p.D121Y、VHL:p.G123fs、VHL:p.D126fs、VHL:p.L128H、VHL:p.L135F、VHL:p.I151T、VHL:p.L153P、VHL:p.L158P、VHL:p.Q164fs、VHL:p.L184P、VHL:p.L188P、WASH6P:p.315_316insAPP、WASH6P:p.T201M、WWP2:p.G458A、ZCCHC6:p.K937N、ZFAND2B:p.I149T、ZFR2:p.Y107N、ZNF273:p.N319K、ZNF462:p.S650T、ZNF516:p.A256D、ZNF519:p.H431Y、ZNF687:p.F858C、ZNF732:p.E227Q、ZNF880:p.Q406R、ZP3:p.V362fs及ZRANB1:p.*735fs。

52. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有LAML；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：NPM1:p.W288fs、DNMT3A:p.R882H、NPM1:p.L287fs、IDH2:p.R140Q、IDH1:p.R132C、FLT3:p.D835Y、DNMT3A:p.R882C、FLT3:p.600_601insFREYEYD、IDH1:p.R132H、

NRAS:p.G13D、U2AF1:p.S34F、KIT:p.D816V、FLT3:p.D835E、IDH2:p.R172K、NRAS:p.G12D、WT1:p.S381fs、ABTB1:p.L249fs、DNMT3A:p.R736H、FLT3:p.D835H、KRAS:p.G12D、NPM1:p.L287fs、NRAS:p.Q61H、NRAS:p.Q61K、PHACTR1:p.V251fs、RBBP4:p.E330K、RUNX1:p.R135G及U2AF1:p.S34Y。

53. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有LUAD；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：KRAS:p.G12C、KRAS:p.G12V、EGFR:p.L858R、U2AF1:p.S34F、KRAS:p.G12A、TP53:p.R158L、KRAS:p.G12D、PIK3CA:p.E545K、TP53:p.R273L、EGFR:p.ELREA746del、KRAS:p.G13D、A2ML1:p.S654fs、BRAF:p.G469V、CTNNB1:p.S37F、EGFR:p.G719A、KRAS:p.G13C、MYOF:p.G165fs、EGFR:p.S768I、FAM47C:p.G948W、KRAS:p.Q61L、MYH10:p.L1091fs、NRAS:p.Q61L、OR4C3:p.H130fs、PI15:p.V22F、RAD50:p.D69Y、RIT1:p.M90I、TP53:p.C275F、TP53:p.R249M、TP53:p.R249G、TP53:p.R248P、TP53:p.R175H、TP53:p.Y163C、TP53:p.A159P、TP53:p.V157F、TP53:p.G154V、ABCB1:p.R467L、ACBD3:p.R224L、ACTA1:p.G275C、ACTN2:p.D893Y、ADAM30:p.Q741H、ADAMTS14:p.G238C、ADAMTS20:p.R1251S、ADAMTS20:p.R541L、ADAMTS5:p.L549M、ADAMTS9:p.G659W、ADCY2:p.P1016T、ADCY5:p.G623C、AFP:p.A182G、AHDC1:p.P155Q、AKAP1:p.LDRNEEG317del、ALKBH1:p.K137E、

ANK2:p.Q3076L、ANKRD44:p.G339C、ANO3:p.A41S、AP1G1:p.R723L、APBB2:p.T243fs、APOB:p.L973M、APOBR:p.R840L、AQP10:p.Q261L、ARAP3:p.R1226L、ARFIP2:p.R86L、ARHGAP36:p.P16H、ARL13B:p.R358L、ASCC2:p.R365L、ASPM:p.S240F、ASXL3:p.P1470Q、ATRN:p.P197Q、AVIL:p.G64W、AXDND1:p.W101R、B3GAT1:p.R125L、BARX2:p.R68P、BCL9L:p.G980C、BCOR:p.N1459S、BEND2:p.P536Q、BMS1:p.G455V、BRAF:p.V600E、BRAF:p.G466V、BRD9:p.G330W、BRF1:p.V469L、BRWD3:p.H160N、BTRC:p.G260W、C11orf68:p.V135L、C15orf2:p.V753F、C15orf2:p.G906W、C18orf8:p.M61I、C1GALT1:p.G299V、C1orf173:p.G1454S、C1orf173:p.S688Y、C1orf87:p.R541L、C2orf53:p.P272H、C3orf20:p.R740L、C7:p.R687S、C7orf58:p.G140W、C7orf58:p.R238L、CACNA1A:p.S772Y、CACNA1D:p.R1073L、CACNA1E:p.R2089Q、CACNA2D1:p.A352E、CACNG3:p.R232W、CADPS:p.R959S、CALB2:p.R258C、CAMK2B:p.G131V、CARD11:p.I1065M、CCDC111:p.R417L、CCDC141:p.E1204V、CCDC19:p.R279L、CCDC19:p.R207L、CCKAR:p.L271M、CD1B:p.W41L、CDH10:p.S577R、CDH10:p.R472C、CDH10:p.R128S、CDH18:p.A721S、CDH20:p.P433H、CDH6:p.Q237K、CDK13:p.R880S、CDK4:p.R24L、CELF4:p.A309P、CFDP1:p.P129fs、CHN1:p.K264N、CHRNA4:p.S396R、CHRNA9:p.P361Q、CLCNKA:p.P124Q、CLEC12B:p.W217L、CLK4:p.R68L、CNTFR:p.D252Y、CNTN6:p.R807M、

CNTNAP2:p.F395L、COL19A1:p.P538Q、COL5A2:p.G612W、COL5A2:p.G516W、COL9A1:p.P211Q、CPE:p.P290Q、CPNE8:p.Q127H、CPSF4:p.P219Q、CRIPAK:p.S180fs、CROT:p.Q580H、CRTC3:p.S363L、CSMD2:p.P1855Q、CSMD3:p.T2810N、CSMD3:p.P2727T、CSMD3:p.Q174H、CUBN:p.G596C、CUL4B:p.R91S、CUL7:p.L371F、CXCL9:p.K122N、CXCR4:p.E345Q、CXorf59:p.R198M、CYP11B1:p.R498G、CYP27A1:p.P112Q、CYP2B6:p.A444E、DACH2:p.R539L、DCC:p.R446H、DDX56:p.R329L、DEFA1:p.W90C、DENND2A:p.R688Q、DENND2A:p.R499L、DMBT1:p.R1521L、DNAH5:p.R3822L、DNAH9:p.S2993R、DNAI2:p.V231L、DPP6:p.L757F、DSG4:p.R128L、DST:p.A4410S、DZIP3:p.M322L、EBF3:p.R231S、EFCAB4B:p.E265Q、EHHADH:p.Q704H、ELAVL2:p.L263F、EMR1:p.R493H、ENAH:p.R514L、ENPP1:p.G738E、EPB41L3:p.A896S、EPG5:p.R2289L、EPHA1:p.G111V、EPHB6:p.R337H、EPRS:p.V1151L、ERBB2:p.S310Y、ERBB2:p.774_775insAYVM、ERBB2:p.776_776G>VC、ERN2:p.T295K、FAM120B:p.P467H、FAM127C:p.F52L、FAM135B:p.W240C、FAM210B:p.L112F、FAM47A:p.R690L、FAM47B:p.W163C、FAM47B:p.L567F、FAM5C:p.R457G、FAM70B:p.P277T、FAM71B:p.L583M、FAM75A6:p.R304S、FAM75A6:p.P54L、FAM75D1:p.R1265S、FARP1:p.R299L、FAT1:p.R4359L、FAT3:p.R1266H、FAT3:p.G1899V、FAT3:p.H3574N、FBXO18:p.M144I、FBXO31:p.G443fs、FCGBP:p.A1022S、FCRL2:p.V505L、

FERD3L:p.P92H、FGB:p.E339Q、FGFR2:p.E116K、FGFRL1:p.R243L、FGFRL1:p.V274L、FKBPL:p.R320L、FLG2:p.G1545V、FLG2:p.L572F、FLG:p.P3254H、FLG:p.P2466Q、FMN2:p.P992T、FOLH1:p.A643S、FOXRED1:p.R136L、FRAS1:p.C382F、FRG2B:p.D142Y、FRMPD1:p.E1093Q、FSHB:p.T43N、GABRA5:p.Q224K、GADL1:p.L352I、GAL3ST3:p.A271S、GALNT14:p.D234E、GAS8:p.R313S、GATA3:p.M443I、GCDH:p.R82C、GEM:p.R268L、GFRAL:p.Q308K、GIT2:p.R123L、GJB4:p.R22S、GLB1L2:p.I407M、GLOD4:p.Q223fs、GNAO1:p.P283Q、GPNMB:p.I174M、GPR137B:p.G240C、GPR158:p.P762T、GPR98:p.G4307W、GRB7:p.R239L、GRHL1:p.G608W、GRID1:p.R683L、GRIK1:p.R368Q、GRM5:p.P895fs、GTF2E1:p.R192L、H3F3C:p.R131L、HAO2:p.H12N、HCN1:p.P231Q、HECW1:p.A183S、HGF:p.M686T、HIP1:p.R940L、HIST1H1E:p.R25P、HLA-DMA:p.A236fs、HOXA5:p.G11C、HS3ST3A1:p.G399W、HSD17B6:p.F209L、HSPA13:p.V85L、HSPBAP1:p.R282L、HTR5A:p.W298C、IGHMBP2:p.R615S、IL2:p.R103M、IL2RA:p.G61W、IL32:p.P215T、ING1:p.A220S、INMT:p.G56V、ITGA8:p.G616C、ITGAD:p.L528fs、ITGAX:p.R283H、ITIH1:p.G254W、ITIH2:p.L842V、ITK:p.R29L、ITPR2:p.P358Q、JMJD1C:p.R1198S、KCNA1:p.G376C、KCNH8:p.M455I、KCNJ3:p.L430F、KCNK18:p.G23V、KCNK2:p.R166L、KEAP1:p.G603W、KEAP1:p.R260L、KEAP1:p.S144F、KHDRBS2:p.S203L、KIAA1211:p.P1203Q、

KIAA1549:p.L1272F、KIAA1755:p.Q108H、KIF15:p.E252Q、KIF9:p.G480R、KIRREL:p.G604C、KLF5:p.E419Q、KRAS:p.Q61H、KRTAP10-12:p.R64P、KRTAP27-1:p.M124I、KRTAP4-5:p.C91F、KRTAP5-1:p.S193Y、L1CAM:p.R632S、L3MBTL4:p.W162L、LAMA1:p.D1030Y、LAMB1:p.T1610fs、LAMB4:p.G1239W、LAMB4:p.G588W、LEF1:p.I53V、LEKR1:p.Q450K、LIM2:p.S150T、LIPJ:p.P236Q、LPHN3:p.E740D、LPPR4:p.R527S、LRFN5:p.N132K、LRP1B:p.G3563C、LRP2:p.M4039I、LRRC4C:p.Q10L、LRRIQ1:p.W792L、LRRTM4:p.S243Y、MAGEA10:p.R7H、MAGEC2:p.W109C、MAGI1:p.G1156V、MAGI2:p.P1044T、MAK:p.P373Q、MAP2K1:p.K57N、MARCH11:p.R193L、MEPE:p.G142C、MKI67:p.R1081S、MKRN3:p.P448H、MLL3:p.N393K、MLL3:p.Q356K、MMRN1:p.A1013S、MOGAT2:p.Q66fs、MXRA5:p.D324Y、MYH4:p.T790M、MYH8:p.R1117C、MYH8:p.H1006N、MYO5B:p.R708L、MYO7B:p.P2040H、MYO9B:p.R94L、MYT1L:p.P351Q、NAA11:p.T184K、NAB1:p.L72F、NAV1:p.R938L、NBPF15:p.G665E、NCAM2:p.G698C、NCAPD2:p.R220L、NDST3:p.V427I、NEK2:p.R239S、NFIA:p.L294F、NLRP3:p.R157C、NOTCH2:p.R2105L、NR4A2:p.R314L、NRG1:p.V481L、NRXN1:p.R813S、NRXN1:p.A660S、NRXN3:p.P23H、NRXN3:p.R103C、NTM:p.G333C、NUAK1:p.G173C、NYAP2:p.P437L、ODZ3:p.P218Q、OIT3:p.R508S、OOEP:p.R101C、OPN1LW:p.P283H、OR10H4:p.M199I、OR10J1:p.L157Q、

OR10X1:p.L298I、OR10Z1:p.L205F、OR14A16:p.G160C、OR2A25:p.M80I、OR2AG2:p.G249W、OR2AK2:p.W37C、OR2H2:p.L205F、OR2J2:p.G234W、OR2L13:p.M106I、OR2L13:p.T242A、OR2L3:p.M1I、OR2L3:p.L67I、OR2L8:p.R121C、OR2L8:p.R171S、OR2M2:p.F177L、OR2M2:p.F323L、OR2M5:p.V205L、OR2T12:p.M258L、OR2T27:p.D11Y、OR2T33:p.P165Q、OR2T34:p.C246F、OR2T6:p.V213L、OR4C12:p.D309Y、OR4C12:p.M279I、OR4C16:p.L162M、OR4M2:p.A119S、OR4M2:p.A161S、OR51V1:p.P298T、OR5AS1:p.M39I、OR5B12:p.S289C、OR5B17:p.M266I、OR5D14:p.H246N、OR5D16:p.P264T、OR5D18:p.R123H、OR5F1:p.G44V、OR5J2:p.A36S、OR5L1:p.T275N、OR6C65:p.I154fs、OR6C75:p.G94W、OR6K2:p.P79Q、OR8D2:p.R306M、OR9A2:p.R289W、OR9G9:p.R169L、P2RX7:p.P142Q、P2RY10:p.T10K、P2RY10:p.V196L、PABPC5:p.R99S、PAPPA2:p.P917T、PAPPA2:p.P1706H、PBLD:p.P55Q、PCDH10:p.R587S、PCDH10:p.V986L、PCDH11X:p.R1010I、PCDHAC2:p.A742V、PCDHB5:p.P649S、PCDHGC5:p.K12N、PCDHGC5:p.P684H、PCLO:p.P3946T、PCMTD1:p.R271M、PDPR:p.G793W、PDYN:p.G191W、PDZD2:p.R565S、PDZD8:p.S980G、PFKM:p.R118S、PIGM:p.R225L、PIK3CA:p.E542K、PIK3CG:p.V165I、PILRA:p.S291fs、PLCE1:p.G564C、PLCL1:p.M564I、PLEKHA6:p.R110L、PNKP:p.G174W、POGZ:p.G75W、POLE:p.R573L、POM121L12:p.P231T、POM121L12:p.P242H、

POTEE:p.V288M、POTEM:p.S78R、POU3F3:p.D321Y、PPT2:p.R265L、PRDM16:p.P1036L、PRELP:p.D201Y、PRPF40B:p.R160S、PRPF6:p.R763L、PTEN:p.R234L、PTPN11:p.G503V、PTPN13:p.E2067K、PTPRJ:p.G334W、PTPRT:p.R928L、PTPRU:p.P559S、PXDNL:p.P1456T、QSOX1:p.R401L、QSOX2:p.R683L、RAB13:p.R167L、RAB8A:p.G20W、RAPGEFL1:p.R356L、RBM19:p.G390W、RCL1:p.P112Q、REG1B:p.W57L、REG3A:p.S150L、REG4:p.G110V、RIMS2:p.R55L、RIT2:p.R85L、RLN2:p.S138C、RNF20:p.P529Q、RORB:p.G94W、RPL10L:p.K187T、RPRD2:p.R97S、RTN1:p.S103W、RUNX2:p.R337M、RYR2:p.K2413N、RYR2:p.M4334I、RYR3:p.P1670T、S100PBP:p.R5L、S1PR1:p.L104F、SAGE1:p.H298Q、SALL1:p.E965K、SALL1:p.R898W、SALL4:p.R187L、SBSPON:p.G133W、SCAF8:p.G740C、SCG2:p.P252Q、SCML4:p.L261F、SCN2A:p.T155K、SEC24D:p.A50fs、SEC61A2:p.G126V、SERPINA12:p.D253Y、SERPINA9:p.M414I、SERPINC1:p.R45L、SGIP1:p.R502L、SH3GL3:p.R174L、SH3PXD2A:p.S759L、SI:p.V1217F、SKOR1:p.Y883C、SLC1A2:p.F348fs、SLC24A5:p.R35S、SLC25A48:p.R101S、SLC35E2:p.R201L、SLC39A12:p.C628S、SLC39A6:p.R53L、SLC4A5:p.I533V、SLC5A1:p.G53W、SLC5A7:p.G442V、SLC6A11:p.W299L、SLC6A2:p.S354C、SLC8A1:p.G433C、SLIT1:p.R1460L、SLITRK5:p.R68L、SLITRK5:p.R468M、SLITRK6:p.N741K、SORL1:p.R205L、SOS1:p.N233Y、

SOX9:p.E75K、SPAG16:p.V439L、SPIN4:p.Y171C、SPRR2D:p.P30fs、SPTA1:p.G2367C、SPTA1:p.D2243Y、SSX3:p.P127T、ST18:p.H778Q、STAC3:p.G117W、STOML3:p.D86Y、STX2:p.R107L、SUMF2:p.G110E、SUN3:p.P339Q、SV2C:p.P60Q、SYNDIG1:p.D135Y、SYNE1:p.K8632E、TARS2:p.E199K、TAS2R16:p.Q177H、TCOF1:p.K264R、TCTE1:p.S127I、TDO2:p.Q197H、THSD7A:p.G810W、THSD7A:p.R801L、TIFAB:p.D43E、TIGD4:p.S312F、TLL1:p.P53Q、TMPRSS11E:p.G259C、TMTC1:p.A864D、TMTC1:p.G212V、TMX3:p.R151C、TNNI1:p.R67L、TNR:p.L692I、TOP2A:p.R736L、TP53:p.R337L、TP53:p.E285K、TP53:p.R283P、TP53:p.D281N、TP53:p.C277F、TP53:p.V274F、TP53:p.R273H、TP53:p.I255F、TP53:p.R249S、TP53:p.M237I、TP53:p.S215I、TP53:p.C176F、TP53:p.R110L、TP53:p.G105C、TP53:p.P72fs、TPO:p.E558K、TRAF6:p.R502S、TRIM42:p.Q127K、TRIM48:p.A93D、TRIM4:p.R398L、TRIM51:p.W131C、TRIM9:p.R337S、TRIML1:p.H399Q、TRPM3:p.G298W、TSC1:p.G378C、TSG101:p.R276S、TSHZ1:p.K501N、TSHZ3:p.G677V、TTF2:p.R761S、TUBA3C:p.Q176fs、UBAC1:p.K330N、UBE2J2:p.G193W、UBR1:p.G1647W、UGT2B7:p.M214I、VMP1:p.E369Q、VPS13B:p.G2575W、VSTM2A:p.G75V、VWA3B:p.R557L、WBP11:p.P227fs、WDR52:p.G612C、WDR59:p.R837S、WDR75:p.P287Q、WDR88:p.G100W、ZCCHC5:p.G335W、ZFHX4:p.L811F、ZFHX4:p.T1663N、ZFHX4:p.H2511Q、

ZFP14:p.Q17L、ZIC1:p.A112E、ZNF154:p.T408N、ZNF223:p.G23W、ZNF295:p.S732C、ZNF322:p.K106N、ZNF385D:p.T226S、ZNF454:p.S190I、ZNF492:p.P392H、ZNF521:p.G640C、ZNF521:p.P270H、ZNF536:p.G186C、ZNF536:p.G663W、ZNF644:p.G21W、ZNF716:p.H263L、ZNF71:p.V411L、ZNF782:p.G484W、ZNF831:p.Q617K、ZNF98:p.C492F及ZSWIM2:p.S214Y。

54. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有LUSC；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：PIK3CA:p.E545K、TP53:p.R158L、KRTAP5-5:p.GCG47del、NFE2L2:p.E79Q、CDKN2A:p.D108Y、DHX9:p.V40G、MAFA:p.207_208HH>H、NFE2L2:p.R34Q、PBX2:p.Y262F、PIK3CA:p.E542K、TP53:p.R273L、TP53:p.C242F、TP53:p.R175G、TP53:p.Y163C、TP53:p.V157F、AICDA:p.R131G、ALPK2:p.D53N、ANKFN1:p.M280I、ARPC1A:p.F212L、ASXL2:p.S1081L、C1orf74:p.D254N、C3orf30:p.D227E、CCDC121:p.W397L、CHN2:p.I43M、CLEC4C:p.R179L、CLN3:p.G206S、CNTN5:p.T178N、COL12A1:p.G2753C、CPS1:p.T855K、CSMD3:p.T1094K、CSMD3:p.Q691K、DDX11:p.R167T、EGFR:p.L861Q、EME1:p.D570H、EP300:p.D1399N、ESYT3:p.S574F、FAM135B:p.L648M、FAM135B:p.Q285H、FAM47A:p.G372W、FBXW7:p.R505G、FGFR3:p.S249C、GALNT13:p.G358C、GNL3L:p.K20N、GPC5:p.R347L、HCN1:p.A714S、HCN1:p.R659L、HCN1:p.G499V、

HCN1:p.P326T、HERC2P3:p.A803V、HEXDC:p.T482P、HIST1H3B:p.E74K、HIST2H2BE:p.G54D、IFNA10:p.V79A、IL7R:p.S54L、INADL:p.P1340A、ISX:p.C2F、ITGAX:p.R685H、ITPR1:p.E1883Q、KCNN3:p.80_81insQQ、KEAP1:p.G480W、KEAP1:p.R470C、KEAP1:p.V155F、KIAA1751:p.L63F、KIAA2022:p.C345F、KIR3DL2:p.K229E、KLF5:p.E419Q、LAMA4:p.M1293I、LMLN:p.G199C、LRP2:p.A516V、LRRC66:p.F458L、LSG1:p.R517L、LUM:p.R310L、MB21D2:p.Q311E、MCHR1:p.S306F、MKRN3:p.G270V、MUC16:p.N11594K、NFE2L2:p.G81S、NFE2L2:p.G31A、NFE2L2:p.L30F、NFE2L2:p.D29H、OR2B11:p.G10V、OR2T2:p.F13V、OR4K2:p.C254F、OR51F2:p.R67P、OR51S1:p.R159Q、OR5D18:p.T271K、OR8H2:p.L166F、OR8J3:p.S160L、OR8K3:p.K235N、PCDHB1:p.N568K、PHIP:p.I1681M、PIK3CA:p.E726K、PIK3CA:p.H1047R、PLCE1:p.G439C、PRSS57:p.E39Q、PYHIN1:p.G148A、RANBP6:p.I984L、RBMXL1:p.G305C、REG1B:p.M67I、RGS6:p.W366L、RNF5:p.T136I、RP1:p.S1771L、RRP15:p.L214F、RYR2:p.E711K、SAMD3:p.Q206H、SLITRK3:p.R214L、SON:p.S908L、SP4:p.E11del、STK11:p.G279fs、TARBP1:p.L782V、TBCD:p.R476C、TMPRSS11F:p.R274Q、TP53:p.R337L、TP53:p.E271K、TP53:p.R267P、TP53:p.G245V、TP53:p.Y234C、TP53:p.Y220C、TP53:p.H214R、TP53:p.H193L、TP53:p.H179L、TPTE:p.M541I、TRIM7:p.L332I、TTN:p.T32425M、ZFP36L2:p.D240N、ZNF208:p.H883Q、ZNF48:p.R235H、

ZNF626:p.K473R、ZNF676:p.P43T、ZZZ3:p.R162Q。

55. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有OV；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：TP53:p.R273H、TP53:p.Y220C、TP53:p.R248Q、TP53:p.R175H、TP53:p.R273C、TP53:p.I195T、TP53:p.R248W、TP53:p.R282W、TP53:p.C176Y、TP53:p.V157F、TP53:p.S241F、TP53:p.H179R、TP53:p.G245S、TP53:p.H193R、ADCY2:p.V888I、B2M:p.M1V、BAP1:p.R227C、CYP4A11:p.V185F、DNAH5:p.R3197Q、GART:p.K807fs、GRIN2B:p.R519Q、HRNR:p.M1fs、KLHL29:p.L716fs、KRAS:p.G12V、MGA:p.R2435Q、MYO3A:p.N525S、NPAS2:p.Q201R、NRAS:p.Q61R、PDAP1:p.K55fs、PGAP1:p.F565C、TP53:p.S315fs、TP53:p.C275Y、TP53:p.R273L、TP53:p.V272M、TP53:p.G266V、TP53:p.G266R、TP53:p.D259Y、TP53:p.P250L、TP53:p.G245D、TP53:p.G245V、TP53:p.G244C、TP53:p.C238fs、TP53:p.Y236C、TP53:p.Y234C、TP53:p.V216M、TP53:p.S215R、TP53:p.Y205C、TP53:p.L194R、TP53:p.P191del、TP53:p.Y163C、TP53:p.A159V、TP53:p.K132N、TRPC7:p.D210V、UXS1:p.V100L、WNT11:p.C344Y及ZNF295:p.E885A。

56. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有READ；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：KRAS:p.G12V、TP53:p.R273H、KRAS:p.A146T、KRAS:p.G12D、TP53:p.R175H、AKAP9:p.L3482I、

APBA1:p.E624K、BAG5:p.D439N、C17orf97:p.E230D、CDH23:p.F177L、CERS3:p.E95D、DNAH5:p.R982H、ERBB2:p.V842I、GABRB3:p.D500N、KRAS:p.G13D、KRAS:p.G12C、KRAS:p.G12S、LRP6:p.R675Q、MACF1:p.F722L、MBOAT2:p.R43Q、MYO1D:p.E246K、NLRC4:p.E409K、NRAP:p.E327K、NRAS:p.Q61K、PCDH15:p.R1552I、PIK3CA:p.N345K、PIK3CA:p.E545K、POLE:p.S459F、PPP2R2B:p.P326L、SMAD4:p.R361H、TP53:p.R248W、ZFP2:p.R150I及ZNF563:p.K26N。

57. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有SKCM；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：BRAF:p.V600E、NRAS:p.Q61R、NRAS:p.Q61K、HSD17B7P2:p.N175S、BRAF:p.V600K、DISP1:p.G732L、IDH1:p.R132C、NRAS:p.Q61L、MUC16:p.P5119S、RAC1:p.P29S、WASH3P:p.G175S、AGAP9:p.M248V、C15orf23:p.S24F、DNAH5:p.D3236N、SPTLC3:p.R97K、TMC5:p.R276C、CFB:p.R314M、FRG1B:p.A50P、INMT:p.S212F、LOC649330:p.G93E、MAP2K1:p.P124S、RGS7:p.R44C、STK19:p.D89N、ADAM30:p.G97L、ARL16:p.G6R、ARMC4:p.E22K、BRAF:p.K601E、CAPN13:p.P405S、CD1C:p.R89C、CLCC1:p.P406Q、CNTN5:p.S379F、DNAH5:p.R742Q、EEF1B2:p.S43G、FRG1B:p.I59V、GABRG1:p.E205K、IARS2:p.R832C、IL32:p.D218fs、ISX:p.R86C、KLHDC7A:p.E635K、NAP1L4:p.P285Q、NBPF10:p.Q908E、

OR2A5:p.S71L、OR4E2:p.R226Q、OR4M1:p.G41E、OR4M2:p.S268F、OR4N2:p.G41E、OR51B2:p.S163L、PCDHGC5:p.R293C、PCLO:p.R4133C、PHGDH:p.G173L、POTEG:p.D51N、PPP6C:p.R301C、PRAMEF11:p.C84S、PSG9:p.E404K、PTPRB:p.D1560N、RNF152:p.P95S、SPAG16:p.P488S、SPATA8:p.E18K、TAF1A:p.R172M、TCEB3C:p.E308K、THSD7B:p.E126K、TTN:p.E12129K、XIRP2:p.D2439N及ZNF831:p.R1393Q。

58. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有UCEC；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：RPL22:p.K15fs、PTEN:p.R130G、PTEN:p.R130Q、KRAS:p.G12D、KRAS:p.G12V、PIK3CA:p.H1047R、PIK3CA:p.R88Q、PIK3CA:p.E545K、PTEN:p.V317fs、FGFR2:p.S252W、PIK3CA:p.E542K、CTNNB1:p.S37F、POLE:p.P286R、PPP2R1A:p.P179R、CTNNB1:p.S37C、KRAS:p.G13D、CTNNB1:p.D32N、CTNNB1:p.S33F、CTNNB1:p.G34R、KIAA2026:p.R574C、LIMCH1:p.R806fs、PIK3CA:p.H1047L、ALPK2:p.K523fs、CTNNB1:p.S33C、FBXW7:p.R505C、HPD:p.R284fs、KRAS:p.G12A、PIK3CA:p.R93Q、POLE:p.V411L、TP53:p.R248W、ABCA11P:p.R385I、ABI1:p.K445N、ACSM2B:p.K195N、APOB:p.F3102L、ASCC3:p.R136Q、C12orf4:p.R335Q、CCDC132:p.R838C、CHD4:p.R975H、CSDE1:p.R220C、CTNNB1:p.D32Y、CTNNB1:p.S33Y、CTNNB1:p.T41I、EXOC1:p.R588C、

FBXW7:p.R465H、FGFR2:p.N549K、FUBP1:p.R430C、GEN1:p.S509L、IK:p.E90fs、KIF20B:p.E54K、MAX:p.H28R、MBOAT2:p.R43Q、METTL14:p.R298P、MFGE8:p.D170N、MS4A8B:p.S3L、NSMCE1:p.D244N、OXR1:p.E122K、PCDH19:p.E530K、PIK3CA:p.R108H、PIK3CA:p.N345K、PIK3CA:p.C420R、PIK3CA:p.Q546P、PIK3CA:p.Q546R、PTEN:p.R130L、RBL2:p.E127K、RXFP1:p.S223Y、SF3B1:p.R957Q、SLC20A1:p.P328fs、SOX17:p.S403I、TNS1:p.Q659del、TP53:p.R273H、TP53:p.R273C、TP53:p.R248Q、TTN:p.D16823N、TXNL1:p.R234C、ZFHX3:p.R1893fs、ZNF180:p.R625I、ZNF257:p.R392I、ZNF354B:p.D609N、ZNF43:p.R280C、ZNF709:p.R468I、ZNF765:p.S254L、ABCA5:p.R1476Q、ACVR1:p.R206H、ADAD1:p.S11L、ADAM9:p.R256Q、ADD3:p.E570K、ADGB:p.S1124L、AGXT2:p.R502C、AMBN:p.S225Y、ANKDD1A:p.R24H、ARHGEF33:p.R46I、ATP10B:p.L1304I、ATP2C1:p.E724K、ATP9A:p.R290Q、ATR:p.R1814fs、AVL9:p.F34L、BMPER:p.R241Q、BTN3A2:p.E153K、C14orf118:p.R279I、C14orf166B:p.F230L、C3orf23:p.R217C、C3orf62:p.R185Q、CACNA1C:p.S710L、CAGE1:p.E539K、CARD10:p.KE272del、CCDC144A:p.S1264L、CCDC168:p.D5020Y、CCDC36:p.R209I、CD55:p.E156K、CEP44:p.S253L、CIITA:p.E728K、CREBBP:p.P2094L、CTNNB1:p.S37A、CTTNBP2:p.S420L、DCT:p.R532Q、DIAPH2:p.E121K、DLG2:p.S624L、DNAH10:p.R1888Q、DNAH14:p.R1367C、DNAH7:p.R2961Q、DNAH8:p.R1347H、

DNAJC13:p.E1248K、DNMT1:p.E51K、DST:p.S1767Y、DYNC2H1:p.E883D、EMR1:p.R631Q、EPHX4:p.R282Q、ERCC6L2:p.L445I、F10:p.E117K、FAM155B:p.E158K、FAM83B:p.R206Q、FARP1:p.S383L、FAT3:p.A4159T、FBXW7:p.R689W、FBXW7:p.R465C、FBXW7:p.G423V、FN1:p.R290C、FZD6:p.R416Q、GABRA3:p.R73H、GABRA4:p.R460Q、GALNTL2:p.E395K、GFAP:p.A233T、GGA2:p.A63V、GIGYF2:p.R227H、GNPTAB:p.R1189Q、GPR112:p.S1283Y、GPR98:p.R4142W、GRIA3:p.S646Y、GRM6:p.E363D、HMCN1:p.S133Y、HSPA4L:p.R483C、HTR2A:p.S219L、INTS7:p.R940C、INTS7:p.R106I、ITM2C:p.E167K、JAKMIP2:p.R283I、KCND3:p.S438L、KCNS2:p.D211N、KDM1B:p.F361L、KIAA0556:p.L330I、KIAA1147:p.A149V、KIF23:p.R150Q、KIF27:p.K925N、KIF9:p.R594Q、KLHL13:p.E213K、KLHL28:p.E33K、LIN9:p.R183W、LRBA:p.E2103K、LRP2:p.R2432I、MAGI2:p.L450M、MC5R:p.A109T、MEGF10:p.S1053L、MKI67:p.T1664fs、MKLN1:p.F485L、MMRN1:p.F917L、MSH4:p.E730K、MTOR:p.S2215Y、MUC7:p.S336L、MYBPC2:p.R646H、N4BP2L2:p.R506C、NAPSA:p.R121Q、NCOA7:p.E369D、NCR1:p.R258W、NEK11:p.R374Q、NHEJ1:p.R109Q、NNMT:p.E233K、NOTCH4:p.15_16LL>L、NPY1R:p.A371T、NRAS:p.Q61R、OGDHL:p.R57C、OMA1:p.R445Q、OPRM1:p.R462C、OR4C12:p.F248L、OR5AK2:p.K89N、OSBPL6:p.R577Q、PCDHAC2:p.K138N、

PCDHB12:p.R289C、PCDHGC5:p.A70T、PIK3CA:p.R38H、PIK3CA:p.E39K、PIK3CA:p.E110del、PIK3CA:p.K111E、PIK3CA:p.Q546K、PIK3CA:p.M1043V、PIK3CA:p.M1043I、PLA2G3:p.R201Q、PLXNA1:p.E1295K、PON1:p.R306Q、POTEE:p.R303I、POTEF:p.K674N、PPP2R1A:p.S256F、PPP2R3B:p.F310L、PRAM1:p.A268T、PREX1:p.E1246K、PRKCQ:p.A324V、PTEN:p.R130P、PVRL4:p.A358T、RAI2:p.S385Y、RBM39:p.T353I、RELN:p.F2722L、RFPL1:p.R148Q、ROBO2:p.D1018N、ROS1:p.R245I、RPS6KA6:p.S394Y、RSBN1:p.E572K、RYR1:p.A2576T、SACS:p.R2906Q、SCAPER:p.R366Q、SELP:p.R429W、SENP7:p.S673Y、SEPHS1:p.E13K、SFRP4:p.R232Q、SGK1:p.K367del、SIX1:p.E191K、SLC10A7:p.S261L、SLC12A2:p.R828Q、SLC16A14:p.R495Q、SLC7A2:p.R322W、SMCR8:p.E175K、SOS1:p.N233Y、SPOP:p.E50K、STRN3:p.K218N、STXBP6:p.D92N、SULT1E1:p.R77Q、SUN3:p.L124I、SUSD1:p.R343C、SYNM:p.R516Q、TAF1:p.R843W、TDRD3:p.R322Q、THADA:p.S1941L、TLN2:p.S208L、TMEM161B:p.R315Q、TMPRSS3:p.R16Q、TP53:p.Y220C、TPTE:p.S423L、TRANK1:p.E846K、TRPC5:p.S490L、TRPM3:p.R429W、TSSK1B:p.E301K、TTLL7:p.R751H、TTN:p.S20317L、TTN:p.E6404K、TTN:p.R4434Q、TTN:p.R2506Q、UGT8:p.E102K、USF1:p.R52Q、USP16:p.R455Q、USP25:p.R873H、USP33:p.R36Q、VPRBP:p.R802Q、VPS13B:p.R692Q、WDR65:p.F110C、YTHDC2:p.E185K、ZFYVE1:p.R266Q、

ZKSCAN1:p.R541fs、ZNF117:p.R157I、ZNF180:p.R569I、ZNF195:p.R59Q、ZNF254:p.K179N、ZNF263:p.R510I、ZNF333:p.R554Q、ZNF354B:p.R402I、ZNF442:p.R309Q、ZNF454:p.R376I、ZNF485:p.R374I、ZNF488:p.R206Q、ZNF559:p.E284K、ZNF594:p.R287I、ZNF611:p.R390I、ZNF645:p.R154C、ZNF649:p.R338Q、ZNF649:p.R198I、ZNF674:p.R405I、ZNF675:p.R220I、ZNF678:p.R564I、ZNF732:p.R354I、ZNF780A:p.R466Q、ZNF823:p.R547I、ZNF836:p.R854I、ZNF836:p.R630I、ZNF841:p.R757I 及 ZNF98:p.R370I。

59. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有ACC；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：ZFPM1:p.EPL444del、GARS:p.P42A、ZNF517:p.V349A、LRIG1:p.L24V、CCDC102A:p.R96W、OPRD1:p.C27F、SOWAHA:p.R124P、LACTB:p.M5L、TOR3A:p.F13L、ZFPM1:p.E444fs、ZNF787:p.D367del、LRIG1:p.L26V、IRX3:p.L422P、TRIOBP:p.H1300R、TUBA1C:p.L146F、ZFPM1:p.P445fs、ZFPM1:p.446_447LA>P、TPO:p.S398T、USP42:p.R779P、ERCC2:p.D312N、GLTPD2:p.D209E、OTOP1:p.LLW104del、RINL:p.P402L、AMDHD1:p.S3G、ASPDH:p.Q266R、KCNK17:p.S21G、TMEM247:p.Q128E、MUC5B:p.D682G、OBSCN:p.R4516W、FAM184B:p.R784W、SEMA5B:p.V840D、ZNF598:p.E25G、ADAD2:p.G44E、C1orf106:p.R538C、ZAR1:p.Q42H、

PANK2:p.G126A、PODXL:p.28_30PSP>P、SALL3:p.L593V、THEM4:p.L17R、C2orf81:p.T315P、CLDN23:p.V210M、FAM109A:p.GGG156del、FPGS:p.I22V、HHIPL1:p.V692A、MUC5B:p.M2869T、PLEC:p.R1386Q、SYT8:p.R373W、TAF5:p.S130A、TMEM189-UBE2V1:p.N6D、UQCRFS1:p.S6A、B3GNT6:p.L316fs、CCDC105:p.P499T、CLIC6:p.Q298E、IDUA:p.T374P、NOTCH2:p.C19W、RGS9BP:p.A96S、RREB1:p.G783V、SP8:p.G165del、WDR34:p.W60G、C19orf10:p.G12R、CELSR2:p.16_17insP、FAM75C1:p.71_71H>HLVSQRH、GPRIN2:p.R446H、KBTBD13:p.A81V、OGFR:p.S557T、PODXL:p.30_30P>PSP、BHLHE22:p.L62Q、C4orf32:p.G32E、C5orf65:p.Q245R、KNDC1:p.V806D、KRTAP10-6:p.49_49P>PSCCAP、LRP11:p.P92R、MAP1S:p.S411C、NOL9:p.S58A、RASIP1:p.R601C、RGMB:p.S63R、SARM1:p.R23P、TSC22D2:p.A419T、ZNF628:p.T230A、ZNF814:p.A337V、AATK:p.A541T、BTBD11:p.G265A、CRIPAK:p.C143R、KCTD3:p.F9V、KRT8:p.S59A、MUC5B:p.S681G、NCOR2:p.1846_1847insSSG、OGFR:p.E556K、APOE:p.C130R、C10orf95:p.A85S、C13orf33:p.R59G、CRIPAK:p.C174R、FAM18B2:p.C51Y、GLI3:p.P998L、GLTSCR2:p.Q389R、HECTD2:p.P19A、IRF2BPL:p.123_125QQQ>Q、MEX3C:p.179_182AAAA>A、NEFH:p.EE658del、RNF149:p.S9G、RNF222:p.A133T、SEZ6L2:p.R74P、TNIP2:p.R73G、ARRDC4:p.T79A、B3GNT6:p.P330fs、BAG1:p.G45R、C22orf26:p.P28L、CHDH:p.E40A、COQ2:p.V66L、CTGF:p.H83D、

DLEU7:p.A83V、EPPK1:p.D2378H、FAM86C1:p.R30P、FZD1:p.93_94insP、GPRIN2:p.V241M、GPX1:p.11_13AAA>A、HES3:p.P96T、JMJD4:p.A11V、KANK3:p.R359H、LPPR2:p.A186S、NEFH:p.665_666insEE、NOM1:p.R24G、RNF39:p.G263C、SCRT1:p.S133A、SNED1:p.L1228P、TTLL11:p.122_123insKA、ZCCHC3:p.A159del、ZNF219:p.QP233del、ASB16:p.T249A、ASB2:p.H515P、ATP9B:p.S39G、AVL9:p.G7fs、C17orf96:p.L63V、C19orf29:p.A499V、CRB2:p.T1110M、CRIPAK:p.P173R、CRIPAK:p.I190L、CSGALNACT2:p.L362F、CTBS:p.LAL31del、CTNNB1:p.S45P、DMRT1:p.S45T、DOK7:p.G461D、FBRSL1:p.A836V、FEZ2:p.P50L、FRG1:p.S169N、HSD17B1:p.G313S、IBA57:p.S130R、KIF1A:p.E917D、KRTAP9-1:p.160_160Q>QPSCGSSCCQ、LURAP1L:p.55_56insGGG、NMU:p.A19E、NMU:p.A18E、NOXA1:p.D6E、NPTX1:p.G100D、PLIN5:p.R306W、TBP:p.95_96insQ、TMEM200C:p.S498G、TNXB:p.V706fs、VARS:p.P51S、ZC3H12D:p.P405S及ZZEF1:p.V30A。

60. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有CESC；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：PIK3CA:p.E545K、PIK3CA:p.E542K、MAPK1:p.E322K、EP300:p.D1399N、ERBB2:p.S310F、ERBB3:p.V104M、KRAS:p.G12D、ANKRD12:p.E721Q、ANKRD36:p.M1144T、MICA:p.G318fs、PIK3CA:p.E726K、PTEN:p.R130Q、ABCD1:p.S606P、ACTL7B:p.E211K、

ADAM21:p.F129C、ADAMTS12:p.P1053A、AKT1:p.E17K、ANKLE1:p.V643L、ANO3:p.M956I、AOAH:p.R326T、APOD:p.S115L、ASCC1:p.H207Y、ATM:p.S800F、AURKA:p.S387L、BAG5:p.M286I、C12orf43:p.E28Q、C16orf3:p.G65S、C3orf70:p.S6L、C4orf21:p.E800Q、CALB2:p.K60N、CALCB:p.R81T、CCDC152:p.E153Q、CCDC53:p.R58C、CDC27:p.P242S、CFHR5:p.R441H、CLOCK:p.L123fs、CMYA5:p.E2733K、CNTRL:p.P185S、CSHL1:p.R117Q、CSMD3:p.H952Y、CTNNB1:p.D32G、CTSH:p.E254Q、DHPS:p.F49L、DMPK:p.R44H、DNAH14:p.F622fs、DNAH3:p.E3367Q、DNAH8:p.E587D、DNASE1L1:p.D212N、ECE2:p.D254N、FAM71B:p.H445D、FAM73A:p.G23V、FAS:p.E261K、FBXW7:p.R505G、FBXW7:p.R465C、FEZF2:p.E82K、FKBPL:p.E161Q、FMNL1:p.E927Q、GPATCH3:p.E275Q、GPR142:p.R304T、GPRIN2:p.T100P、GRAMD2:p.I123M、HERC2:p.S329F、HGF:p.G229A、HIF3A:p.A72T、HIST1H1B:p.K188N、HIST1H2AL:p.R30P、HIST2H2AC:p.R30P、HLA-C:p.N104K、HLA-DPB1:p.G114fs、HRNR:p.G2539S、INVS:p.R799K、JPH3:p.Q433H、JUP:p.S627L、KIAA1211:p.R308fs、KIAA1211:p.E309fs、KLK2:p.E161K、KRAS:p.G13D、KRAS:p.G12V、LIN9:p.E231K、LOC151174:p.P90S、LRRC37A3:p.A406D、LRTM2:p.L176V、MEPE:p.S30T、MUC12:p.R2634C、MUC4:p.S2936L、MYOM2:p.D988N、NFE2L2:p.D29H、NOTCH2:p.R2298W、NPIPL1:p.P250L、NR5A2:p.E80K、NYAP2:p.R197Q、

OBSL1:p.E1642K、OR13C2:p.L9V、OSBP:p.Q721H、PAOX:p.H107Y、PDILT:p.E500K、PIAS3:p.D460N、PLEKHO2:p.E351Q、PNRC1:p.R73C、PPP4R1:p.L597F、PREP:p.F469L、PRKDC:p.Q3568E、PSME3:p.R231W、RANBP6:p.R915W、RCAN2:p.D440N、RNPC3:p.E116fs、SDHAP1:p.H66Y、SDHAP2:p.S37fs、SERPINA3:p.K158N、SERPINA4:p.R98C、SF1:p.R255W、SGSM1:p.E818K、SIM1:p.V213M、SLC10A4:p.F281L、SLC25A5:p.I79F、SLC35G2:p.K62fs、SLC4A9:p.R617C、SLCO2A1:p.M479I、SND1:p.Q38E、SPATA17:p.R72K、SRSF12:p.S150C、TADA2B:p.E67K、TCTEX1D2:p.S74L、TEDDM1:p.M166I、TEX15:p.E1652Q、TMC2:p.E92D、TMEM131:p.E1319Q、TNKS2:p.T619fs、TNS1:p.Q659del、TP53:p.E285K、TRAF3:p.S9F、TRIM61:p.K98N、TRPM1:p.M996I、TUFT1:p.L101F、U2AF1:p.S34F、UNC93B1:p.V498M、USP4:p.L259V、VCAN:p.S1308C、WDR17:p.P278S、ZBED4:p.S385L、ZEB2:p.E1094K、ZFYVE9:p.M1147I、ZNF16:p.R452W、ZNF677:p.R131T及ZSWIM4:p.E407K。

61. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有CRC；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：KRAS:p.G12D、KRAS:p.G12V、BRAF:p.V600E、KRAS:p.G13D、TP53:p.R175H、PIK3CA:p.E545K、FBXW7:p.R465H、KRAS:p.A146T、PIK3CA:p.H1047R、TP53:p.R248W、CDC27:p.D555E、SMAD4:p.R361H、

TP53:p.R273H、KRAS:p.G12C、NRAS:p.Q61K、ERBB2:p.V842I、ERBB3:p.V104M、FBXW7:p.R465C、PIK3CA:p.R88Q、PIK3CA:p.E542K、TP53:p.R273C、TP53:p.G245S、AXIN2:p.G665fs、C16orf45:p.T106N、C20orf26:p.R1088Q、DNMT1:p.E432K、FBXW7:p.R505C、HLCS:p.E362K、HPSE2:p.K58N、KIF14:p.R598Q、KIF18A:p.R17C、KIF20B:p.E991K、KLHL5:p.R326C、KLK2:p.P57T、KRAS:p.G12A、KRAS:p.G12S、LPHN3:p.R1183Q、LRP6:p.R675Q、MYH8:p.R1048Q、NRAP:p.E327K、NRAS:p.G12C、PIK3CA:p.N345K、POSTN:p.R508C、PPP2R1A:p.R183W、PTEN:p.R130Q、RAF1:p.S257L、SDK1:p.T1181M、SGSM1:p.F1117L、TCF7L2:p.R482fs、TP53:p.R282W、TRIM23:p.R289Q、UGT8:p.E102K、ZNF491:p.R343Q、A2M:p.R732Q、AADACL4:p.A266T、ABCA8:p.E1158K、ABCA8:p.R842Q、ABCA8:p.A696T、ABCB8:p.R345H、ACACA:p.R1731C、ACADM:p.F48C、ACOT9:p.R50Q、ACPP:p.R105Q、ACTL7B:p.R354H、ACTL9:p.R331H、ACVR1:p.S290L、ADAM30:p.S314Y、ADAM32:p.R559Q、ADAMTS16:p.D817N、ADAMTS4:p.R156W、ADCY5:p.R661H、AGMAT:p.V313M、AGPAT4:p.A212T、AKAP12:p.E1282K、AKAP9:p.L3482I、ALB:p.S294L、ALDH1L1:p.A870T、ALG2:p.S302Y、AMOTL1:p.R676Q、AMPD1:p.K502N、AMPH:p.R292W、ANKRD6:p.R479C、APBA1:p.K730N、APBA1:p.E624K、APC:p.E847fs、APC:p.F1354fs、APC:p.M1413fs、APOB:p.R3136C、APOB:p.A43V、APPL1:p.R668W、

AQPEP:p.A309T、ARF4:p.R149H、ARFGEF1:p.D1632N、ARHGAP32:p.E1253K、ARHGAP36:p.R128C、ARHGAP36:p.A147V、ARHGAP5:p.D890fs、ARNTL:p.T395M、ARPP21:p.R338H、ARSG:p.V131I、ASCC3:p.R1197Q、ATP10D:p.R311H、ATP6V0A4:p.R191Q、ATP9B:p.R265Q、AXDND1:p.E930D、AXIN2:p.W663fs、B2M:p.L13fs、B3GALNT1:p.R145Q、BACH1:p.R538Q、BAG5:p.D439N、BBOX1:p.F176V、BCL2L11:p.R91Q、BCL7A:p.T52M、BCLAF1:p.R37fs、BEND5:p.R198C、BICD2:p.R162H、BLVRA:p.S44L、BMP3:p.R344W、BNC2:p.R512W、BRPF1:p.R66C、BRWD3:p.R787C、BTBD7:p.S436L、BUB1B:p.F996L、BZRAP1:p.V1627I、C11orf30:p.R1111C、C14orf101:p.E295K、C14orf102:p.D115N、C14orf105:p.R100I、C15orf2:p.V488I、C15orf33:p.D340N、C16orf87:p.R151I、C1RL:p.L351fs、C22orf40:p.P32fs、C3orf39:p.R333W、C5orf30:p.D4N、C5orf4:p.R114Q、C6orf170:p.K724T、C7orf63:p.A10T、CACHD1:p.S720Y、CACNA1A:p.T665M、CACNA2D3:p.A332T、CACNB2:p.R608H、CACNG3:p.V134I、CACNG3:p.A138V、CACNG5:p.G121R、CADM1:p.S190L、CADPS:p.A1073T、CAPRIN2:p.E13K、CARD11:p.R423Q、CASC1:p.R54Q、CASP14:p.R5W、CBFB:p.E152K、CC2D2A:p.R1284C、CCDC18:p.K615N、CCDC60:p.R230H、CCDC81:p.R259I、CCDC88C:p.P1851fs、CCKBR:p.V236M、CD101:p.D283Y、CD101:p.R594Q、CD180:p.N228T、CDC14B:p.R375C、CDCA7L:p.P405fs、CDH10:p.E349K、CDH12:p.D674N、

CDH20:p.A134V、CDH23:p.F177L、CDH2:p.D547Y、CDH9:p.F523L、CDK16:p.R108C、CEACAM5:p.L640I、CEP152:p.E21K、CERS3:p.E95D、CHD4:p.R975H、CHD5:p.A801T、CIZ1:p.V668A、CLEC18A:p.R423H、CLTCL1:p.R481W、CMAS:p.R110Q、CNRIP1:p.R102W、COBLL1:p.K732N、COL14A1:p.R1082I、COL17A1:p.P1004L、COL4A6:p.L550I、COL6A3:p.D2792N、COPB1:p.R425C、CORO2A:p.*526R、COX15:p.L86I、CSMD1:p.S781Y、CTCFL:p.E423K、CTDNEP1:p.E126K、CTTNBP2:p.R164C、CYP4B1:p.E434D、DACH2:p.R539C、DBC1:p.V216I、DBF4B:p.S254Y、DCHS2:p.F2149L、DCLK2:p.S549Y、DDI1:p.R275Q、DENND4A:p.P357H、DENND4C:p.R1081Q、DHTKD1:p.R410Q、DISP1:p.R763C、DKK2:p.R230H、DKK4:p.R203Q、DLC1:p.A350V、DLC1:p.E222D、DMD:p.R3195H、DNAH5:p.R982H、DNAH5:p.R224Q、DNAH9:p.D1547N、DNAJC24:p.E61K、DNM1:p.A251T、DNMT1:p.E1531Q、DNMT3B:p.R92W、DOCK10:p.A1830V、DOCK1:p.E864K、DOCK2:p.G170R、DOCK3:p.R1183C、DOCK5:p.E177K、DOK5:p.R274W、DPP8:p.G165R、DPY19L1:p.F378L、DUOX2:p.F880L、DVL2:p.A601fs、EBAG9:p.E187K、EBF3:p.G255fs、EDNRB:p.L450R、EGR2:p.R390H、EHD3:p.E44K、EIF2C1:p.R139Q、ELF3:p.F305fs、ELMOD2:p.T141M、EMR2:p.S75L、ENAM:p.R373H、ENOX2:p.R356W、ENTPD7:p.E327K、EPG5:p.D369N、EPHB2:p.R392H、ERCC6:p.V780I、ERCC6L:p.R505Q、ERRFI1:p.A421T、

ESCO1:p.R300Q、ETV6:p.R369W、F8:p.S2269Y、FAM123B:p.F173fs、FAM135B:p.R884H、FAM169B:p.K165N、FAM170A:p.E56K、FAM171B:p.D459N、FAM181A:p.R109H、FAM5B:p.R402C、FBXO11:p.A432V、FBXW7:p.R689W、FBXW7:p.S582L、FBXW7:p.R14Q、FGF14:p.A236V、FHDC1:p.R254W、FHOD3:p.A225T、FHOD3:p.E813K、FMO3:p.F510L、FNDC1:p.R652H、FOXK1:p.R354W、FOXN3:p.P96fs、FPGT-TNNI3K:p.R455H、FZD3:p.D367N、GABRA4:p.R460Q、GABRA5:p.S126N、GABRB3:p.D500N、GALNTL5:p.R262I、GJA1:p.R362Q、GLRA3:p.L454I、GLRA3:p.F132L、GOLGA4:p.Q1536H、GP2:p.S41L、GPC6:p.A214T、GPLD1:p.R717Q、GPR125:p.R113Q、GPR156:p.F754L、GPR158:p.D566N、GPR21:p.R216H、GPR61:p.A62T、GPR98:p.R4142W、GPRC5A:p.V30I、GRAP2:p.E69D、GRIA1:p.R218C、GRIA2:p.R845Q、GRM7:p.R679Q、GTF3A:p.K306N、HAO1:p.R172C、HARS2:p.R168H、HBB:p.F42L、HCN4:p.R525H、HDAC5:p.A1044T、HGF:p.S467Y、HIPK4:p.R280H、HLA-DMA:p.E84K、HMG20A:p.E248D、HPS3:p.S468L、HRSP12:p.R120Q、HS3ST1:p.E287K、HTR3B:p.R236C、HTR5A:p.R152C、HTT:p.D1548N、HYDIN:p.R1187C、HYDIN:p.R939Q、HYDIN:p.R451Q、HYOU1:p.R158C、IFT172:p.A944V、IGJ:p.R77Q、IL17RA:p.Q803fs、IL1RAPL2:p.T647M、IL3:p.A90T、IL5RA:p.L47I、INPP5D:p.R523Q、INPP5K:p.R263C、IRAK3:p.R267Q、

IREB2:p.R419Q、ITGA4:p.T673M、ITGA4:p.F900L、ITIH5:p.A912T、ITK:p.E196K、JAG1:p.A462T、JAK1:p.V310I、KAL1:p.V303I、KBTBD8:p.V549I、KCNA3:p.A415V、KCND3:p.S438L、KCNMB4:p.F209L、KCTD20:p.L314fs、KDELC1:p.L447I、KIAA0528:p.R181Q、KIAA0556:p.R1082W、KIAA1109:p.S4937Y、KIAA1804:p.V474M、KIAA1804:p.R477W、KIF16B:p.R145Q、KIF26B:p.A1114V、KPNA4:p.R29Q、KRAS:p.K117N、KRAS:p.Q61L、KRAS:p.Q61K、KRT6B:p.L197P、L1CAM:p.T186M、LALBA:p.A41T、LAMA4:p.A558V、LBX1:p.R176W、LPAR4:p.R145Q、LRP1B:p.K2623N、LRP2:p.R3043C、LRP2:p.S737L、LRRC18:p.R218W、LRRC31:p.K23T、LRRC7:p.R1389H、LZTS2:p.P100fs、MACF1:p.S292L、MACF1:p.F722L、MAEL:p.R345C、MAGEE1:p.V380M、MAGI1:p.R1198C、MAP1B:p.E2046D、MAP2:p.K530N、MAP2K4:p.R287H、MAP3K4:p.R275Q、MAP7D2:p.R487C、MAPK8IP1:p.L217fs、MBOAT2:p.R43Q、MCF2L2:p.R926Q、MECOM:p.R969C、METTL16:p.R200Q、METTL21A:p.R174Q、METTL6:p.F56L、MFF:p.R162C、MFSD5:p.R280Q、MIA3:p.Q356H、MMAA:p.R326C、MORC1:p.D113Y、MORC2:p.R740H、MPDZ:p.L804I、MR1:p.S46L、MRPL47:p.L234I、MS4A8B:p.S3L、MSH4:p.K464N、MSH6:p.T1085fs、MSH6:p.R1095H、MUC16:p.R8606H、MYH13:p.D311N、MYH7:p.R1689C、MYO1D:p.E246K、MYO3A:p.N525H、MYO6:p.D1180N、MYO9A:p.R2179Q、MYO9A:p.R167Q、MYOZ2:p.E251K、MYT1:p.E226K、

NAA25:p.S807Y、NCAM1:p.R474W、NCOA4:p.R562Q、NEB:p.D5434N、NEB:p.L1591I、NEB:p.E1214K、NEDD9:p.A798T、NEDD9:p.A316T、NEK1:p.R608C、NFASC:p.V256I、NINL:p.R1366C、NLRC4:p.D593N、NLRC4:p.E409K、NLRP4:p.V229I、NLRP5:p.R392H、NME9:p.E75K、NOLC1:p.T428M、NPC1:p.E451K、NPSR1:p.R235Q、NRAS:p.Q61L、NRAS:p.G13R、NRAS:p.G12D、NRG2:p.T246M、NTN4:p.E59K、NUB1:p.R373Q、NUDT15:p.S83Y、NUF2:p.S340L、NUP88:p.A302V、ODZ1:p.R2556W、OGDHL:p.A427T、OGFRL1:p.E427K、OLFM4:p.K132N、OPRM1:p.R353H、OR10A3:p.S93Y、OR2M3:p.R235H、OR52W1:p.R133C、OR5AU1:p.R312H、OR5B17:p.R163H、OR8S1:p.A99V、OSTN:p.R115Q、OTOL1:p.V431I、OTUD3:p.R277I、PAN3:p.S580N、PANK3:p.R260I、PAX3:p.T424M、PCBP1:p.L102Q、PCDH10:p.V477M、PCDH15:p.R1552I、PCDHAC2:p.A519T、PCDHAC2:p.E190K、PCDHAC2:p.A266T、PCDHAC2:p.A156V、PCDHAC2:p.E271K、PCDHAC2:p.A736V、PCDHB5:p.D51Y、PCDHB8:p.D235N、PCDHGC5:p.S289L、PCDHGC5:p.V662M、PCNXL2:p.R135Q、PCOLCE2:p.A348V、PCOLCE2:p.R87H、PDE4B:p.S417L、PGAM1:p.R240H、PHF3:p.R1410I、PIAS2:p.S519L、PIGR:p.A580T、PIK3CA:p.D350G、PIK3CA:p.E545A、PIK3CA:p.E545G、PIK3CA:p.Q546K、PIP4K2C:p.R204H、PKHD1L1:p.F1856L、PLA2G4A:p.E443K、PLCG2:p.E544K、PLCG2:p.D973N、PLEKHA6:p.V328fs、PLEKHG4B:p.E384K、PLK1:p.D233G、

PLOD3:p.R297fs、PLSCR3:p.E77K、PLXNC1:p.S462L、PLXNC1:p.R819C、POLA1:p.E603D、POLE:p.S459F、POLE:p.V411L、POLQ:p.R860Q、PPP2R2B:p.P326L、PPP2R5C:p.S259Y、PRAMEF4:p.R248H、PREX1:p.V731I、PRKAA2:p.R407Q、PRKAR2B:p.S309L、PRKCI:p.R480C、PRKRA:p.K122N、PSG8:p.R397C、PSG8:p.R320C、PSMD12:p.R201Q、PTPDC1:p.R430W、PTPN12:p.R765Q、PTPN13:p.S887L、PTPRD:p.L1053I、PTPRU:p.D1434N、PXDN:p.P856fs、PXDNL:p.T1312M、QRSL1:p.S226L、RAB7L1:p.R79W、RALGAPA1:p.R398C、RANBP2:p.R1231C、RBBP7:p.E313K、RBBP7:p.E274K、RBFOX2:p.A340T、RBMXL1:p.R331Q、RHOBTB1:p.T464M、RIMS2:p.R599Q、RIN3:p.S708L、RLBP1:p.D281N、RLBP1:p.A72V、RNASET2:p.A127V、RNF113B:p.A172V、RNF150:p.R236Q、RNF150:p.S208L、RNF43:p.S216L、ROR2:p.D672N、RPL6:p.F193C、RPS6KA5:p.E166K、RSPO2:p.R28C、RUVBL1:p.E431K、RUVBL1:p.R117C、RWDD2B:p.R254H、RXFP3:p.R113C、RYR3:p.R2705Q、SAGE1:p.R229C、SCFD2:p.R545W、SCML4:p.R194Q、SCN10A:p.T1570M、SCN11A:p.A1688T、SCN11A:p.V1289I、SCN11A:p.V566I、SCUBE2:p.V342M、SEMA3A:p.D81N、SEMA4D:p.R252Q、SEPHS1:p.R371Q、SEZ6L:p.S207L、SFPQ:p.R611Q、SFSWAP:p.S617Y、SGCG:p.A220V、SGCZ:p.I41M、SH3TC2:p.R89C、SIGLEC11:p.S363F、SIPA1L1:p.R1063Q、SIPA1L1:p.S1227Y、SLC12A1:p.S292L、SLC22A15:p.S201L、

SLC24A2:p.A134V、SLC25A40:p.R96Q、SLC2A7:p.A65T、SLC30A9:p.R194H、SLC33A1:p.S542L、SLC35F3:p.A280T、SLC39A7:p.R382C、SLC43A1:p.P133L、SLC43A3:p.R216H、SLC44A5:p.R185H、SLC6A2:p.A562T、SLC8A1:p.R431H、SLFN12L:p.F232fs、SLITRK1:p.R52H、SLITRK3:p.S298L、SMAD2:p.R321Q、SMARCA4:p.R381Q、SOCS5:p.S464L、SORBS1:p.V1156M、SORBS1:p.F570L、SORCS2:p.R320W、SOX6:p.R719W、SPATA22:p.S150L、SPEG:p.A944V、SPTB:p.R86C、SPTBN4:p.A1993V、STIM2:p.R572Q、STT3B:p.D583Y、SULT1C4:p.R85Q、SUN3:p.E128K、SUPT6H:p.A957T、SYNE1:p.I1249L、SYNE1:p.R170W、SYNE2:p.K3103N、SYNGR4:p.R169Q、SYT7:p.T349M、TANK:p.S380L、TAS1R2:p.R270C、TAS2R1:p.F183L、TCF7L2:p.R488C、TDRD10:p.S322L、TECTB:p.L29I、TEKT5:p.R401H、TGFBR1:p.S241L、THAP5:p.S287Y、THSD7B:p.R90H、TLL1:p.T153M、TLL2:p.S872L、TM9SF2:p.R91H、TMCC3:p.R110H、TMEM132A:p.R481C、TMEM132D:p.R578W、TMEM55A:p.R189Q、TMEM74:p.R125Q、TMPRSS11A:p.S288L、TNIP2:p.A139T、TOP2B:p.R656H、TOX:p.S354L、TP53:p.G244D、TP53:p.R175C、TPO:p.A826T、TPR:p.S2155L、TPTE2:p.R258Q、TPTE:p.S423L、TRAK1:p.D627N、TRAPPC11:p.R568Q、TRIM23:p.R396Q、TRIM44:p.D331N、TRIO:p.R661W、TRPA1:p.K54N、TRPC5:p.S490L、TRPM6:p.R995H、TRPM7:p.R1862C、TRPM7:p.R843Q、TRPS1:p.R1125W、TRPV5:p.R492H、TRRAP:p.R3515W、

TSHZ1:p.R881M、TTC21A:p.S270Y、TTN:p.R22795C、TTN:p.R3193Q、TTN:p.R328H、TUBA3D:p.R243Q、TUFT1:p.A340T、TXNDC15:p.R343Q、UBE2NL:p.R86I、UBIAD1:p.A97T、UGT2A1:p.N97fs、USH2A:p.F2369L、USP11:p.A286T、USP25:p.R1119Q、USP26:p.R861Q、USP29:p.F81L、USP31:p.D391N、USP40:p.S851L、UTP14A:p.V148I、VAV3:p.E685K、VCAN:p.R1125H、VPS13C:p.D1359Y、WBSCR17:p.R228C、WDR3:p.E841K、WDR52:p.A157T、XKR6:p.R268Q、XPOT:p.R541W、YTHDC1:p.R267Q、YTHDC2:p.E634K、ZBBX:p.R596I、ZBTB24:p.L607I、ZC3H13:p.R103Q、ZCWPW2:p.D144N、ZEB2:p.R156H、ZFHX4:p.E237D、ZFP14:p.R386C、ZFP28:p.R525I、ZFP2:p.R150I、ZFP3:p.R273I、ZFP90:p.R330Q、ZHX2:p.V790I、ZIC4:p.S305L、ZIM3:p.D352N、ZKSCAN4:p.R319Q、ZMYM4:p.R1446Q、ZNF117:p.R185I、ZNF167:p.R683I、ZNF180:p.R401I、ZNF19:p.R349I、ZNF205:p.R384C、ZNF236:p.S1480L、ZNF248:p.R568I、ZNF259:p.R174I、ZNF266:p.R512Q、ZNF266:p.R344Q、ZNF280B:p.E363K、ZNF283:p.R392Q、ZNF32:p.S62L、ZNF345:p.R82Q、ZNF345:p.R334I、ZNF350:p.R310Q、ZNF434:p.R306C、ZNF439:p.E239D、ZNF439:p.R262I、ZNF443:p.R301I、ZNF445:p.L682M、ZNF470:p.R641I、ZNF471:p.R282I、ZNF484:p.R138C、ZNF528:p.R279Q、ZNF563:p.K26N、ZNF573:p.R350I、ZNF583:p.R344I、ZNF585A:p.E638K、ZNF585A:p.E491D、ZNF625:p.R235Q、ZNF652:p.K327N、

ZNF677:p.R451I、ZNF678:p.R368I、ZNF699:p.R41I、ZNF70:p.R244I、ZNF770:p.S441P、ZNF774:p.R423Q、ZNF782:p.K247T、ZNF7:p.R337I及ZNF831:p.E949D。

62. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有DLBCL；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：EZH2:p.Y641F、MYD88:p.L273P、BCL2:p.G33R、CARD11:p.E626K、ADCY2:p.A87V、BCL2:p.N172S、BCL2:p.H20Q、BRAF:p.K601E、BTG1:p.L31F、CACNA1E:p.R1458C、CARD11:p.E93D、CD79B:p.Y197D、CD79B:p.Y197H、CREBBP:p.R1446H、GRID1:p.E622K、HIST1H1C:p.A65V、HIST1H1E:p.G133A、HIST1H3B:p.A48S、KRAS:p.G13D、MYD88:p.S251N、PABPC1:p.R94C、PIM1:p.L164F、PIM1:p.L184F、POU2F2:p.T239A、POU2F2:p.T239S、RELN:p.R2971Q、SLC25A48:p.A67T、STAT6:p.D468H、TNF:p.L47F及TRAF7:p.R11H。

63. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有KICH；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：ACR:p.W279C、AGRN:p.1284_1285VT>A、C7orf25:p.R384fs、CAMSAP1:p.T466fs、CBWD6:p.E102fs、DOCK8:p.L1111fs、EBPL:p.Q196P、EBPL:p.L189V、GFM1:p.A17fs、GOLGA6L6:p.D570E、ITGA5:p.A48D、LUZP2:p.S154fs、MTMR9:p.K193fs、MUC16:p.P10452fs、MUC4:p.S2832P、ODF2L:p.K407fs、RHBDD3:p.G34fs、

RILPL1:p.S358R、TAS2R30:p.L236fs、TRRAP:p.A973S、UBR5:p.K2120fs、URGCP:p.G639fs、ZNF98:p.A222T及ZSWIM6:p.Q610fs。

64. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有KIRP；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：FAM18B2:p.C51Y、ZNF598:p.E25G、NEFH:p.E645K、EEF1B2:p.S43G、NEFH:p.AKSPEKEE652del、OBP2B:p.K61N、SKI:p.A62G、C14orf126:p.R6W、KRT8:p.S59A、ACSBG2:p.I250M、ASIC2:p.R46L、CSGALNACT2:p.L362F、FRG1B:p.A50P、IDUA:p.H33Q、KRTAP4-5:p.S74C、SCAF11:p.E926fs、SYN2:p.A34del、ZNF814:p.R322K、BMS1:p.E878D、JMY:p.P822T、KIF1A:p.E917D、KRTAP4-7:p.S57P、LAMA5:p.L2223R、LRP1:p.P1058T、MED16:p.H449Q、MUC2:p.T1488P、MUC5B:p.D682G、NACA2:p.R75K、NEFH:p.665_666insEE、OR2L8:p.S201fs、RGPD5:p.P1760A、RRN3:p.P11S、RRN3:p.R9C、STAG3L2:p.L81fs、ZNF814:p.G320E、ACP6:p.V29G、AHNAK2:p.S2166F、AHNAK2:p.P1215S、AP1G1:p.I782fs、AQP2:p.N68T、BAIAP2L2:p.V396M、BMP6:p.Q118L、BST1:p.G36A、CDR1:p.V31A、CLDN7:p.S172A、CLIP1:p.S1018fs、COL18A1:p.G884fs、CROCC:p.A355P、CTAGE15P:p.A364V、CUBN:p.I2816M、DMRT2:p.T106S、DPY19L1:p.V249L、DSPP:p.D1047N、EBPL:p.L189V、EIF4G1:p.E465del、EXOSC2:p.R11P、FAM216A:p.P36S、FCGR2A:p.V222G、FMOD:p.S331R、FOLR2:p.Q112R、

FRG1B:p.L20P、GAGE2B:p.9_10insY、GDPD5:p.G593fs、GIMAP8:p.A544S、GLUD2:p.R300G、GLUD2:p.S496R、GPR135:p.Q5P、HOXD8:p.Q67H、IER5:p.R194G、IL25:p.C168fs、JSRP1:p.V92A、KRAS:p.G12D、KRTAP1-1:p.Y86C、KRTAP4-11:p.L161V、LTBP1:p.L163P、MAML2:p.Q591K、MAPK7:p.A501D、MEF2A:p.P99S、MET:p.H1094Y、MET:p.M1250T、MST1:p.N435fs、MUC2:p.T1582R、MUC2:p.T1722I、MUC4:p.A4222T、MUC4:p.T2335M、MUC4:p.P1138L、MUC5B:p.S1098A、MUC5B:p.S3431N、MYH7:p.A1487T、NBPF10:p.R39fs、NBPF10:p.Y638S、NEFH:p.654_654S>SPEKAKS、PARG:p.A584T、PBX2:p.Y262F、PIP4K2A:p.R219K、RLIM:p.S471P、RUNX2:p.Q71E、SGK223:p.R63S、SMARCB1:p.L365fs、SRCAP:p.Q1875fs、TBC1D2B:p.R920Q、TCF7L2:p.R482fs、TMEM131:p.K640fs、TMEM60:p.K77fs、TPPP:p.R30K、TRPV3:p.A218E、TTBK2:p.C83W、UBXN11:p.S510G、UGT1A1:p.T4A、UTS2R:p.A289E、YBX1:p.P250L、ZNF514:p.V81G、ZNF516:p.A256D、ZNF681:p.K405Q、ZNF814:p.D404E、ZNF814:p.P323H、ZXDB:p.G206R。

65. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有LIHC；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：TP53:p.R249S、CTNNB1:p.D32V、CTNNB1:p.D32G、CTNNB1:p.S33P、CTNNB1:p.K335I、CTNNB1:p.H36P、EEF1A1:p.T432L、GNAS:p.R844C、

OR2T4:p.V137L、TP53:p.H193R、ATXN1:p.Q217H、CSMD3:p.F2383fs、CTNNB1:p.D32N、CTNNB1:p.S33C、CTNNB1:p.G34V、CTNNB1:p.S45P、CTNNB1:p.N387K、DHRS4:p.I218T、DNM2:p.E378D、F5:p.Q426L、GALNTL5:p.A45T、GPX1:p.P77R、GRM8:p.R852C、IDH1:p.R132C、KIF26B:p.A2033T、KRT8:p.S59A、LOC100132247:p.T532P、NEB:p.D3854H、PIK3CA:p.H1047R、SOLH:p.R714H、TP53:p.R158H、TP53:p.V157F及ZNF638:p.D400N。

66. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有MM；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：NRAS:p.Q61R、KRAS:p.Q61H、KRAS:p.G13D、NRAS:p.Q61K、BRAF:p.V600E、NRAS:p.Q61H、NRAS:p.G13R、ZNF717:p.W315C、ATP13A4:p.V431G、DNAJC12:p.R135K、IRF4:p.K123R、KRAS:p.A146T、KRAS:p.Q61R、KRAS:p.G12A、KRAS:p.G12D、ZNF717:p.N594I、ACTG1:p.A22P、ARL6IP1:p.M75L、BEND2:p.E630K、BRAF:p.G469A、CDHR1:p.R218G、DIS3:p.R780K、DMXL2:p.D2412E、DNAJC10:p.I80K、EGR1:p.Q9H、FGFR3:p.*807S、IDH1:p.R132C、IL6ST:p.P216H、INTS12:p.M1V、KRAS:p.K117N、KRAS:p.A59G、KRAS:p.G12R、MAX:p.R36W、MLL5:p.G492E、NBPF1:p.E810K、NRAS:p.Q61L、NRAS:p.G12D、ODF2L:p.E294K、PADI2:p.T114P、PNLIP:p.T37M、PRDM1:p.S588C、PTPN11:p.E76K、PTPN14:p.E286K、RBM6:p.V675G、SCN10A:p.R1142H、SRGAP1:p.T61M、SUSD1:p.T168P、TAS2R16:p.V231I、

TINAG:p.E403K、TRIP12:p.L1775P及ZNF717:p.C844S。

67. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有PRAD；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：HSD17B7P2:p.N175S、RGPD5:p.P1760A、FRG1B:p.L52S、EEF1B2:p.S43G、FRG1B:p.I10T、FRG1B:p.A53T、LRRC37A2:p.T102S、NBPF10:p.E3455K、PTH2:p.L22V、CYP2D7P1:p.S32A、FAM47C:p.N648D、MAP3K9:p.E38del、MUC4:p.H4205Q、CHEK2:p.K373E、FRG1B:p.A11T、FRG1B:p.A50P、HLA-J:p.R124W、KRTAP1-5:p.I88T、KRTAP4-9:p.D18V、NPIP:p.A271V、PDGFRA:p.R483fs、ZNF780A:p.Q600H、ZNF845:p.R925H、ZNF91:p.R333H、ARFGAP3:p.N299fs、BTN2A3P:p.P3S、FNBP4:p.TT58del、HLA-A:p.Q78R、LOC554223:p.RAPWMEQ147del、PODXL:p.28_30PSP>P、POLI:p.D17del、SPOP:p.F133L、SYN2:p.A34del、TMEM52:p.23_26LLPL>L、UBC:p.L149R、ZNF208:p.I647S、ZNF799:p.E589G、ZNF814:p.D404E、ASTN2:p.L221del、B4GALNT1:p.G88fs、C16orf74:p.S21del、CCDC15:p.H458P、CD209:p.R129W、CNTNAP1:p.S1029I、DBR1:p.541_542DD>D、FAM22F:p.S691del、FRG1B:p.D32V、FRG1B:p.I34T、FRG1B:p.N55D、FRG1B:p.I59V、FRG1B:p.S71N、KIF25:p.W3R、KRTAP4-11:p.L161V、KRTAP4-11:p.M93V、KRTAP4-11:p.R51K、KRTAP4-6:p.S153Y、LILRB5:p.S598P、LMOD2:p.E124del、LOC645752:p.L40P、LRP1:p.P1058T、LRRIQ3:p.K244fs、LURAP1L:p.55_56insGGG、MLLT10:p.V463E、MYOCD:p.Q310del、

NBPF10:p.N1369D、OTUD4:p.T909I、PARG:p.A584T、PEX1:p.I370fs、POTEC:p.K507E、POTEC:p.R477Q、POU4F2:p.68_69insG、PRG4:p.T417P、SDHAP2:p.R31C、SPOP:p.F133C、SPOP:p.W131G、TIMD4:p.T152del、TMEM121:p.P299del、TP53:p.G245S、UBC:p.R73L、UBC:p.I191T、WASH3P:p.G175S、ZMIZ1:p.D1048fs、ZNF709:p.T413I、ACADS:p.R330H、ADAMTS7:p.K1357fs、AFF2:p.R597H、AGAP6:p.S127I、AK302238:p.A44T、AK302879:p.Q191R、ALDH1A2:p.R85C、ANAPC1:p.T537A、ANKRD36C:p.H438R、AP4B1:p.R276W、ARFGAP2:p.S38N、BBS9:p.F268fs、BC139719:p.L133R、BRAF:p.G469A、C22orf43:p.D171del、CANT1:p.K131R、CHD3:p.E35del、CLEC4A:p.R209H、CNOT3:p.E20K、CNPY3:p.17_18LL>L、CNTNAP3B:p.S317T、CNTNAP3B:p.M1247I、CTNNB1:p.T41A、DDX10:p.D788del、DLC1:p.S741T、DPY19L2:p.M210V、EDC4:p.S617del、EFCAB6:p.R379K、ERC2:p.927_928HH>H、FAM111B:p.S269fs、FEM1A:p.L620M、FHOD3:p.A632fs、FLJ43860:p.L850fs、FMN2:p.G59del、FNBP4:p.914_915PP>P、FRG1:p.E86del、FRG1B:p.K13N、FRG1B:p.P42Q、GABRB1:p.R416C、GABRR2:p.A368V、GAGE2B:p.9_10insY、GOLGA8DP:p.N84H、GOT2:p.R355W、GPATCH4:p.K210fs、HDGFL1:p.188_189insA、HLA-DQB2:p.G250S、HLA-DQB2:p.R247H、IDH1:p.R132H、IL27:p.E176del、IRF2BPL:p.123_125QQQ>Q、KANK3:p.DGDS489del、KIAA1462:p.858_859SS>S、KRTAP4-11:p.S48R、KRTAP4-7:p.S57P、KRTAP4-8:p.C95S、

LPHN3:p.R826H、LRP10:p.L11del、LRP5:p.S1609P、LRRC16B:p.R787W、MAS1L:p.R324G、MECOM:p.R915Q、MED12:p.L1224F、MED12L:p.Q2115del、MESP2:p.GQGQGQGQ195del、MGAT4C:p.T345M、MLEC:p.E238del、MSLNL:p.T68P、MUC7:p.S173P、MYC:p.Q37del、NBPF10:p.N440D、NLRP6:p.E611del、NOX3:p.C404fs、OR1M1:p.V69I、OR7E24:p.L7fs、OTUD4:p.A153del、PANK2:p.T417fs、PCLO:p.S496P、PCNT:p.S162G、PCSK9:p.23_24insL、PHOSPHO1:p.S32del、POU4F1:p.H108del、PRAMEF8:p.R319H、PRDM7:p.M387L、PRG4:p.T597P、PTPRD:p.R1323C、PTPRF:p.R1174Q、ROBO3:p.RS1367del、ROCK1:p.T518S、RPTN:p.G296S、RTL1:p.152_152E>EE、SIRPA:p.V233I、SLC2A6:p.A230D、SLC8A2:p.E710del、SMG7:p.E846fs、SNAPC4:p.S542del、SP8:p.G165del、SPOP:p.F133I、SPOP:p.F133V、SPOP:p.F102C、SPOP:p.F102V、SRSF11:p.G17fs、SRSF4:p.K396del、SSPO:p.S4198fs、STAG3L2:p.L81fs、STK19:p.R18fs、TBC1D2B:p.R920Q、TBC1D9:p.P1233T、TCHH:p.P1158R、TCOF1:p.K1366del、TNRC18:p.2664_2665SS>S、TP53:p.R248Q、TP53:p.R175H、TP53:p.C141G、TSPAN4:p.L92V、UBXN11:p.GPGPGPSP504del、UTP3:p.E81del、WASH3P:p.L187V、ZAN:p.P717L、ZAN:p.L878P、ZFP90:p.R591fs、ZNF761:p.H373R及ZNF91:p.H305R。

68. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有STAD；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：RNF43:p.G659fs、BZRAP1:p.P1416fs、XYLT2:p.Y526fs、LARP4B:p.T163fs、PGM5:p.I98V、ZBTB20:p.P692fs、ARID1A:p.G1848fs、FHOD3:p.P334fs、KIAA0182:p.T120fs、ATP6V1B1:p.Y383fs、PIK3CA:p.H1047R、FRMD4A:p.P1005fs、PIK3CA:p.E545K、CDC14A:p.N123fs、KRAS:p.G13D、MLL2:p.T172fs、BCORL1:p.S1679fs、PLEKHA6:p.V328fs、C9orf131:p.P342fs、CD4:p.Q164fs、FBXW7:p.R465C、GNG12:p.T68fs、IRS4:p.G591fs、JARID2:p.V422fs、KIAA0195:p.I902fs、MBD6:p.P732fs、MVK:p.P138fs、PAMR1:p.G101fs、WNT16:p.W165fs、ZNF43:p.N251fs、ABCA6:p.L306fs、ADAM28:p.K73fs、AOC3:p.L79fs、ATP2A1:p.R819fs、B2M:p.L13fs、C6orf89:p.P58fs、CNTLN:p.K1305fs、CR2:p.V206fs、DYRK4:p.K468fs、ERBB3:p.V104M、GLI1:p.W272fs、KRAS:p.G12D、MLL2:p.T172fs、MSH6:p.T1085fs、NLK:p.C190fs、OR5M3:p.T89fs、PAX6:p.P375fs、PTEN:p.L265fs、RABGAP1:p.K928fs、RAD51AP2:p.T316fs、SVIL:p.G1862fs、TP53:p.R273H、WNK4:p.G606fs、ARID1A:p.P2139fs、AXIN2:p.G665fs、C13orf33:p.R67fs、C1QTNF5:p.P308fs、CELSR1:p.G614fs、CRYGD:p.G159fs、DCHS1:p.R235fs、DDC:p.I433fs、EDNRB:p.Y383fs、EPHA2:p.P460fs、FOXN3:p.P96fs、HDAC4:p.P901fs、INF2:p.S527fs、KIRREL2:p.V649fs、KLF3:p.I104fs、KLHL14:p.P231fs、MAP7D3:p.Q308fs、OTX2:p.R44fs、PAFAH1B1:p.K302fs、PLAGL2:p.P10fs、POLM:p.P97fs、

PRPF40B:p.I31fs、RALGAPB:p.T379fs、SBNO1:p.N1139fs、SERPINI1:p.L81fs、SH3KBP1:p.L574fs、SLC12A7:p.H686fs、SLC27A3:p.P643fs、TBX4:p.S370fs、TP53:p.R273C、TP53:p.R175H、TRAM1L1:p.R345fs、WBP1:p.P138fs、ABCC4:p.L883fs、AKAP13:p.K2785fs、ALDH3A1:p.P562fs、ALPK2:p.L356fs、ARFGEF1:p.P1552fs、ARID1A:p.G1848fs、AVPR1A:p.F351fs、BAX:p.M38fs、C14orf43:p.P313fs、C1QTNF5:p.G194fs、C7orf50:p.L179fs、CDC25C:p.K322fs、CETN3:p.K63fs、CHD3:p.P597fs、CTCF:p.K202fs、CTSC:p.F105fs、DDX17:p.G163fs、DLGAP3:p.G377fs、EBF3:p.G255fs、FHDC1:p.F100fs、FILIP1L:p.K749fs、FLNB:p.W529fs、GBP7:p.G431fs、GCC2:p.E700fs、GPR161:p.G517fs、IWS1:p.S802fs、KIAA0240:p.K895fs、KIAA1967:p.P415fs、LRRC43:p.D558fs、MACF1:p.R707fs、MBD6:p.G780fs、MLL3:p.F4496fs、MPRIP:p.A351fs、MUC6:p.2129_2130SS>S、NOX5:p.P467fs、OPTN:p.P24fs、OR4K5:p.F177fs、PIK3CA:p.N345K、PIK3CA:p.E542K、PLXNA1:p.P1016fs、PNPLA7:p.P1199fs、PODN:p.I301fs、PPP2R3B:p.T389fs、PRSS36:p.L680fs、RGL2:p.G203fs、RHOQ:p.V190fs、RNF111:p.R771fs、RTN2:p.P313fs、SALL4:p.V995fs、SBF1:p.P1076fs、SETDB2:p.R715fs、SNAPC2:p.T292fs、SPG20:p.F232fs、SRCAP:p.P1876fs、STAT2:p.P489fs、TCHP:p.E172fs、TP53:p.R282W、TP53:p.R248Q、USP21:p.K474fs、WDR7:p.G262fs、ZBTB7C:p.E157fs、ZFC3H1:p.K385fs、ZNF124:p.T339fs、ZNF626:p.K115fs、ADNP2:p.S322fs、

AGAP1:p.G127fs、ALDH2:p.L286fs、ARHGAP5:p.D890fs、ARHGEF17:p.A615fs、ARID1A:p.Y1324fs、ART1:p.I243fs、ASCL4:p.D35fs、ATXN2L:p.G998fs、B3GNT5:p.F30fs、BCKDHA:p.H37fs、BCL9L:p.P1127fs、BEND3:p.D265fs、BNC2:p.S575R、BRD3:p.P24fs、C12orf51:p.P4235fs、C1R:p.P216fs、C7orf49:p.G130fs、CA2:p.I145fs、CABP5:p.R145fs、CASD1:p.F781fs、CASP8:p.R471fs、CCDC153:p.P200fs、CD93:p.D280fs、CROT:p.L32fs、CSF3R:p.P468fs、CTCF:p.K202fs、ERBB2:p.S310F、FAM46D:p.S69R、FBN3:p.G601fs、FBXO21:p.F144fs、GAS6:p.G150fs、GLYR1:p.G380fs、GXYLT1:p.L223fs、HAUS6:p.S530fs、IGF2R:p.T1314fs、ITGB1:p.L378I、KDM3B:p.P1316fs、KIF13A:p.K1115fs、KLF3:p.S224fs、LARP1:p.A223fs、LRP1:p.G1488fs、LRP1:p.G1488fs、MAGEE2:p.Q45fs、MAMSTR:p.P162fs、MAPK15:p.Q511fs、MLL2:p.P647fs、MOCS2:p.P22fs、MTG1:p.L105fs、MTG1:p.H327fs、MTIF2:p.N109fs、NID2:p.R1035fs、PAX2:p.P395fs、PCCA:p.R230H、PDZD2:p.R101fs、PFKP:p.M593fs、PIK3CA:p.R88Q、PLA2G1B:p.L53fs、PLAU:p.R201fs、PMEPA1:p.P208fs、POP1:p.K750fs、PTCH1:p.P1307fs、PTPRT:p.P1075fs、RDBP:p.P6fs、RNMT:p.K392fs、ROBO2:p.P1080fs、RUNDC3B:p.L6fs、SDAD1:p.K275fs、SLC10A6:p.G109fs、SNAPC1:p.D211fs、SPATA5L1:p.C685fs、SPTA1:p.K1732T、STAT5B:p.P367fs、SYT4:p.M1fs、TAF1L:p.K851fs、TAP2:p.L75fs、TBL1XR1:p.N126fs、THEMIS:p.K406fs、TMEM79:p.P161fs、

TP53:p.C176F、TP53BP2:p.K69fs、TP53RK:p.L174fs、UBQLN2:p.A523fs、UHRF1BP1:p.I1330fs、VPRBP:p.K939fs、VPS13B:p.T56fs、WASF3:p.P305fs、YLPM1:p.E1178fs、ZC3H13:p.K1006fs、ZC3H18:p.P825fs、ZC3H4:p.E779Q、ZNF48:p.P247fs、ZNF608:p.A465fs、ZNF878:p.S238fs、ZSCAN18:p.P225fs、ABCB1:p.R527fs、ABCB6:p.G318fs、ACACB:p.G255fs、ACP1:p.Q123fs、ACTL6A:p.L88fs、ADAMTSL4:p.G778fs、AGBL5:p.I420fs、AHI1:p.K303fs、AKAP9:p.M3743fs、AKD1:p.R1209fs、ANKRD40:p.D99E、ARHGEF5:p.S1512fs、ARID1A:p.K1071fs、ARID3A:p.S557G、ARPP21:p.I130fs、ASPN:p.F67fs、ASXL3:p.E873fs、ATP6V1C2:p.R312fs、BEST3:p.P444fs、BRAF:p.P403fs、BRMS1:p.G107fs、BTBD11:p.T451fs、BTBD11:p.A561V、C11orf9:p.S261fs、C14orf102:p.R90fs、C14orf43:p.Q36fs、C15orf52:p.G98fs、C19orf21:p.R262C、C19orf70:p.P50fs、C20orf160:p.P46fs、C3:p.P890fs、CADPS2:p.N468fs、CASC3:p.S232F、CASC3:p.P603L、CASC3:p.P645L、CASC3:p.S658L、CASKIN2:p.P727fs、CBLL1:p.E138fs、CBLN3:p.P69fs、CCDC108:p.P1164fs、CCDC148:p.K420fs、CCDC153:p.P200fs、CCDC169-SOHLH2:p.K162R、CCDC88A:p.K677fs、CD1E:p.F85V、CD3EAP:p.K218fs、CDH11:p.K357T、CDH1:p.D254Y、CDH23:p.V403I、CFI:p.K37fs、CHPF2:p.D645fs、CIC:p.R507fs、CIC:p.A1114fs、CIC:p.A1114fs、CLSTN1:p.T615M、CNBD1:p.L396P、CNGA4:p.K510T、CNOT6:p.S248fs、CNTROB:p.R920fs、COL9A1:p.P283fs、

CPAMD8:p.P784fs、CR1L:p.L79fs、CRB1:p.F630V、CSMD1:p.L3410V、CTNNA3:p.K856fs、CTNND1:p.I447fs、CTSD:p.P89fs、CUX1:p.A439fs、CYP7B1:p.K332T、DAB2IP:p.D994fs、DNAH11:p.T871fs、DNAH8:p.K1688fs、DNAJC1:p.K193fs、DNM2:p.P791fs、DSTN:p.F101fs、DYRK1B:p.Q545fs、EAF2:p.V109fs、EDNRB:p.A104V、EEA1:p.N570fs、EFHA1:p.F290fs、EGR1:p.P332fs、EIF4G3:p.K563fs、ELK3:p.S173fs、ENTPD2:p.G204fs、EOMES:p.G332fs、EPHA10:p.P868fs、EPHB6:p.G54fs、EPHX1:p.P132fs、EPPK1:p.G2015fs、ERBB4:p.M1fs、ESF1:p.T99fs、EXOSC8:p.L160fs、FAM113B:p.R51fs、FAM116A:p.L441fs、FAM135B:p.S645R、FAM151A:p.P117fs、FAM193A:p.D428fs、FAM193A:p.D428fs、FAM214B:p.A42fs、FAM40B:p.R740C、FAM70B:p.S19L、FASTKD1:p.K3fs、FBXW7:p.R479Q、FBXW9:p.G298fs、FER:p.L474fs、FERMT2:p.K152fs、FGGY:p.G138fs、FIGNL1:p.K309fs、FLG:p.K159fs、FLNB:p.W529fs、FOLH1:p.S501fs、FYB:p.G324fs、GABRD:p.Q412fs、GALNTL1:p.W317fs、GANAB:p.L23fs、GCDH:p.L389fs、GIMAP7:p.V276fs、GIPC3:p.G227fs、GLI3:p.P1033fs、GLIPR1L2:p.G92fs、GNPNAT1:p.F54fs、GON4L:p.M134fs、GPATCH4:p.K210fs、GRK4:p.K22fs、GTF3C1:p.S767fs、GTF3C4:p.E562fs、H2AFY2:p.K144fs、HCFC1R1:p.P83fs、HCRTR2:p.S9fs、HCRTR2:p.S9fs、HDLBP:p.G747fs、HECA:p.R333fs、HIVEP3:p.H554fs、HIVEP3:p.P534fs、HLA-C:p.P209fs、HOOK1:p.L361fs、

HOXD8:p.P122fs、HTT:p.G697fs、IBTK:p.K1213fs、IDE:p.K37fs、IFT172:p.A837T、INPPL1:p.A974fs、INPPL1:p.P1154fs、INSM2:p.T533fs、INTS12:p.L14fs、INVS:p.R815fs、IPO11:p.S844fs、IRX6:p.A425V、ISG20L2:p.P288fs、ITGB8:p.A7fs、JARID2:p.G394fs、JHDM1D:p.R97fs、KBTBD6:p.G442fs、KCNC1:p.K455fs、KCNH2:p.G149A、KCNJ10:p.P102fs、KCNMB2:p.N151K、KCTD21:p.T6M、KIAA0586:p.A1592fs、KIAA1009:p.F406fs、KIAA1109:p.E1588fs、KIAA2026:p.K690fs、KIF26B:p.S1065fs、KIF6:p.L204fs、KIRREL:p.P335fs、KLC2:p.T568fs、KRAS:p.Q61H、KRAS:p.G12S、MAN1C1:p.G431fs、MAP1A:p.P2063fs、MAP2:p.K1472fs、MAP3K12:p.R449del、MAP7D1:p.A80fs、MGST2:p.K102fs、MKI67:p.T1664fs、MKL1:p.P307fs、MLL2:p.P2354fs、MLL2:p.L656fs、MLL2:p.P647fs、MLL2:p.L1877fs、MMP3:p.I64fs、MPDZ:p.K1582fs、MTUS2:p.R1005W、MUC16:p.A6156T、MYB:p.R481fs、MYEOV:p.L269fs、MYH11:p.K1263del、MYO18A:p.P209fs、MYO7A:p.I539fs、MYOCD:p.G226fs、NAA16:p.H514fs、NBEA:p.V2247fs、NCAPD3:p.Q909fs、NCAPH:p.T466fs、NCOR2:p.P1308fs、NEFM:p.A213V、NEK8:p.V690fs、NF1:p.T676fs、NHLRC1:p.F204fs、NKD1:p.P286fs、NPR3:p.Y138H、NT5M:p.P206fs、NUFIP2:p.R224fs、NUP210:p.L135fs、NYNRIN:p.G113fs、OBSCN:p.G997fs、OGDH:p.Y948fs、OR4C16:p.S135R、OR51A7:p.L124R、OR7C1:p.C179fs、OSBP2:p.H627fs、OTOF:p.E1304K、P2RX1:p.R20fs、PALB2:p.M296fs、

PALB2:p.N280fs、PANK1:p.K400fs、PAPD4:p.C225fs、PAPPA2:p.I1683fs、PARP15:p.K461fs、PARP4:p.K847fs、PCDH10:p.N118fs、PCDH10:p.P225fs、PCGF3:p.H63fs、PELI2:p.G197fs、PHACTR1:p.V251fs、PHACTR2:p.S237fs、PHACTR4:p.S354fs、PHKB:p.K642fs、PIAS3:p.H116fs、PIGO:p.P787fs、PIGT:p.A346fs、PIK3R3:p.M341fs、PITPNM1:p.P295fs、PKN2:p.K76fs、PLA2G15:p.W230fs、PLAG1:p.K184fs、PLEKHO1:p.T254fs、PLOD3:p.R297fs、PLOD3:p.P296fs、PLXNA2:p.P464fs、POLQ:p.L1430fs、PPARGC1B:p.P135fs、PPL:p.P454fs、PPM1H:p.P226fs、PPP1R12C:p.P372fs、PREX2:p.R562fs、PRICKLE4:p.Q109fs、PRKAR1B:p.P87fs、PRKCG:p.R345C、PRMT8:p.S28fs、PROX1:p.F592fs、PRRG3:p.R163fs、PSD2:p.G256fs、PTCHD3:p.F588fs、PTPN4:p.N319fs、PTPRC:p.Q895H、PWWP2B:p.S84fs、PYGO2:p.Q150fs、RABGAP1:p.K928fs、RB1CC1:p.N1171fs、RBM6:p.R96fs、RHOA:p.Y42C、RIMS1:p.R71G、RIMS2:p.V401fs、RING1:p.G171fs、RINT1:p.L107fs、RNF43:p.P116fs、ROBO2:p.K1293fs、RPS6KA6:p.K109fs、RRS1:p.N45fs、RSF1:p.K386fs、RUSC2:p.P486fs、RXFP3:p.A60V、SAFB:p.W798fs、SCARF1:p.R614Q、SCLT1:p.K109fs、SERPINB12:p.Q168fs、SGK3:p.L61fs、SGOL2:p.E407fs、SIGLEC1:p.P318fs、SIK1:p.Q678fs、SLC16A6:p.G98fs、SLC25A17:p.F28fs、SLC26A7:p.I629fs、SLC32A1:p.V494I、SLC4A3:p.L1061fs、SLC7A10:p.P157fs、SLC9A2:p.T746fs、SLITRK1:p.K45fs、

SND1:p.H721fs、SOAT1:p.F64fs、SORBS2:p.E1158fs、SOX7:p.L309fs、SPAG17:p.Q1264fs、SPTY2D1:p.P485fs、SRCIN1:p.P865fs、SREBF2:p.H763fs、SRRT:p.G102fs、STAB1:p.P1120fs、STRADA:p.R333fs、STX2:p.K252fs、SV2A:p.E138fs、SYCP2:p.M176fs、SYNJ2:p.P1111fs、TAS2R10:p.L196fs、TBC1D22B:p.A175fs、TEAD2:p.P298fs、TFE3:p.G482fs、TGM6:p.T358fs、TIMM44:p.K83fs、TIMP3:p.A199fs、TLR4:p.L498V、TMEM132D:p.P206fs、TMEM41A:p.F156fs、TMEM41B:p.F230fs、TMTC4:p.R611C、TNK2:p.P632fs、TOPBP1:p.I1381fs、TP53:p.E286K、TP53:p.P152fs、TRIP11:p.K541fs、TRPA1:p.T673fs、TRPM8:p.H765fs、TTF1:p.K336fs、TTI1:p.R707H、TTN:p.E15192D、U2AF2:p.L175fs、UBC:p.G684fs、UBR4:p.P2802fs、UPF2:p.E1033D、UPK2:p.P49fs、USP13:p.I116fs、USP15:p.K782fs、VASH1:p.G3fs、VEZF1:p.355_356insN、VPS13A:p.F2883fs、WAPAL:p.R522fs、WDFY3:p.L1842fs、WDR59:p.N160fs、WDR5:p.N214fs、WDR60:p.Q412fs、WDTC1:p.M287fs、WHSC1L1:p.K418fs、WNT1:p.W167fs、XIRP2:p.E1007D、YBX2:p.P226fs、YIF1A:p.R131fs、ZBBX:p.E151del、ZBTB40:p.L262fs、ZBTB7C:p.G342fs、ZBTB7C:p.D154fs、ZC3H18:p.T701fs、ZDHHC5:p.E651del、ZDHHC7:p.P316fs、ZFHX3:p.R1893fs、ZFHX3:p.E763fs、ZFHX4:p.L408fs、ZHX3:p.N249K、ZIM3:p.I384fs、ZKSCAN5:p.D13fs、ZMYM4:p.K345fs、ZNF236:p.T1410M、ZNF23:p.F122fs、ZNF334:p.K426fs、ZNF358:p.T130fs、

ZNF701:p.L296fs、ZNF711:p.L737fs及ZNF831:p.A49fs。

69. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有TGCT；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：FAM18B2:p.C51Y、BTN2A3P:p.P3S、MUC2:p.G1715S、NBPF10:p.L44V、SP8:p.G156S、DCP1B:p.Q252H、DEK:p.E41D、ERC1:p.K692R、FAM104B:p.D75H、FRG1B:p.M49V、KRTAP10-10:p.V234M、LRRCC1:p.A6V、NRAS:p.Q61R、PNPLA4:p.L223P、ANKLE1:p.C644fs、ANKLE1:p.C644fs、KIT:p.D816H、KIT:p.D816Y、MUC2:p.T1597I、PSMD11:p.A5V、RHPN2:p.V73M、RUNX2:p.Q71E、SP4:p.E7K、TUBA1C:p.L146F、ZNF814:p.Y324H、ADAMTS17:p.N572T、ATRX:p.K1936R、BCL11B:p.E535D、BMP2K:p.Q460H、BMP2K:p.H487Q、C12orf32:p.D60V、C22orf43:p.K19E、CDC27:p.N571I、CDC27:p.P242S、DDX11:p.K208fs、EBPL:p.L189V、EZH2:p.K510R、FAM86A:p.A141T、GAS2L2:p.D189A、GRID2IP:p.LS754del、HGC6.3:p.E171G、KIT:p.D816V、KIT:p.N822Y、KIT:p.N822K、KRAS:p.Q61R、KRAS:p.G12V、KRTAP1-1:p.I116V、LRRC37BP1:p.Y166D、MEF2A:p.R127Q、MFF:p.S7F、MST1:p.R347W、MUC4:p.S3048L、MUC6:p.H2000Q、MUC6:p.P1977H、NAT10:p.I393T、OPLAH:p.A900D、PIEZO1:p.Q749E、PRAMEF4:p.F300V、RBM10:p.E184D、SERINC2:p.T121P、SPIN2A:p.M150V、SRRM2:p.A2257S、SSBP3:p.K6R、ZNF680:p.R501W、ABCC8:p.Y512C、

ABCC9:p.L466P、ABCD1:p.H169Q、ABL2:p.P19T、ACVR2B:p.R48C、AHDC1:p.P33fs、AHNAK2:p.L1640M、ALPPL2:p.W31S、AMMECR1:p.G77C、ANK3:p.D1322E、ANKHD1-EIF4EBP3:p.G60S、ANKRD11:p.Y2015S、ANKRD11:p.K369R、ANKRD50:p.V637M、APBB3:p.L450P、ARHGAP24:p.T35A、ARID4B:p.G1076A、ARMC3:p.A514T、ARRB2:p.T99P、ATAD5:p.I305V、ATXN3:p.305_306insQQQQQQQ、AVPR1B:p.G39R、AXDND1:p.E994Q、BAI2:p.A231G、BEST3:p.P383L、BIRC6:p.V414L、BIRC8:p.A225M、BRWD1:p.K1319R、BTN2A2:p.L15F、C12orf51:p.A2644T、C12orf65:p.K143T、C16orf62:p.L244I、C1QBP:p.T225I、C1orf167:p.S123G、C5orf25:p.Y4F、CACNA1E:p.G2080S、CAPNS1:p.LV303del、CCDC159:p.A332S、CDKAL1:p.P409L、CDYL:p.V48A、CDYL:p.A60G、CELSR2:p.L17P、CHD4:p.E138D、CKAP5:p.G576A、CLCC1:p.K52R、CMTM8:p.S26T、CNKSR2:p.P249L、CNTN5:p.I501T、COG5:p.H617R、COL15A1:p.K708R、COL6A3:p.A2378D、CRYGB:p.R143G、CSGALNACT2:p.L362F、CUL4A:p.I438F、CXXC1:p.Q156H、CYP19A1:p.F406L、DCLRE1B:p.F28I、DDX11:p.A376T、DDX11:p.E680D、DEPDC5:p.R1525Q、DLC1:p.S741T、DNMT1:p.R995Q、DOCK11:p.Q169E、DSPP:p.D1047N、E2F7:p.I91S、EBF1:p.D353G、ECI2:p.K55R、EEF1A2:p.Y418S、EIF3J:p.A8G、EML6:p.K805R、EPAS1:p.S474T、EPRS:p.L1335I、ERICH1:p.E327K、FAM101B:p.L5P、FAM104A:p.M1R、FAM110D:p.R71H、FAM155A:p.Q95R、FAM186A:p.G1492E、

FAM194B:p.Y139H、FAM21B:p.P1231S、FAM32A:p.K9R、FAM46B:p.H416R、FAM48B1:p.I499V、FAM48B1:p.A516P、FAM5C:p.S425W、FAM86C2P:p.C120Y、FBXL14:p.V48G、FRMPD3:p.Q832del、FRS2:p.L47S、GDF5:p.E105fs、GPNMB:p.C3fs、GPT2:p.R10P、H2AFV:p.Q125R、HDLBP:p.R503C、HERC2:p.R2129C、HIST1H2BJ:p.K13R、HLX:p.N231K、HMGB3:p.E198D、HSF4:p.R169W、HSF4:p.S491P、HYAL4:p.D222N、INO80E:p.P206fs、INTS4:p.S460A、IQCF6:p.R3H、ITPR1:p.M1569I、ITPR3:p.R1698G、KANSL3:p.G376E、KCNA4:p.E627del、KDM5A:p.P423S、KDM6A:p.Y362fs、KIAA0020:p.K63R、KIDINS220:p.N851S、KIT:p.W557G、KLHDC2:p.W321S、KRAS:p.A146T、KRAS:p.Q61H、KRAS:p.Q61L、KRAS:p.G12A、KRAS:p.G12R、KRBA1:p.R839G、KRTAP4-8:p.T63S、L2HGDH:p.P441del、LAMC3:p.P174Q、LHCGR:p.L16Q、LOC401296:p.L144M、LPHN2:p.F906I、LRP12:p.G310C、LTB4R:p.F73L、LTBP3:p.L35del、LUC7L3:p.S148T、LYPD4:p.T64K、MAMLD1:p.Q572L、MAP4K2:p.R341G、MAPK7:p.A501D、MAT2A:p.E166G、MED12L:p.C1292Y、MESP2:p.Q182E、MEX3C:p.R534S、MIER2:p.L131F、MLL5:p.Y66C、MLLT3:p.177_178SS>S、MMS19:p.D1005N、MRPS25:p.E119del、MSH6:p.D576A、MTIF3:p.G65E、MUC17:p.M1807T、MUC17:p.T2279N、MUC17:p.G2474S、MUC2:p.TTPSPP1475del、MUC2:p.T1568M、MUC2:p.T1580N、MUC2:p.T1704I、MUC2:p.T1706M、MUC4:p.H1117D、MUC5B:p.R1097H、

MYEF2:p.K323E、MYEOV:p.L302H、MYH8:p.A785V、MYO1A:p.N584K、NAP1L3:p.P353R、NAV1:p.I1433M、NCAM1:p.E131G、NEB:p.D3107N、NEFH:p.V670E、NELL2:p.G170D、NHS:p.D1561N、NKD2:p.H447del、NSD1:p.T461R、NT5C3:p.A3P、NYAP1:p.P480S、OBSCN:p.A908T、OR10J1:p.R244Q、OR1S2:p.M298I、OR2L3:p.K294R、OR6K6:p.F311L、PABPC3:p.V325fs、PBX2:p.Y262F、PCDHB4:p.P255F、PCMTD1:p.V281A、PCP4L1:p.K64R、PDE3A:p.A98E、PDIA6:p.N56K、PDS5A:p.L1309F、PHLDA2:p.R28S、PIGR:p.V183G、PIK3CA:p.E545K、PIK3CD:p.C381R、PKD1:p.T938M、PLEKHM1:p.A895V、PLEKHN1:p.A600D、PLXND1:p.R367L、PMS2:p.K651R、PNMA3:p.E200G、POTEF:p.S112G、PRAMEF8:p.I448V、PRDM2:p.E278D、PRODH:p.L527V、PRPF31:p.R289W、PSME4:p.N495D、PTGR1:p.E40A、PTPRB:p.Q726H、RABGEF1:p.N207D、RAC1:p.P34R、RANBP17:p.M900I、REV3L:p.A30S、RFC3:p.I82N、RFC3:p.K296N、RIMBP3:p.Q1154R、RPL19:p.R151C、RPL5:p.R58fs、RPTN:p.M538I、RRAD:p.A278E、RYR1:p.D668Y、RYR2:p.L2023F、SAFB:p.G799V、SCRIB:p.G332V、SDK1:p.Y2146C、SEC16A:p.T443K、SEC31B:p.P905S、SELO:p.R565Q、SELP:p.A297T、SI:p.I1681K、SLC2A7:p.H268Q、SLC37A1:p.V528I、SLC38A1:p.G100R、SMARCA2:p.D1158A、SMARCA5:p.T156fs、SMC3:p.E970Q、SMG1:p.P2696H、SNRNP200:p.A2129G、SPIN2B:p.M150V、ST6GALNAC1:p.S354N、

STAMBPL1:p.Y143H、STARD8:p.G662A、STON1-GTF2A1L:p.N451S、SYMPK:p.A336G、TAS2R8:p.W98C、TCHH:p.W1016R、TET1:p.T1472S、TIAM1:p.G247M、TNS1:p.P183S、TOR1AIP2:p.G146R、TPRX1:p.S216P、TPRX1:p.S200P、TRMT61A:p.S244I、TSPAN4:p.L92V、TTF1:p.Q530R、UBE2M:p.G131D、UBR5:p.R2517S、UGT2B11:p.R447I、UMODL1:p.M559I、UNC93A:p.V445A、USP46:p.Q137R、VWA2:p.G317D、VWA7:p.V792G、WASH3P:p.L187V、WNT5B:p.K327E、WRN:p.E510D、XDH:p.P410S、ZAN:p.S755P、ZC3H11A:p.I777T、ZC3H7A:p.C575S、ZDHHC11:p.H250Q、ZFHX4:p.D3239N、ZKSCAN3:p.K200A、ZMYM4:p.T367I、ZNF174:p.P353T、ZNF322:p.Y353C、ZNF592:p.K324Q、ZNF592:p.P500T、ZNF782:p.C145F、ZNF799:p.C453R、ZNF804B:p.P644S及ZNRF3:p.R889W。

70. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有THCA；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：BRAF:p.V600E、NRAS:p.Q61R、HRAS:p.Q61R、NRAS:p.Q61K、OTUD4:p.T909I、HRAS:p.Q61K、NLRP6:p.E611G、AKT1:p.E17K、ANKMY1:p.N302I、ATP6V1A:p.L237P、CYP19A1:p.S113I、DCUN1D4:p.L275P、DGCR8:p.E518K、DLC1:p.S741T、DNAH10:p.C1853F、EIF1AX:p.G9D、FAM75D5:p.L222P、FCGRT:p.P40A、KRAS:p.Q61K、LMX1B:p.Q285del、MAS1L:p.R324G、MED15:p.S35I、

MEGF6:p.Y393C、ODZ2:p.A1529V、OR5L1:p.R122H、OR6K6:p.F311L、OTX1:p.D315N、POTEE:p.S75G、SCN5A:p.D1978H、TOP2A:p.K1199E及TSG101:p.K265R。

71. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有UCS；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：TP53:p.R248Q、ZNF814:p.D404E、BTN2A3P:p.P3S、FBXW7:p.R465C、FRG1B:p.G65E、MUC4:p.H4205Q、NBPF10:p.V99F、PIK3CA:p.E545K、PIK3CA:p.H1047R、PPP2R1A:p.P179R、DDX11L2:p.*128Q、FBXW7:p.R479Q、FRG1B:p.K13N、FRG1B:p.L52S、HSD17B7P2:p.N175S、KRAS:p.G12V、LOC283788:p.S37G、TP53:p.R273H、TP53:p.S241Y、ADAMTS12:p.E359K、BCL2L11:p.L187fs、CDC27:p.L460fs、CHEK2:p.K373E、ESPNP:p.W122fs、FBXW7:p.R689W、FBXW7:p.R505G、FBXW7:p.R465H、FCGBP:p.V4019M、FRG1B:p.I10T、FRG1B:p.D32V、FRG1B:p.R37K、KRAS:p.G12D、LOC100233156:p.R21C、LOC283788:p.I46M、LRP1B:p.L1392F、MAMLD1:p.Q572L、MST1P9:p.L319P、MUC4:p.A2390T、MUC4:p.G2172S、NBPF10:p.E3455K、PIK3CA:p.G106V、PODXL:p.28_30PSP>P、POTEC:p.R477Q、PPP2R1A:p.R183W、PPP2R1A:p.S219L、PTPN18:p.TG378del、RGPD3:p.N756D、RPL13AP20:p.G107R、SAMD4B:p.R477W、SMAP1:p.E169fs、TP53:p.H193R、TP53:p.H179R、TP53:p.R175H、TUBBP5:p.R119H及U2AF1:p.S34F。

72. 如段落30至36中任一段落之醫藥組合物，其中：

(a) 個體之群體患有PAAD；且

(b) 該至少一個腫瘤特異性突變包含選自由以下組成之群之突變之任一組合：RBM14:p.AAAAAAA286del、KRAS:p.G12D、JMY:p.PPPPPPPPPPP811del、RIOK1:p.D69del、LCE2A:p.SSGGCCGSSSGGCC47del、KRAS:p.G12V、C1QB:p.GPKGPMGPKGGPGAPGAP90del、ZFHX3:p.V777del、DBR1:p.541_542DD>D、AEBP1:p.K1133del、KRAS:p.G12R、RBM47:p.495_502AAAAAAAA>A、AP3S1:p.K41fs、MLL2:p.AEGPHLSPQPEELHLSPQ792del、RFX1:p.386_401GGGGGGGGGGGGGGSG>G、AXDND1:p.EQ991del、HERC2P3:p.A803V、RGPD3:p.N756D、FNDC1:p.D1180del、ANAPC1:p.T537A、IRS4:p.21_22AA>A、GIGYF2:p.Q1005del、NCOA3:p.Q1253fs、SIK3:p.950_951QQ>Q、GPR6:p.AAAAATAAGGPDTGEWGPPA36del、NBPF12:p.D1323fs、SHROOM4:p.1156_1157EE>E、ZMIZ2:p.VAAAAATATATATAT153del、DGKK:p.PAPP41del、LZTS1:p.RTQDLEGALRTKGLEL432del、CASQ2:p.395_396DD>D、DCP1B:p.251_252insH、ESPNP:p.296_317PPPPSFPPPPPPPPGTQLPPPPP>P、KBTBD6:p.T403K、NBPF16:p.D449fs、ANKRD36C:p.H438R、ESPN:p.PPPPPPSFPPPPPPPPGTQLPP430del、FCGBP:p.A2493V、KRAS:p.Q61H、NCOA3:p.Q1276del、OR2T2:p.C203fs、TMCC1:p.Q565L、BCKDHA:p.G129fs、ESPNP:p.H64fs、GNAS:p.R844H、NBPF14:p.R25C、OGFOD1:p.G477fs、

RBM12:p.P693S 、 SLC38A10:p.1071_1072II>I 、 SORBS2:p.P866S 、 TP53:p.R248W、TP53:p.R175H及UBAC1:p.E269del。

73. 如段落30至72中任一段落之醫藥組合物，其中該組合物包含至少2、至少3、至少4、至少5、至少6、至少7、至少8、至少9、至少10、至少11、至少12、至少13、至少14、至少15、至少16、至少17、至少18、至少19、至少20、至少21、至少22、至少23、至少24、至少25、至少26、至少27、至少28、至少29或至少30種新抗原肽。

74. 如段落73之醫藥組合物，其中該組合物包含15至20種新抗原肽。

75. 如段落73或74之醫藥組合物，其進一步包含至少一種對個別患者之腫瘤具有特異性之其他新抗原肽。

76. 如段落75之醫藥組合物，其中該患者特異性新抗原肽係藉由鑑別該患者之腫瘤樣品之基因體、外顯子體及/或轉錄體與非腫瘤樣品之基因體、外顯子體及/或轉錄體之間之序列差異來選擇。

77. 如段落75之醫藥組合物，其中該等樣品係新鮮或經福馬林固定之石蠟包埋之腫瘤組織、剛分離之細胞或循環腫瘤細胞。

78. 如段落75之醫藥組合物，其中該序列差異係藉由次世代定序測定。

79. 如段落30至78中任一段落之醫藥組合物，其中每一新抗原肽之長度為約5至約50個胺基酸。

80. 如段落79之醫藥組合物，其中每一新抗原肽之長度介於約15個至約35個胺基酸之間；長度為約15個胺基酸或更短；長度為約8個及約11個胺基酸；或長度為9個或10個胺基酸。

81. 如段落79或80之醫藥組合物，其中每一新抗原肽結合I類主要組織相容性複合體(MHC)。

82. 如段落30至81中任一段落之醫藥組合物，其中每一新抗原肽以小於約500 nM之結合親和性結合至I類MHC，或視情況每一新抗原肽以小於500 nM之K_D結合至HLA-A、HLA-B或HLA-C。

83. 如段落79之醫藥組合物，其中每一新抗原肽之長度為約30個胺基酸或更短；長度介於約6個與約25個胺基酸之間；長度介於約15個與約24個胺基酸之間；或長度介於約9個與約15個胺基酸之間。

84. 如段落79、82或83之醫藥組合物，其中每一新抗原肽結合II類主要組織相容性複合體(MHC)。

85. 如段落84之醫藥組合物，其中每一新抗原肽以小於約500 nM之結合親和性結合至I類MHC，或視情況每一新抗原肽以小於500 nM之K_D結合至HLA-A、HLA-B或HLA-C。

86. 如段落30至85中任一段落之醫藥組合物，其中至少一種新抗原肽進一步包含側翼胺基酸。

87. 如段落86之醫藥組合物，其中該等側翼胺基酸並非天然側翼胺基酸。

88. 如段落30至87中任一段落之醫藥組合物，該至少一種新抗原肽連接至至少第二新抗原肽。

89. 如段落88之醫藥組合物，其中肽係使用聚-甘胺酸或聚-絲胺酸連接體連接。

90. 如段落88或89之醫藥組合物，其中該第二新抗原肽以小於約1000 nM之結合親和性結合I類或II類MHC。

91. 如段落88至90中任一段落之醫藥組合物，其中該第二新抗原肽以小於約500 nM之結合親和性結合I類或II類MHC。

92. 如段落88至91中任一段落之醫藥組合物，其中該等新表位中之二者結合至人類白血球抗原(HLA) -A、-B、-C、-DP、-DQ或-

DR。

93. 如段落88至92中任一段落之醫藥組合物，其中該經分離新抗原肽及該第二新抗原肽結合I類HLA或該經分離新抗原肽及該第二新抗原肽結合II類HLA。

94. 如段落88至92中任一段落之醫藥組合物，其中該經分離新抗原肽結合II類HLA且該第二新抗原肽結合I類HLA或該經分離新抗原肽結合I類HLA且該第二新抗原肽結合II類HLA。

95. 如段落30至94中任一段落之醫藥組合物，其中至少一種新抗原肽進一步包含增加活體內半衰期、細胞靶向、抗原攝取、抗原處理、MHC親和性、MHC穩定性或抗原呈遞之修飾。

96. 如段落95之醫藥組合物，其中該修飾係偶聯至載體蛋白、偶聯至配體、偶聯至抗體、聚乙二醇化、聚唾液酸化羥乙基澱粉化、重組PEG模擬物、Fc融合、白蛋白融合、奈米顆粒附接、奈米粒子囊封、膽固醇融合、鐵融合、醯化、醯胺化、糖基化、側鏈氧化、磷酸化、生物素化、添加表面活性物質、添加胺基酸模擬物或添加非天然胺基酸。

97. 如段落95之醫藥組合物，其中該等經靶向細胞為抗原呈遞細胞。

98. 如段落97之醫藥組合物，其中該等抗原呈遞細胞係樹突細胞。

99. 如段落98之醫藥組合物，其中該樹突細胞係使用DEC205、XCR1、CD197、CD80、CD86、CD123、CD209、CD273、CD283、CD289、CD184、CD85h、CD85j、CD85k、CD85d、CD85g、CD85a、CD141、CD11c、CD83、TSLP受體或CD1a標記來靶向。

100. 如段落99之醫藥組合物，其中該等樹突細胞係使用

CD141、DEC205或XCR1標記來靶向。

101. 如段落30至100中任一段落之醫藥組合物，其係免疫原性組合物或疫苗組合物。

102. 如段落101之醫藥組合物，其進一步包含免疫調節劑或佐劑。

103. 如段落102之醫藥組合物，其中該免疫調節劑或佐劑選自由以下組成之群：聚(I:C)、聚-ICLC、STING激動劑、1018 ISS、鋁鹽、Amplivax、AS15、BCG、CP-870,893、CpG7909、CyaA、dSLIM、GM-CSF、IC30、IC31、咪喹莫特、ImuFact IMP321、IS貼片(Patch)、ISS、ISCOMATRIX、JuvImmune、LipoVac、MF59、單磷醯脂質A、Montanide IMS 1312 VG、Montanide ISA 206 VG、Montanide ISA 50 V2、Montanide ISA 51 VG、OK-432、OM-174、OM-197-MP-EC、ISA-TLR2激動劑、ONTAK、PepTel®、載體系統、PLG微粒、雷西莫特、SRL172、病毒體及其他類病毒顆粒、YF-17D、VEGF trap、R848、β-葡聚糖、Pam3Cys、Pam3CSK4、丙烯酸或甲基丙烯酸聚合物、馬來酸酐共聚物及QS21刺激子。

104. 一種經分離多核苷酸，其編碼如段落1至24中任一段落之經分離新抗原肽。

105. 如段落104之經分離多核苷酸，其係RNA。

106. 如段落105之經分離多核苷酸，其中該RNA經修飾以增加穩定性、促進細胞靶向、提高轉譯效率、佐劑性、胞質液可及性，及/或降低細胞毒性。

107. 如段落106之經分離多核苷酸，其中該修飾係偶聯至載體蛋白、偶聯至配體、偶聯至抗體、密碼子最佳化、增加GC含量、納入經修飾核苷、納入5'-端帽或端帽類似物，及/或納入未遮蔽聚-A序

列。

108. 一種細胞，其包含如段落104至107中任一段落之多核苷酸。

109. 一種載體，其包含如段落104至107中任一段落之多核苷酸。

110. 如段落110之載體，其中該多核苷酸可操作連接至啟動子。

111. 如段落109或110之載體，其係質體、噬菌體、轉位子、黏粒、病毒或病毒體。

112. 如段落111之載體，其係腺相關病毒、皰疹病毒、慢病毒或其假型。

113. 一種活體內遞送系統，其包含如段落104至107中任一段落之經分離多核苷酸。

114. 如段落113之遞送系統，其中該遞送系統包括球形核酸、病毒、類病毒顆粒、質體、細菌質體或奈米顆粒。

115. 一種細胞，其包含如段落109至114中任一段落之載體或遞送系統。

116. 如段落115之細胞，其係抗原呈遞細胞。

117. 如段落116之細胞，其係樹突細胞。

118. 如段落117之細胞，其係不成熟樹突細胞。

119. 一種組合物，其包含至少一種如段落104至107中任一段落之多核苷酸。

120. 如段落119之組合物，其中該組合物包含該等經分離多核苷酸中之至少2、至少3、至少4、至少5、至少6、至少7、至少8、至少9、至少10、至少11、至少12、至少13、至少14、至少15、至少16、至少17、至少18、至少19、至少20、至少21、至少22、至少23、至少

24、至少25、至少26、至少27、至少28、至少29或至少30種。

121. 如段落120之組合物，其中該組合物包含介於約2種與約20種之間之多核苷酸。

122. 如段落119至121中任一段落之組合物，其中該組合物進一步包含至少1、至少2、至少3、至少4、至少5、至少6、至少7、至少8、至少9、至少10、至少11、至少12、至少13、至少14、至少15、至少16、至少17、至少18、至少19、至少20、至少21、至少22、至少23、至少24、至少25、至少26、至少27、至少28、至少29或至少30種編碼額外新抗原肽之額外新抗原性多核苷酸。

123. 如段落122之組合物，其中該組合物包含介於約4種與約20種之間之額外新抗原性多核苷酸。

124. 如段落122之組合物，其中該等經分離多核苷酸及該等額外新抗原性多核苷酸經連接。

125. 如段落124之組合物，其中該等多核苷酸係使用編碼聚-甘胺酸或聚-絲胺酸連接體之核酸連接。

126. 如段落122至125中任一段落之組合物，其中至少一種該額外新抗原肽對個別患者之腫瘤具有特異性。

127. 如段落126之組合物，其中該患者特異性新抗原肽係藉由鑑別該患者之腫瘤樣品之基因體、外顯子體及/或轉錄體與非腫瘤樣品之基因體、外顯子體及/或轉錄體之間之序列差異來選擇。

128. 如段落127之組合物，其中該等樣品係新鮮或經福馬林固定之石蠟包埋之腫瘤組織、剛分離之細胞或循環腫瘤細胞。

129. 如段落127或128之組合物，其中該序列差異係藉由次世代定序測定。

130. 一種T細胞受體(TCR)，其能結合至少一種如段落1至27中

任一段落中列示之新抗原肽，視情況包含FGFR3 S249C、ERBB3 V104M、EGFR L858R、MUC4 H4205Q、PDGFRA R483fs、TMEM52 23_26LLPL>L或PODXL 28_30PSP>P之新抗原肽。

131. 如段落130之TCR，其能結合在I類或II類MHC背景中之該經分離新抗原肽。

132. 一種嵌合抗原受體，其包含：(i) T細胞活化分子；(ii) 跨膜區；及(iii) 能結合如段落1至27中任一段落之經分離新抗原肽之抗原識別部分。

133. 如段落132之嵌合抗原受體，其中CD3-ζ係T細胞活化分子。

134. 如段落132或133之嵌合抗原受體，其進一步包含至少一個共刺激信號傳導結構域。

135. 如段落132至134中任一段落之嵌合抗原受體，其中該信號傳導結構域係CD28、4-1BB、ICOS、OX40、ITAM或Fc ε RI-γ。

136. 如段落132至135中任一段落之嵌合抗原受體，其中該抗原識別部分能結合在I類或II類MHC背景中之該經分離新抗原肽。

137. 如段落132至136中任一段落之嵌合抗原受體，其包含CD3-ζ、CD28、CTLA-4、ICOS、BTLA、KIR、LAG3、CD137、OX40、CD27、CD40L、Tim-3、A2aR或PD-1跨膜區。

138. 如段落132至137中任一段落之嵌合抗原受體，其中該腫瘤特異性表位位於腫瘤相關多肽之細胞外結構域，視情況該腫瘤特異性表位包含FGFR3 S249C、ERBB3 V104M、EGFR L858R、MUC4 H4205Q、PDGFRA R483fs、TMEM52 23_26LLPL>L或PODXL 28_30PSP>P。

139. 一種T細胞，其包含如段落130至138中任一段落之T細胞受

體或嵌合抗原受體。

140. 如段落139之T細胞，其係輔助細胞或細胞毒性T細胞。

141. 一種核酸，其包含可操作連接至編碼如段落130或131之T細胞受體之多核苷酸之啟動子。

142. 如段落141之核酸，其中該TCR能結合至少一種在I類或II類主要組織相容性複合體(MHC)背景中之新抗原肽。

143. 一種核酸，其包含可操作連接至編碼如段落132至138中任一段落之嵌合抗原受體之多核苷酸之啟動子。

144. 如段落143之核酸，其中該抗原識別部分能結合至少一種在I類或II類主要組織相容性複合體(MHC)背景中之新抗原肽。

145. 如段落143或144之核酸，其中該腫瘤特異性表位位於腫瘤相關多肽之細胞外結構域中。

146. 如段落143至145中任一段落之核酸，其包含CD3-ζ、CD28、CTLA-4、ICOS、BTLA、KIR、LAG3、CD137、OX40、CD27、CD40L、Tim-3、A2aR或PD-1跨膜區。

147. 一種抗體，其能結合表1至9中所列示之至少一種新抗原肽。

148. 一種經修飾細胞，其經如段落141至146中任一段落之核酸轉染或轉導。

149. 如段落148之經修飾細胞，其中該經修飾細胞係T細胞、腫瘤浸潤淋巴球、NK-T細胞、TCR表現細胞、CD4+ T細胞、CD8+ T細胞或NK細胞。

150. 一種組合物，其包含如段落130至138中任一段落之T細胞受體或嵌合抗原受體。

151. 一種組合物，其包含含有如段落130至138中任一段落之T細

胞受體或嵌合抗原受體之自體患者T細胞。

152. 如段落150或151之組合物，其進一步包含免疫檢查點抑制劑。

153. 如段落150或151之組合物，其進一步包含至少兩種免疫檢查點抑制劑。

154. 如段落152或153之組合物，其中該免疫檢查點抑制劑抑制選自由以下組成之群之檢查點蛋白：CTLA-4、PDL1、PDL2、PD1、B7-H3、B7-H4、BTLA、HVEM、TIM3、GAL9、LAG3、VISTA、KIR、2B4、CD160、CGEN-15049、CHK 1、CHK2、A2aR及B-7家族配體或其組合。

155. 如段落154之組合物，其中該免疫檢查點抑制劑與選自由以下組成之群之檢查點蛋白之配體相互作用：CTLA-4、PDL1、PDL2、PD1、B7-H3、B7-H4、BTLA、HVEM、TIM3、GAL9、LAG3、VISTA、KIR、2B4、CD160、CGEN-15049、CHK 1、CHK2、A2aR及B-7家族配體或其組合。

156. 如段落119至129或150至156中任一段落之組合物，其進一步包含免疫調節劑或佐劑。

157. 如段落156之組合物，其中該免疫調節劑係共刺激配體、TNF配體、Ig超家族配體、CD28、CD80、CD86、ICOS、CD40L、OX40、CD27、GITR、CD30、DR3、CD69或4-1BB。

158. 如段落156之組合物，其中該免疫調節劑係至少一種癌細胞或癌細胞提取物。

159. 如段落158之組合物，其中該癌細胞係需要該組合物之該個體之自體癌細胞。

160. 如段落159之組合物，其中該癌細胞已經歷溶解或已曝露於

UV輻射。

161. 如段落156之組合物，其中該組合物進一步包含佐劑。

162. 如段落161之組合物，其中該佐劑選自由以下組成之群：聚(I:C)、聚-ICLC、STING激動劑、1018 ISS、鋁鹽、Amplivax、AS15、BCG、CP-870,893、CpG7909、CyaA、dSLIM、GM-CSF、IC30、IC31、咪喹莫特、ImuFact IMP321、IS貼片(Patch)、ISS、ISCOMATRIX、JuvImmune、LipoVac、MF59、單磷醯脂質A、Montanide IMS 1312 VG、Montanide ISA 206 VG、Montanide ISA 50 V2、Montanide ISA 51 VG、OK-432、OM-174、OM-197-MP-EC、ISA-TLR2激動劑、ONTAK、PepTel®、載體系統、PLG微粒、雷西莫特、SRL172、病毒體及其他類病毒顆粒、YF-17D、VEGF trap、R848、β-葡聚糖、Pam3Cys、Pam3CSK4、丙烯酸或甲基丙烯酸聚合物、馬來酸酐共聚物及QS21刺激子。

163. 如段落161或162之組合物，其中該佐劑在投與個體時誘導體液性免疫反應。

164. 如段落162之組合物，其中該佐劑在投與個體時誘導T輔助細胞1型反應。

165. 一種活體內遞送系統，其包含如段落30至103中任一段落之醫藥組合物。

166. 如段落165之遞送系統，其中該遞送系統包括細胞穿透肽、奈米粒子囊封、類病毒顆粒或脂質體。

167. 如段落166之遞送系統，其中該細胞穿透肽係TAT肽、單純皰疹病毒VP22、轉運素或Antp。

168. 一種細胞，其包含如段落1至29中任一段落之經分離新抗原肽。

169. 如段落168之細胞，其係抗原呈遞細胞。

170. 如段落169之細胞，其係樹突細胞。

171. 一種在有需要之個體中治療癌症或起始、增強或延長抗腫瘤反應之方法，其包含向該個體投與如段落1至164中任一段落之肽、多核苷酸、載體、組合物、抗體或細胞。

172. 一種預防性癌症治療之方法，其包含：

(a) 選擇用於有需要之患者之癌症藥物，該藥物選自由以下組成之群：依魯替尼、厄洛替尼、伊馬替尼、吉非替尼、克唑替尼、曲妥珠單抗、威羅菲尼、RAF/MEK抑制劑及抗雌激素療法；及

(b) 向該個體預防性投與如段落30至103中任一段落之醫藥組合物，其中該至少一種新抗原肽源自與該所選癌症藥物相關之抗藥性突變。

173. 一種治療或預防有需要之個體群體之腫瘤的方法，其包含向個體投與包含細胞外配體結合結構域之藥劑，該細胞外配體結合結構域識別腫瘤特異性新表位，該腫瘤特異性新表位包含發生率為該群體中至少1%之個體之腫瘤特異性突變。

174. 如段落171至173中任一段落之方法，其中該腫瘤特異性突變包含表9中針對任一群體列示之突變。

175. 如段落171至173中任一段落之方法，其中該腫瘤特異性突變在含有細胞外結構域之基因內。

176. 如段落175之方法，其中該腫瘤特異性突變包含FGFR3 S249C、ERBB3 V104M、EGFR L858R、MUC4 H4205Q、PDGFRA R483fs、TMEM52 23_26LLPL>L或PODXL 28_30PSP>P。

177. 如段落176之方法，其中該腫瘤特異性突變在該細胞外結構域內。

178. 如段落177之方法，其中該腫瘤特異性突變包含FGFR3 S249C或ERBB3 V104M。

179. 如段落171至178中任一段落之方法，其中該個體係人類。

180. 如段落179之方法，其中該個體患有癌症。

181. 如段落180之方法，其中該癌症選自由以下組成之群：泌尿生殖癌、婦科癌、肺癌、胃腸癌、頭頸癌、惡性神經膠母細胞瘤、惡性間皮瘤、非轉移或轉移乳癌、惡性黑色素瘤、Merkel細胞癌或骨與軟組織肉瘤、血液性贅瘤形成、多發性骨髓瘤、急性骨髓性白血病、慢性骨髓性白血病、骨髓發育不良症候群及急性淋巴母細胞性白血病、非小細胞肺癌(NSCLC)、乳癌、轉移結腸直腸癌、激素敏感性或激素抵抗性前列腺癌、結腸直腸癌、卵巢癌、肝細胞癌、腎細胞癌、胰臟癌、胃癌、食管癌、肝細胞癌、膽管細胞癌、頭頸部鱗狀細胞癌軟組織肉瘤及小細胞肺癌。

182. 如段落171至181中任一項之方法，其中該個體已經歷腫瘤之手術移除。

183. 如段落171至182中任一項之方法，其中該肽、多核苷酸、載體、組合物或細胞係經由靜脈內、腹膜內、腫瘤內、真皮內或皮下投與來投與。

184. 如段落183之方法，其中該肽、多核苷酸、載體、組合物或細胞係投與至引流至淋巴結池(basin)中之解剖學位點中。

185. 如段落184之方法，其中投與至多個淋巴結池中。

186. 如段落183至185中任一段落之方法，其中投與係藉由皮下或真皮內途徑進行。

187. 如段落183之方法，其中投與肽。

188. 如段落187之方法，其中投與係腫瘤內投與。

189. 如段落183之方法，其中投與多核苷酸、視情況RNA。

190. 如段落189之方法，其中該多核苷酸係靜脈內投與。

191. 如段落183之方法，其中該細胞係T細胞或樹突細胞。

192. 如段落191之方法，其中該肽或多核苷酸包含抗原呈遞細胞靶向部分。

193. 如段落171至192中任一項之方法，其進一步包含向該個體投與至少一種免疫檢查點抑制劑。

194. 如段落193之方法，其中該檢查點抑制劑係生物治療劑或小分子。

195. 如段落193或194之方法，其中該檢查點抑制劑選自由以下組成之群：單株抗體、人類化抗體、完全人類抗體及融合蛋白或其組合。

196. 如段落193至195中任一項之方法，其中該檢查點抑制劑抑制選自由以下組成之群之檢查點蛋白：CTLA-4、PDL1、PDL2、PD1、B7-H3、B7-H4、BTLA、HVEM、TIM3、GAL9、LAG3、VISTA、KIR、2B4、CD160、CGEN-15049、CHK 1、CHK2、A2aR及B-7家族配體或其組合。

197. 如段落193至196中任一項之方法，其中該檢查點抑制劑與選自由以下組成之群之檢查點蛋白之配體相互作用：CTLA-4、PDL1、PDL2、PD1、B7-H3、B7-H4、BTLA、HVEM、TIM3、GAL9、LAG3、VISTA、KIR、2B4、CD160、CGEN-15049、CHK 1、CHK2、A2aR及B-7家族配體或其組合。

198. 如段落193至197中任一項之方法，其中投與兩種或更多種檢查點抑制劑。

199. 如段落198之方法，其中該檢查點抑制劑係：(i) 伊匹單抗

(ipilimumab)或曲美目單抗(tremelimumab)，及(ii)尼沃魯單抗(nivolumab)。

200. 如段落193至199中任一項之方法，其中該檢查點抑制劑及該組合物係同時投與或以任一順序依序投與。

201. 如段落200之方法，其中該肽、多核苷酸、載體、組合物或細胞係在該檢查點抑制劑之前投與。

202. 如段落200之方法，其中該肽、多核苷酸、載體、組合物或細胞係在該檢查點抑制劑之後投與。

203. 如段落200之方法，其中該檢查點抑制劑之投與係在整個新抗原肽、多核苷酸、載體、組合物或細胞療法中連續進行。

204. 如段落193至203中任一項之方法，其中將該新抗原肽、多核苷酸、載體、組合物或細胞療法投與對檢查點抑制劑療法僅部分反應或不反應之個體。

205. 如段落193至204中任一段落之方法，其中該檢查點抑制劑係靜脈內或皮下投與。

206. 如段落205之方法，其中該檢查點抑制劑係在投與該組合物之位點之約2 cm內皮下投與。

207. 如段落206之方法，其中將該組合物投與至與該檢查點抑制劑相同之引流淋巴結中。

208. 如段落171至207中任一項之方法，其進一步包含在用該肽、多核苷酸、載體、組合物或細胞治療之前、同時或之後向該個體投與額外治療劑。

209. 如段落208之方法，其中該額外藥劑係化學治療劑、免疫調節藥物、免疫代謝修飾藥、靶向療法、輻射、抗血管生成劑或降低免疫抑制之藥劑。

210. 如段落209之方法，其中該化學治療劑係烷基化劑、拓撲異構酶抑制劑、抗代謝物或抗有絲分裂劑。

211. 如段落208之方法，其中該額外藥劑係抗糖皮質激素誘導之腫瘤壞死因子家族受體(GITR)激動性抗體或抗體片段、依魯替尼、多西他賽(docetaxel)、順鉑或環磷醯胺。

212. 如段落171至211中任一項之方法，其引發CD4+ T細胞免疫反應。

213. 如段落171至212中任一項之方法，其引發CD4+ T細胞免疫反應及CD8+ T細胞免疫反應。

214. 一種刺激個體之免疫反應之方法，其包含投與有效量之如段落30至103、108、115至129、139、140、148至164及168至170中任一段落之經修飾細胞或組合物。

215. 如段落214之方法，其中該免疫反應係細胞毒性及/或體液性免疫反應。

216. 如段落214之方法，其中該方法刺激個體中T細胞介導之免疫反應。

217. 如段落216之方法，其中該T細胞介導之免疫反應係針對靶細胞。

218. 如段落217之方法，其中該靶細胞係腫瘤細胞。

219. 如段落214至218中任一項之方法，其中該經修飾細胞在活體內經轉染或轉導。

220. 如段落214至219中任一項之方法，其中該經修飾細胞經離體轉染或轉導。

221. 如段落214至220中任一項之方法，其中該經修飾細胞係自體患者T細胞。

222. 如段落221之方法，其中該自體患者T細胞係自已接受新抗原肽或核酸疫苗之患者獲得。

223. 如段落222之方法，其中該新抗原肽或核酸疫苗包含至少一種個人化新抗原。

224. 如段落223之方法，其中該新抗原肽或核酸疫苗包含表1-9中列示之至少一種額外新抗原肽。

225. 如段落224之方法，其中該患者在接受該新抗原肽或核酸疫苗之前及/或期間接受化學治療劑、免疫調節藥物、免疫代謝修飾藥、靶向療法或輻射。

226. 如段落222至225中任一項之方法，其中該患者接受使用至少一種檢查點抑制劑之治療。

227. 如段落222至226中任一項之方法，其中該自體T細胞係自已接受至少一輪含有新抗原之T細胞療法之患者獲得。

228. 如段落222至227中任一項之方法，其中該方法進一步包含過繼性T細胞療法。

229. 如段落228之方法，其中該過繼性T細胞療法包含自體T細胞。

230. 如段落229之方法，其中該等自體T細胞靶向腫瘤抗原。

231. 如段落228或229之方法，其中該過繼性T細胞療法進一步包含同種異體T細胞。

232. 如段落231之方法，其中該等同種異體T細胞靶向腫瘤抗原。

233. 如段落227至231中任一項之方法，其中該過繼性T細胞療法係在該檢查點抑制劑之前投與。

234. 一種評估如段落171至213中任一項之效能之方法，其包

含：(i) 量測在投與經修飾細胞之前自個體獲得之第一樣品中靶細胞之數目或濃度，(ii) 量測在投與該經修飾細胞之後自該個體獲得之第二樣品中靶細胞之數目或濃度，及(iii) 測定該第二樣品中靶細胞之數目或濃度與該第一樣品中靶細胞之數目或濃度相比之增加或減少。

235. 如段落234之方法，其中治療效能係藉由監測以下來測定：臨床結果；T細胞之抗腫瘤活性之增加、增強或延長；抗腫瘤T細胞或經活化T細胞之數目與治療前數目相比之增加；B細胞活性；CD4 T細胞活性；或其組合。

236. 如段落235之方法，其中治療效能係藉由監測生物標記來測定。

237. 如段落236之方法，其中該生物標記選自由以下組成之群：CEA、Her-2/neu、膀胱腫瘤抗原、甲狀腺球蛋白、α-胎兒蛋白、PSA、CA 125、CA19.9、CA 15.3、瘦素、泌乳素、骨橋蛋白、IGF-II、CD98、肌成束蛋白、sPIgR、14-3-3 η、肌鈣蛋白I及b型利鈉肽。

238. 如段落235之方法，其中臨床結果選自由以下組成之群：腫瘤消退；腫瘤收縮；腫瘤壞死；免疫系統之抗腫瘤反應；腫瘤擴大、復發或擴散；或其組合。

239. 如段落235之方法，其中該治療效果係藉由T細胞之存在或藉由指示T細胞發炎之基因印記之存在或其組合來預測。

240. 一種套組，其包含如段落1至164中任一段落之新抗原治療劑。

因此，本發明之一目標係在本發明內不涵蓋任一先前已知產物、製備該產物之製程或使用該產物之方法，使得申請者保留權利並由此揭示對任一先前已知產物、製程或方法之放棄聲明。另外應注意，本發明不欲在本發明範圍內涵蓋任何不符合USPTO(35 U.S.C.

§112，第一段)或EPO (EPC之第83條)之書面說明及可據以實施要件(enablement requirement)之產物、方法、或製備該產物或使用該產物之方法，使得申請者保留權利並由此揭示對於任一先前闡述產物、製備該產物之製程或使用該產物之方法的放棄聲明。符合EPC第53(c)條及EPC之規則28(b)及(c)在本發明之實踐中可係有利的。明確保留明確放棄任何實施例之所有權利，該等實施例係申請人在本申請案系列中或在任何其他系列中或在任何第三方之任何先前提交之申請案中之任何授權專利之標的。本文中任何內容皆不欲視為允諾。

應注意，在本揭示內容中且尤其在申請專利範圍及/或段落中，諸如「包含(comprises)」、「包含(comprised)」、「包含(comprising)」等術語可具有其在美國專利法(U.S. Patent law)中被賦予之含義；例如，其可意指「包括(includes)」、「包括(included)」、「包括(including)」等；且諸如「基本上由……組成(consisting essentially of)」及「基本上由……組成(consists essentially of)」之術語具有其在美國專利法中被賦予之含義，例如其容許未明確列舉之要素，但不包括在先前技術中發現或影響本發明之基本或新穎特徵之要素。本文中之內容皆不欲作為允諾。

該等及其他實施例揭示於下文具體實施方式中或自下文具體實施方式顯而易見且涵蓋於下文具體實施方式中。

【實施方式】

相關申請案及以引用方式併入

本申請案主張2015年5月20日申請之美國臨時申請案第62/179,877號及2016年2月23日申請之美國臨時申請案第62/389,377號之優先權及權益。

前述申請案、及其中或在其申請期間所引用之所有文件(「申請

案引用文件」)及該等申請案引用文件中所引用或提及之所有文件、及本文中所引用或提及之所有文件(「本文引用文件」)、及本文引用文件中所引用或提及之所有文件、以及關於本文或以引用方式併入本文中之任一文件中所提及任一產品的任何製造商說明書、說明、產品說明書及產品介紹皆以引用方式併入本文中，且可用於實踐本發明。更特定而言，所提及之所有文件皆以引用方式併入，併入程度如同每一個別文件明確且個別地指示以引用方式併入一般。

為促進理解本發明，本文中定義多個術語及片語：

除非明確說明或自上下文可明瞭，否則如本文所用術語「約」理解為在業內正常耐量之範圍內，例如在平均值之2個標準偏差內。「約」可理解為在所述值之50%、45%、40%、35%、30%、25%、20%、15%、10%、9%、8%、7%、6%、5%、4%、3%、2%、1%、0.5%、0.1%、0.05%或0.01%內。除非上下文明確說明，否則本文所提供之所有數值皆由術語約修飾。

除非明確說明或自上下文可明瞭，否則如本文所用術語「或」理解為包括性。除非明確說明或自上下文可明瞭，否則如本文所用術語「一(a)」、「一(an)」及「該」理解為單數或複數。

所有基因名稱符號係指業內眾所周知之基因。基因符號可為HUGO基因術語委員會(HGNC)。對基因符號之任何提及係提及整個基因或基因變體。HUGO基因術語委員會負責提供人類基因命名準則及核准新的獨特的人類基因名稱及符號。所有人類基因名稱及符號皆可在HGNC網站www.genenames.org搜索到，且其形成準則可在該網站獲得(www.genenames.org/guidelines)。

「藥劑」意指任何小分子化學化合物、抗體、核酸分子或多肽或其片段。

「改善」意指降低、抑制、減弱、減小、阻止或穩定疾病(例如，贅瘤形成、腫瘤等)之發展或進展。

「改變」意指如藉由業內已知標準方法(例如本文所述之彼等)所檢測，基因或多肽之表現程度或活性之變化(增加或減少)。如本文所用之改變包括表現程度之10%變化，較佳表現程度之25%變化，更佳40%變化，且最佳50%或更大變化。

「類似物」意指不相同但具有類似功能或結構特徵之分子。舉例而言，腫瘤特異性新抗原多肽類似物保留相應天然腫瘤特異性新抗原多肽之生物活性，同時具有某些相對於天然多肽增強類似物功能之生物化學修飾。該等生物化學修飾可增強類似物之蛋白酶抗性、膜滲透性或半衰期，而不改變例如配體結合。類似物可包括非天然胺基酸。

「組合療法」意欲包括以依序方式投與治療劑(例如本文所述之新抗原肽)，亦即其中每一治療劑係在不同時間投與，以及以實質上同時之方式投與該等治療劑或該等治療劑中之至少兩種。實質上同時投與可藉由例如向個體投與具有固定比率之每一治療劑之單一膠囊，或投與多個用於每一治療劑之單一膠囊來完成。舉例而言，本發明之一組合可包含在同時或不同時間投與之新抗原肽之合併樣品，或可將其調配為單一共調配之包含該等肽之醫藥組合物。作為另一實例，本發明之組合(例如，腫瘤特異性新抗原之合併樣品)可調配為單獨醫藥組合物，其可在同時或不同時間投與。如本文所用術語「同時地」欲係指同時投與一或多種藥劑。舉例而言，在某些實施例中，新抗原肽係同時投與。同時地包括同時期投與，即在相同時間段期間投與。在某些實施例中，一或多種藥劑係在同一小時內同時投與，或在同一天內同時投與。依序或實質上同時投與每一治療劑可藉由任一適當途徑

來實現，包括(但不限於)經口途徑、靜脈內途徑、皮下途徑、肌內途徑、經由黏膜組織直接吸收(例如，鼻、口、陰道及直腸)及經眼途徑(例如，玻璃體內、眼內等)。治療劑可藉由相同途徑或藉由不同途徑投與。舉例而言，具體組合中之一種組份可藉由靜脈內注射來投與，而該組合之其他組份可經口投與。多種組份可以任何治療有效序列來投與。片語「組合」包括可用作組合療法之一部分之化合物或非藥物療法之群組。

術語「新抗原」或「新抗原性」意指一類源自改變基因體編碼蛋白質之胺基酸序列之腫瘤特異性突變之腫瘤抗原。

「贅瘤形成」意指因不適當高程度之細胞分裂、不適當低程度之細胞凋亡或二者引起或導致該等情形之疾病。舉例而言，癌症係贅瘤形成之實例。癌症之實例包括(但不限於)白血病(例如，急性白血病、急性淋巴球性白血病、急性骨髓細胞性白血病、急性骨髓母細胞性白血病、急性前髓細胞性白血病、急性骨髓單核球性白血病、急性單核球性白血病、急性紅血球性白血病、慢性白血病、慢性骨髓細胞性白血病、慢性淋巴球性白血病)、真性多血症、淋巴瘤(例如，霍奇金氏病、非霍奇金氏病)、華氏巨球蛋白血症(Waldenstrom's macroglobulinemia)、重鏈病及實體腫瘤，例如肉瘤及癌(例如，纖維肉瘤、黏液肉瘤、脂肪肉瘤、軟骨肉瘤、骨原性肉瘤、脊索瘤、血管肉瘤、內皮肉瘤、淋巴管肉瘤、淋巴管內皮肉瘤、滑膜瘤、間皮瘤、尤恩氏腫瘤(Ewing's tumor)、平滑肌肉瘤、橫紋肌肉瘤、結腸癌、胰臟癌、乳癌、卵巢癌、前列腺癌、鱗狀細胞癌、基底細胞癌、腺癌、汗腺癌、皮脂腺癌、乳頭狀癌、乳頭狀腺癌、囊腺癌、髓樣癌、支氣管癌、腎細胞癌、肝細胞瘤、膽管癌、絨毛膜癌、精原細胞瘤、胚胎性癌、威爾姆氏腫瘤(Wilm's tumor)、子宮頸癌、子宮癌、睪丸癌、

肺癌、小細胞肺癌、膀胱癌、上皮癌、神經膠質瘤、星細胞瘤、髓母細胞瘤、顱咽管瘤、室管膜瘤、松果體瘤、血管母細胞瘤、聽神經瘤、寡樹突神經膠細胞瘤、神經鞘瘤、腦脊髓膜瘤、黑色素瘤、神經胚細胞瘤及視網膜母細胞瘤)。淋巴增殖性病症亦視為增殖性疾病。

術語「疫苗」在本發明上下文中欲指腫瘤特異性新抗原肽(例如至少2種、至少3種、至少4種、至少5種或更多種新抗原肽)之合併樣品。「疫苗」應理解為意指用於生成免疫性以供預防及/或治療疾病(例如，贅瘤形成/腫瘤)之組合物。因此，疫苗係包含抗原且意欲藉由疫苗接種在人類或動物中用於生成特異性防禦及保護物質之藥劑。「疫苗組合物」可包括醫藥上可接受之賦形劑、載劑或稀釋劑。

術語「醫藥上可接受」係指聯邦或州政府之管理機構已核准或可核准，或列示於美國藥典(U.S. Pharmacopeia)或其他公認藥典中用於動物(包括人類)。

「醫藥上可接受之賦形劑、載劑或稀釋劑」係指可與藥劑一起投與個體之賦形劑、載劑或稀釋劑，且其不破壞該藥劑之藥理學活性並在以足以遞送治療量之該藥劑之劑量投與時無毒性。

如本文所列舉之合併腫瘤特異性新抗原之「醫藥上可接受之鹽」可為業內一般視為適用於與人類或動物之組織接觸且無過度毒性、刺激、過敏反應或其他問題或併發症之酸鹽或鹼鹽。該等鹽包括諸如胺等鹼性殘基之無機酸鹽及有機酸鹽，以及諸如羧酸等酸性殘基之鹼金屬鹽或有機鹽。特定醫藥鹽包括(但不限於)諸如以下等酸之鹽：鹽酸、磷酸、氫溴酸、蘋果酸、羥乙酸、富馬酸、硫酸、磺胺酸、對胺苯磺酸、甲酸、甲苯磺酸、甲烷磺酸、苯磺酸、乙烷二磺酸、2-羥基乙基磺酸、硝酸、苯甲酸、2-乙醯氧基苯甲酸、檸檬酸、酒石酸、乳酸、硬脂酸、柳酸、麩胺酸、抗壞血酸、撲酸、琥珀酸、

富馬酸、馬來酸、丙酸、羥基馬來酸、氫碘酸、苯基乙酸、烷酸(例如乙酸)、HOOC-(CH2)n-COOH (其中n為0-4)及諸如此類。類似地，醫藥上可接受之陽離子包括(但不限於)鈉、鉀、鈣、鋁、鋰及銨。熟習此項技術者將自本揭示內容及業內知識認識到，本文所提供之合併腫瘤特異性新抗原之其他醫藥上可接受之鹽包括列示於Remington's Pharmaceutical Sciences，第17版，Mack Publishing Company, Easton, PA，第1418頁(1985)中之彼等。一般而言，醫藥上可接受之酸鹽或鹼鹽可自含有鹼性或酸性部分之母化合物藉由任何習用化學方法來合成。簡言之，該等鹽可藉由使該等化合物之游離酸或鹼形式與化學計量量之適當鹼或酸在適當溶劑中反應來製備。

「多肽」或「肽」意指已與其天然伴隨組份分離之多肽。通常，在多肽有至少60重量%自與其天然結合之蛋白質及天然有機分子游離時，該多肽經分離。較佳地，製備係以重量計至少75%、更佳至少90%、且最佳至少99%多肽。經分離多肽可藉由自天然來源萃取、藉由編碼此一多肽之重組核酸之表現或藉由化學合成蛋白質來獲得。純度可藉由任何適當方法來量測，例如管柱層析、聚丙烯醯胺凝膠電泳或HPLC分析。

如本文所用術語「預防(prevent)」、「預防(preventing)」、「預防(prevention)」、「預防性治療」及諸如此類係指降低未患但具有發生疾病或病況之風險或易患病症或病況之個體發生疾病或病況之機率。

術語「啟始/加強」或「啟始/加強給藥方案」欲係指相繼投與疫苗或免疫原性或免疫組合物。啟動投與(啟動)係投與第一疫苗或免疫原性或免疫組合物類型且可包含1次、2次或更多次投與。加強投與係第二次投與疫苗或免疫原性或免疫組合物類型且可包含1次、2次或更

多次投與，且例如可包含每年投與或基本上由每年投與組成。在某些實施例中，投與贅瘤形成疫苗或免疫原性組合物係在啟始/加強給藥方案中。

本文所提供之範圍應理解為該範圍內所有值之簡寫。舉例而言，1至50之範圍應理解為包括由以下組成之群之任何數字、數字組合或子範圍：1、2、3、4、5、6、7、8、9、10、11、12、13、14、15、16、17、18、19、20、21、22、23、24、25、26、27、28、29、30、31、32、33、34、35、36、37、38、39、40、41、42、43、44、45、46、47、48、49或50，以及上文所提及之整數之間之所有中間小數值，例如1.1、1.2、1.3、1.4、1.5、1.6、1.7、1.8及1.9。關於子範圍，明確涵蓋自範圍之任一終點延伸之「巢套子範圍」。舉例而言，1至50之實例性範圍之巢套子範圍可包含一個方向上之1至10、1至20、1至30及1至40，或另一方向上之50至40、50至30、50至20及50至10。

「受體」應理解為意指能結合配體之生物分子或分子分組。受體可用於在細胞、細胞形成或生物體中傳遞資訊。受體包含至少一個受體單元且通常含有兩個或更多個受體單元，其中每一受體單元可由蛋白質分子、尤其糖蛋白分子組成。受體具有補充配體結構且可與該配體複合為結合配偶體之結構。信號傳導資訊可藉由受體在與細胞表面上之配體結合後之構象變化來傳遞。根據本發明，受體可係指能與配體、尤其具有適宜長度之肽或肽片段形成受體/配體複合體之I類及II類MHC之具體蛋白質。

術語「個體」係指為治療、觀察或實驗目標之動物。僅舉例而言，個體包括(但不限於)哺乳動物，包括(但不限於)人類或非人類哺乳動物，例如非人類靈長類動物、牛、馬、犬、綿羊或貓。

術語「治療(treat)」、「治療(treated)」、「治療(treating)」、「治療(treatment)」及諸如此類欲係指減少或改善病症及/或與其相關之症狀(例如，贅瘤形成或腫瘤)。「治療」可係指在癌症發作或懷疑發作後向個體投與療法。「治療」包括「緩和」之概念，其係指降低與癌症相關之任何症狀或其他疾病效應及/或與癌症療法相關之副作用之發生或復發之頻率或嚴重度。術語「治療」亦涵蓋「管控」之概念，其係指降低患者之具體疾病或病症之嚴重度或延遲其復發，例如延長已患疾病之患者之消退期。應瞭解，治療病症或病況無需完全消除病症、病況或與其相關之症狀，但並不排除完全消除。

術語「治療效果」係指一定程度之緩解病症(例如，贅瘤形成或腫瘤)之一或多種症狀或其相關病狀。如本文所用「治療有效量」係指藥劑在單劑量或多劑量投與細胞或個體後在延長患有此一病症之患者之存活期、減少該病症之一或多種體徵或症狀、預防或延遲及超出在不存在該治療時之預期之效果中有效之量。「治療有效量」意欲限定達成治療效果所需之量。具有一般技術之醫師或獸醫可容易地確定並處方所需醫藥組合物之「治療有效量」(例如ED50)。舉例而言，醫師或獸醫可以低於達成期望治療效果所需之量之用於醫藥組合物中之本發明化合物之劑量開始，並逐漸增加劑量直至達成期望效果。

如提及融合蛋白時所用之術語「間隔體」或「連接體」係指接合構成融合蛋白之蛋白質之肽。通常，除了接合蛋白質或RNA序列或在蛋白質或RNA序列之間保持某一極小距離或其他空間關係以外，間隔體不具有特定生物活性。然而，在某些實施例中，間隔體之組成胺基酸可經選擇以影響分子之某一性質，例如分子之摺疊、淨電荷或疏水性。

用於本發明實施例之適宜連接體為熟習此項技術者熟知且包括

(但不限於)直鏈或具支鏈碳連接體、雜環碳連接體或肽連接體。連接體用於將兩個新抗原肽隔開一定距離，該距離足以確保在較佳實施例中每一新抗原肽適當摺疊。較佳肽連接體序列採取撓性延伸構象且不展現產生有序二級結構之傾向。撓性蛋白質區域中之典型胺基酸包括Gly、Asn及Ser。實際上，預期含有Gly、Asn及Ser之胺基酸序列之任何排列皆可滿足上文用於連接體序列之準則。其他近中性胺基酸(例如Thr及Ala)亦可用於連接體序列中。可用作連接體之其他胺基酸序列揭示於以下文獻中：Maratea等人(1985), Gene 40: 39-46；Murphy等人(1986) Proc. Nat'l. Acad. Sci. USA 83: 8258-62；美國專利第4,935,233號；及美國專利第4,751,180號。

本文變量之任何定義中化學基團之列表之列舉包括該變量作為任何單一基團或所列示基團之組合的定義。本文變量或態樣之實施例之列舉包括作為任何單一實施例或與任何其他實施例或其部分組合之該實施例。

本文所提供之任何組合物或方法可與本文所提供之任何其他組合物及方法中之一或多者組合。

本文所揭示療法組成治療各種類型癌症之新方法。本文所述療法亦提供在不產生不可接受程度之副作用之情況下達成臨床益處之治療方法。

在一個態樣中，本發明係關於藉由向個體投與包含複數種腫瘤特異性新抗原肽之疫苗或免疫原性組合物來治療贅瘤形成、且更具體而言腫瘤之方法。如本文更詳細地闡述，在一些實施例中，組合物提供適於治療大部分患有癌症之個體之腫瘤之特異性最佳化之腫瘤特異性新抗原亞組。在一些實施例中，腫瘤特異性新抗原可一起結合至存於個體群體中之高總比例之HLA異型。

免疫系統可分類為兩個功能性子系統：先天及後天免疫系統。先天免疫系統係抵抗感染之第一線防禦，且大多數潛在病原體在其可引起例如嚴重感染之前被此系統快速中和。後天免疫系統與侵入生物體之稱為抗原之分子結構反應。有兩種類型之後天免疫反應，其包括體液性免疫反應及細胞介導之免疫反應。在體液性免疫反應中，B細胞分泌至體液中之抗體結合至病原體源抗原，導致經由多種機制(例如補體介導之溶解)清除病原體。在細胞介導之免疫反應中，活化能破壞其他細胞之T細胞。舉例而言，若與疾病相關之蛋白質存於細胞中，則其在該細胞內以蛋白水解方式片段化為肽。然後特定細胞蛋白質將其自身附接至以此方式形成之抗原或肽並將其轉運至細胞表面，在此處將其呈遞至機體之分子防禦機制，具體而言T細胞。細胞毒性T細胞識別該等抗原並殺滅具有該等抗原之細胞。

在細胞表面上轉運並呈遞肽之分子稱為主要組織相容性複合體(MHC)之蛋白質。MHC蛋白質分類為兩種類型，稱為I類MHC及II類MHC。兩個MHC種類之蛋白質之結構極為相似；然而，其功能極為不同。I類MHC之蛋白質存於機體中幾乎所有細胞之表面上，包括大多數腫瘤細胞。I類MHC蛋白質加載有通常源自內源蛋白或源自存於細胞內部之病原體之抗原，且之後呈遞至原始態或細胞毒性T-淋巴球(CTL)。II類MHC蛋白質存於樹突細胞、B-淋巴球、巨噬細胞及其他抗原呈遞細胞上。其主要將自外部抗原來源(即細胞外部)處理之肽呈遞至T-輔助(Th)細胞。I類MHC蛋白質結合之大多數肽源自生物體自身之健康宿主細胞產生之細胞質蛋白質，且通常不刺激免疫反應。因此，識別該等自身肽呈遞I類MHC分子之細胞毒性T-淋巴球在胸腺中缺失(中樞耐受性)，或在其自胸腺釋放後缺失或不活化，即經耐受(周圍耐受性)。MHC分子能在其將肽呈遞至未經耐受之T-淋巴球時刺激

免疫反應。細胞毒性T-淋巴球在其表面上具有T細胞受體(TCR)及CD8分子二者。T細胞受體能識別並結合與I類MHC分子複合之肽。每種細胞毒性T-淋巴球表現獨特的能結合特異性MHC/肽複合體之T細胞受體。

在內質網內，肽抗原藉由競爭性親和性結合將其自身附接至I類MHC分子，之後將其呈遞於細胞表面上。此處，個別肽抗原之親和性與其胺基酸序列及特定結合基序在胺基酸序列內指定位置中之存在直接相關。若已知此一肽之序列，則可能使用例如肽疫苗操縱免疫系統抵抗患病細胞。

研發治癒性及腫瘤特異性免疫療法之關鍵障礙之一係鑑別及選擇高特異性且受限之腫瘤抗原以避免自身免疫性。在惡性細胞內因遺傳變化(例如，倒轉、易位、缺失、誤義突變、剪接位點突變等)而產生之新抗原代表最具腫瘤特異性之抗原種類。由於鑑別新抗原、選擇最佳化新抗原及產生用於疫苗或免疫原性組合物中之新抗原中之技術困難，新抗原極少用於癌症疫苗或免疫原性組合物。該等問題可藉由以下方式來解決：

• 鑑別贅瘤形成/腫瘤中之突變，該等突變在DNA層面上存於腫瘤中但在來自大部分患有癌症之個體之匹配種系樣品中不存在；

• 用一或多種肽-MHC結合預測算法分析所鑑別之突變以生成複數個在贅瘤形成/腫瘤內表現並結合至大部分患者HLA等位基因之新抗原T細胞表位；及

• 合成複數個選自所有新抗原肽及預測結合肽之組之新抗原肽用於適合治療大部分患有癌症之個體之癌症疫苗或免疫原性組合物中。

舉例而言，將測序資訊轉換為治療性疫苗可包括：

(1) *預測可結合至大部分個體之HLA分子之突變肽*. 有效選擇哪

些具體突變可用作免疫原需要能預測哪些突變肽可有效結合至大部分患者之HLA等位基因。最近，使用經驗證結合肽及非結合肽之基於神經網絡之學習方法提高了用於主要HLA-A及-B等位基因之預測算法之準確度。

(2) *將藥物調配為長肽之多表位疫苗.* 靶向實際上儘可能多的突變表位利用免疫系統之巨大容量，防止藉由下調具體免疫靶向基因產物而發生免疫逃逸之機會，及補償表位預測方法之已知不準確性。合成肽提供尤其有用之有效製備多種免疫原並將突變體表位之鑑別快速轉換為有效疫苗之方式。肽可容易地化學合成且容易地利用不含污染性細菌或動物物質之試劑來純化。小尺寸容許清晰地集中於蛋白質之突變區域上且亦減少來自其他組份(未突變蛋白質或病毒載體抗原)之無關抗原性競爭。

(3) *與強疫苗佐劑組合.* 有效疫苗需要強佐劑來起始免疫反應。如下文所述，TLR3及MDA5及RIG3之RNA解旋酶結構域之激動劑聚-ICLC已顯示若干種用於疫苗佐劑之期望性質。該等性質包括在活體內誘導免疫細胞之局部及全身活化，產生刺激趨化介素及細胞介素，及刺激DC之抗原呈遞。此外，聚-ICLC可在人類中誘導持久CD4+及CD8+反應。重要的是，在經聚-ICLC疫苗接種之個體中及在已接受高度有效之複製勝任的黃熱病疫苗之志願者中觀察到轉錄及信號轉導路徑上調之顯著類似性。此外，>90%之經與NYES0-1肽疫苗(除Montanide外)組合之聚-ICLC免疫之卵巢癌患者在最近的1期研究中顯示誘導CD4+及CD8+ T細胞，以及對該肽之抗體反應。同時，聚ICLC迄今已在25個以上臨床試驗中廣泛測試且展現相對良性毒性概況。

本發明之上述優點進一步闡述於下文中。

如本文所述，在動物及人類二者中有許多證據表明，突變表位

可有效誘導免疫反應且自發腫瘤消退或長期存活之情形與針對突變表位之CD8+ T細胞反應相關(Buckwalter及Srivastava PK. 「It is the antigen(s), stupid」 and other lessons from over a decade of vaccitherapy of human cancer. Seminars in immunology 20:296-300 (2008)；Karanikas等人，High frequency of cytolytic T lymphocytes directed against a tumor-specific mutated antigen detectable with HLA tetramers in the blood of a lung carcinoma patient with long survival. Cancer Res. 61:3718-3724 (2001)；Lennerz等人，The response of autologous T cells to a human melanoma is dominated by mutated neoantigens. Proc Natl Acad Sci U S A.102:16013 (2005))，且可追蹤「免疫編輯」至小鼠及人類中主要突變抗原之表現的改變(Matsushita等人，Cancer exome analysis reveals a T-cell-dependent mechanism of cancer immunoediting Nature 482:400 (2012)；DuPage等人，Expression of tumor-specific antigens underlies cancer immunoediting Nature 482:405 (2012)；及Sampson等人，Immunologic escape after prolonged progression-free survival with epidermal growth factor receptor variant III peptide vaccination in patients with newly diagnosed glioblastoma J Clin Oncol. 28:4722-4729 (2010))。

測序技術已揭示，每種腫瘤含有多個改變基因之蛋白質編碼內容之患者特異性突變。該等突變產生經改變蛋白質，範圍從單一胺基酸變化(由誤義突變引起)至由於框移、終止密碼子之通讀(read-through)或內含子區域之轉譯(新穎開放閱讀框突變；neoORF)導致之增加新胺基酸序列之長區域。該等突變蛋白質係宿主對腫瘤之免疫反應之有價值的靶，此乃因與天然蛋白質不同，其不經受自身耐受性之免疫弱化效應。因此，與患者之正常細胞相比，突變蛋白質更可能具

有免疫原性且對腫瘤細胞亦更具特異性。

在一個實施例中，組合物中之新抗原肽共同具有對複數個MHC分子之親和性，例如其共同覆蓋靶群體之大部分。有效選擇哪些具體突變可用作免疫原需要能預測哪些突變肽可有效結合至存於患者群體中之HLA等位基因。最近，使用經驗證結合肽及非結合肽之基於神經網絡之學習方法提高了用於主要HLA-A及-B等位基因之預測算法之準確度。利用最近改良之用於預測哪些誤義突變產生強結合的肽與同源MHC分子之算法，可鑑別代表患者群體之最佳突變表位(neoORF及誤義二者)之肽組並進行優先級排序(Zhang等人，Machine learning competition in immunology - Prediction of HLA class I binding peptides J Immunol Methods 374:1 (2011)；Lundegaard等人，Prediction of epitopes using neural network based methods，J Immunol Methods 374:26 (2011))。

靶向實際上儘可能多的突變表位利用免疫系統之巨大容量，防止藉由下調具體免疫靶向基因產物而發生免疫逃逸之機會，及補償表位預測方法之已知不準確性。合成肽提供尤其有用之有效製備多種免疫原並將突變體表位之鑑別快速轉換為有效疫苗或免疫原性組合物之方式。肽可容易地化學合成且容易地利用不含污染性細菌或動物物質之試劑來純化。小尺寸容許清晰地集中於蛋白質之突變區域上且亦減少來自其他組份(未突變蛋白質或病毒載體抗原)之無關抗原性競爭。

在一個實施例中，藥物調配物係長肽之多表位疫苗或免疫原性組合物。該等「長」肽在專職性抗原呈遞細胞(例如樹突細胞)中經歷有效內化、處理及交叉呈遞，且已顯示其可在人類中誘導CTL (Melief及van der Burg，Immunotherapy of established (pre) malignant disease by synthetic long peptide vaccines Nature Rev Cancer 8:351

(2008))。在一個實施例中，製備至少2種肽用於免疫。在一些實施例中，製備20或更多種肽用於免疫。在一個實施例中，新抗原肽之長度在約5至約50個胺基酸範圍內。在另一實施例中，合成長度為約15個至約35個胺基酸之肽。在較佳實施例中，新抗原肽之長度在約20至約35個胺基酸範圍內。

產生腫瘤特異性新抗原

本發明至少部分係基於用合併之腫瘤特異性新抗原呈遞患者之免疫系統之能力。熟習此項技術者自本揭示內容及業內知識將瞭解，有多種方式可產生該等腫瘤特異性新抗原。一般而言，該等腫瘤特異性新抗原可之活體外或活體內產生。腫瘤特異性新抗原可在活體外作為肽或多肽產生，然後可將其調配為贅瘤形成疫苗或免疫原性組合物並投與個體。如本文中更詳細地描述，該活體外產生可藉由熟習此項技術者已知之多種方法來進行，例如肽合成或在多種細菌、真核或病毒重組表現系統中之任一者中自DNA或RNA分子表現肽/多肽，之後純化所表現肽/多肽。或者，腫瘤特異性新抗原可在活體內藉由將編碼腫瘤特異性新抗原之分子(例如，DNA、RNA、病毒表現系統及諸如此類)引入個體中，之後表現所編碼之腫瘤特異性新抗原來產生。本文中亦更詳細地闡述活體外及活體內產生新抗原之方法，此乃因其與遞送療法之醫藥組合物及方法相關。

在某些實施例中，本發明包括經修飾之新抗原肽。如本文中提及新抗原肽時所用，術語「經修飾(modified)」、「修飾(modification)」及諸如此類係指一或多種增強新抗原肽之期望性質之變化，其中該變化不改變新抗原肽之主要胺基酸序列。「修飾」包括不改變新抗原肽自身之主要胺基酸序列之共價化學修飾。該等期望性質包括例如延長活體內半衰期、提高穩定性、降低清除率、改變免疫

原性或致敏性，使能產生特定抗體、細胞靶向、抗原攝取、抗原處理、MHC親和性、MHC穩定性或抗原呈遞。可實施之新抗原肽之變化包括(但不限於)偶聯至載體蛋白、偶聯至配體、偶聯至抗體、聚乙二醇化、聚唾液酸化羥乙基澱粉化(HESylation)、重組PEG模擬物、Fc融合、白蛋白融合、奈米顆粒附接、奈米粒子囊封、膽固醇融合、鐵融合、醯化、醯胺化、糖基化、側鏈氧化、磷酸化、生物素化、添加表面活性物質、添加胺基酸模擬物或添加非天然胺基酸。

蛋白質治療劑之臨床有效性通常受限於短血漿半衰期及對蛋白酶降解之敏感性。各種治療性蛋白質(例如非格司亭(filgrastim))之研究已顯示，該等困難可藉由多種修飾克服，包括將多肽序列偶聯或連接至多種非蛋白質性聚合物中之任一種，例如聚乙二醇(PEG)、聚丙二醇或聚烷二醇(polyoxyalkylenes)(參見例如通常經由連接部分共價結合至蛋白質及非蛋白質性聚合物(例如PEG))。已顯示該等PEG偶聯之生物分子具有臨床上有用之性質，包括更佳物理及熱穩定性、針對酶降解之敏感性之保護、增加之溶解度、更長活體內循環半衰期及降低之清除率、降低之免疫原性及抗原性及降低之毒性。

適於偶聯至多肽序列之PEGs一般在室溫下可溶於水中，且具有通式$R(0\text{-}CH_2\text{-}CH_2)_nO\text{-}R$，其中R係氫或保護基團，諸如烷基或烷醇基團等，且其中n係1至1000之整數。在R係保護基團時，其一般具有1至8個碳。偶聯至多肽序列之PEG可為直鏈或具支鏈。本揭示涵蓋具支鏈PEG衍生物，「星形PEGs」及多臂PEGs。用於本揭示之PEG之分子量不限於任何特定範圍，但某些實施例之分子量介於500與20,000之間，而其他實施例之分子量介於4,000與10,000之間。

本揭示內容亦涵蓋偶聯物之組合物，其中該PEG具有不同n值且由此多種不同PEG以特定比率存在。舉例而言，一些組合物包含偶聯

物之混合物，其中n=1、2、3及4。在一些組合物中，其中n=1之偶聯物之百分比為18-25%，其中n=2之偶聯物之百分比為50-66%，其中n=3之偶聯物之百分比為12-16%，且其中n=4之偶聯物之百分比為最高5%。該等組合物可藉由業內已知之反應條件及純化方法來產生。舉例而言，可使用陽離子交換層析來分離偶聯物，且之後鑑別含有例如附接有期望數目之PEG之偶聯物之部分，自未經修飾之蛋白質序列且自附接有其他數目之PEG之偶聯物純化。

PEG可經由末端反應基團(「間隔體」)結合至本揭示內容之多肽。間隔體係例如末端反應基團，其介導一或多個多肽序列之游離胺基或羧基與聚乙二醇之間之鍵結。具有間隔體可結合至游離胺基之PEG包括N-羥基琥珀醯亞胺聚乙二醇，其可藉由用N-羥基琥珀醯亞胺活化聚乙二醇之琥珀酸酯來製備。可結合至游離胺基之另一經活化聚乙二醇係2,4-雙(0-甲氧基聚乙二醇)-6-氯-s-三嗪，其可藉由使聚乙二醇單甲醚與氰尿醯氯反應來製備。結合至游離羧基之經活化聚乙二醇包括聚氧乙烯二胺。

本揭示內容之一或多個多肽序列與具有間隔體之PEG之偶聯可藉由多種習用方法來實施。舉例而言，偶聯反應可在溶液中在5至10之pH下在4℃至室溫之溫度下進行30分鐘至20小時，所利用試劑對蛋白質之莫耳比為4:1至30:1。反應條件可經選擇以將反應引導向主要產生期望取代程度。一般而言，低溫度、低pH (例如，pH=5)及短反應時間往往減小附接之PEG數目，而高溫度、中至高pH (例如，pH>7)及較長反應時間往往增加附接之PEG數目。可使用業內已知之各種方式來終止反應。在一些實施例中，藉由酸化反應混合物並在例如-20℃下冷凍來終止反應。

本揭示內容亦涵蓋使用PEG模擬物。已研發出保留PEG之屬性

(例如，延長之血清半衰期)同時賦予若干種其他有利性質之重組PEG模擬物。舉例而言，能形成類似於PEG之延長構象之簡單多肽鏈(例如，包含Ala、Glu、Gly、Pro、Ser及Thr)可以重組方式產生且已融合至所關注肽或蛋白質藥物(例如，Amunix之XTEN技術；Mountain View, CA)。此避免了在製程期間對額外偶聯步驟之需要。此外，已確立之分子生物學技術使得能控制多肽鏈之側鏈組成，從而容許免疫原性及製造性質之最佳化。

出於本揭示內容之目的，「糖基化」意欲概括地指將聚糖附接至蛋白質、脂質或其他有機分子之酶促過程。結合本揭示內容使用術語「糖基化」通常欲意指添加或缺失一或多個碳水化合物部分(藉由化學及/或酶促方式移除潛在糖基化位點或缺失糖基化)，及/或添加一或多個天然序列中可存在或可不存在之糖基化位點。另外，該片語包括天然蛋白質中糖基化之定量變化，包括存在之各種碳水化合物部分之性質及比例之變化。糖基化可顯著影響蛋白質之物理性質且亦可在蛋白質穩定性、分泌及亞細胞定位中具有重要意義。適當糖基化可為生物活性所必需。事實上，一些來自真核生物體之基因在缺少用於糖基化蛋白質之細胞過程之細菌(例如，大腸桿菌(E. coli))中表現時，產生由於缺少糖基化而具有極低或不具有活性之所回收蛋白質。

糖基化位點之增加可藉由改變胺基酸序列來完成。多肽之改變可藉由例如添加或一或多個絲胺酸或蘇胺酸殘基(對於O-連接糖基化位點)或天冬醯胺殘基(對於N-連接糖基化位點)或經該等殘基取代來實施。N-連接及O-連接寡醣之結構及在每一類型中發現之糖殘基可不同。一般在二者上發現之一種類型之糖係N-乙醯基神經胺酸(下文稱作唾液酸)。唾液酸通常係N-連接及O-連接寡醣二者之末端殘基且由於其負電荷而可賦予糖蛋白酸性性質。本揭示內容之一具體實施例包

含生成及使用N-糖基化變體。

本揭示內容之多肽序列可視情況經由DNA層面之變化、尤其藉由使編碼該多肽之DNA在預選鹼基處突變，使得生成將轉譯成期望胺基酸之密碼子來改變。增加多肽上之碳水化合物部分數目之另一方式係將醣苷化學或酶偶合至多肽。

碳水化合物之移除可以化學或酶促方式或藉由取代編碼經糖基化胺基酸殘基之密碼子來完成。化學去糖基化技術為業內已知，且多肽上碳水化合物部分之酶裂解可藉由使用多種內醣苷酶及外醣苷酶來達成。

二氫葉酸還原酶(DHFR)缺陷之中國倉鼠卵巢(CHO)細胞係產生重組糖蛋白之常用宿主細胞。該等細胞不表現酶β-半乳糖苷α-2,6-唾液酸轉移酶且因此在與該等細胞中產生之糖蛋白之N-連接寡醣之α-2,6鍵聯中不添加唾液酸。

本揭示內容亦涵蓋使用聚唾液酸化，即將肽及蛋白質偶聯至天然生物可降解之a-(2→8)連接之聚唾液酸(「PSA」)，以改良其穩定性及活體內藥物動力學。PSA係生物可降解之無毒天然聚合物，其高度親水，使其在血液中具有高視分子量，從而延長其血清半衰期。另外，眾多種肽及蛋白質治療劑之聚唾液酸化已導致顯著降低之蛋白分解、活體內活性之保留以及免疫原性及抗原性之降低(例如，參見G. Gregoriadis等人，Int. J. Pharmaceutics 300(1-2): 125-30)。對於使用其他偶聯物(例如，PEG)之修飾，可使用用於位點特異性聚唾液酸化之多種技術(例如，參見T. Lindhout等人，PNAS 108(18)7397-7402 (2011))。

用於偶聯之其他適宜組份及分子包括(例如)甲狀腺球蛋白；白蛋白，例如人類血清白蛋白(HAS)；破傷風類毒素；白喉類毒素；聚胺

基酸，例如聚(D-離胺酸:D-麩胺酸)；輪狀病毒之VP6多肽；流行性感冒病毒血球凝集素、流行性感冒病毒核蛋白；鑰孔帽貝(鑰孔帽貝)血藍蛋白(KLH)；及B型肝炎病毒核心蛋白及表面抗原；或前述各項之任一組合。

白蛋白與本揭示內容之一或多種多肽之融合可藉由例如遺傳操縱來達成，使得編碼HSA之DNA或其片段接合至編碼該一或多種多肽序列之DNA。此後，適宜宿主可經呈例如適宜質體形式之融合核苷酸序列轉變或轉染，以表現融合多肽。該表現可在活體外自例如原核或真核細胞實現，或在活體內自例如轉基因生物體實現。在本揭示內容之一些實施例中，融合蛋白之表現係在哺乳動物細胞系、例如CHO細胞系中進行。轉變在本文中概括地用於指細胞由於自其環境直接攝取、納入及表現外源遺傳物質(外源DNA)及穿過細胞膜吸收所致之遺傳改變。轉變在一些細菌物種中天然地進行，但其在其他細胞中亦可藉由人工方式來實現。

此外，白蛋白自身可經修飾以延長其循環半衰期。經修飾白蛋白與一或多種多肽之融合可藉由上述遺傳操縱技術或藉由化學偶聯來達成；所得融合分子之半衰期長於與未經修飾白蛋白之融合物。(參見WO2011/051489)。

已研發出若干種白蛋白結合策略作為直接融合之替代，包括經由偶聯脂肪酸鏈之白蛋白結合(醯化)。由於血清白蛋白係脂肪酸之轉運蛋白，該等天然配體與白蛋白之結合活性已用於延長小型蛋白質治療劑之半衰期。舉例而言，經核准用於糖尿病之產品地特胰島素(insulin determir，LEVEMIR)包含偶聯至經遺傳修飾之胰島素之肉豆蔻基鏈，得到長效胰島素類似物。

另一種類型之修飾係在多肽序列N-端及/或C-端偶聯(例如，連

接)一或多種其他組份或分子，例如另一種蛋白質(例如，胺基酸序列與標的蛋白質為異源之蛋白質)或載體分子。因此，可提供實例性多肽序列作為與另一組份或分子之偶聯物。

偶聯物修飾可得到保留活性且具有第二分子之額外或互補功能或活性之多肽序列。舉例而言，多肽序列可偶聯至分子，例如以提高溶解度，促進儲存，增加活體內或儲放半衰期或穩定性，促進免疫原性降低，促進活體內延遲或控制釋放等。其他功能或活性包括相對於未偶聯多肽序列降低毒性之偶聯物、較未偶聯多肽序列更有效地靶向一種類型之細胞或器官之偶聯物、或進一步抵抗與如本文所述病症或疾病(例如，糖尿病)相關之病因或效應之藥物。

多肽亦可偶聯至代謝緩慢之大型大分子，例如蛋白質；多醣，例如瓊脂醣凝膠、瓊脂醣、纖維素、珠狀纖維素；聚合胺基酸，例如聚麩胺酸、聚離胺酸；胺基酸共聚物；不活化病毒顆粒；不活化細菌毒素，例如來自白喉、破傷風、霍亂、白血球毒素分子之類毒素；不活化細菌；及樹突細胞。

用於偶聯之其他候選組份及分子包括彼等適於分離或純化者。具體非限制性實例包括結合分子，例如生物素(生物素-抗生物素蛋白特異性結合對)、抗體、受體、配體、凝集素或包含固體載體之分子，該固體載體包括例如塑膠或聚苯乙烯珠粒、板或珠粒、磁性珠粒、測試條及膜。

可使用諸如陽離子交換層析等純化方法藉由電荷差異來分離偶聯物，其可有效將偶聯物按其不同分子量分離。舉例而言，陽離子交換管柱可經加載且之後用-20 mM乙酸鈉(pH -4)洗滌，且之後用在約3至5.5之pH下(例如在pH -4.5)下緩衝之線性(0 M至0.5 M) NaCl梯度溶析。可依據分子量使用習用方法鑑別藉由陽離子交換層析獲得之部分

之內容物，該等習用方法例如質譜術、SDS-PAGE或其他已知用於依據分子量分離分子實體之方法。

在某些實施例中，本揭示內容之多肽序列之胺基端或羧基端可與免疫球蛋白Fc區(例如，人類Fc)融合以形成融合偶聯物(或融合分子)。已顯示Fc融合偶聯物可延長生物醫藥劑之全身半衰期，且因此生物醫藥產品所需要投與頻率可較低。

Fc結合至內襯血管之內皮細胞中之新生Fc受體(FcRn)，且在結合後防止Fc融合分子降解並將其再釋放至循環中，從而使分子在循環中保持更久。據信此Fc結合係內源IgG保持其長血漿半衰期之機制。較新的Fc融合技術將單拷貝之生物醫藥劑連接至抗體之Fc區，以與傳統Fc融合偶聯物相比最佳化生物醫藥劑之藥物動力學及藥效學性質。

本揭示內容涵蓋使用當前已知或將來研發之多肽之其他修飾以改良一或多種性質。一種用於延長本揭示內容之多肽之循環半衰期、提高穩定性、降低清除率或改變免疫原性或致敏性之此類方法涉及藉由羥乙基澱粉化修飾多肽序列，其利用連接至其他分子之羥基乙基澱粉衍生物以修改分子之特徵。羥乙基澱粉化之各個態樣闡述於例如美國專利申請案第2007/0134197號及第2006/0258607號。

活體外肽/多肽合成

蛋白質或肽可藉由彼等熟習此項技術者已知之任何技術來製備，包括經由標準分子生物學技術表現蛋白質、多肽或肽、自天然來源分離蛋白質或肽、活體外轉譯或化學合成蛋白質或肽。先前已揭示對應於多種基因之核苷酸及蛋白質、多肽及肽序列，且可參見彼等熟習此項技術者已知之電腦化資料庫。一個此類資料庫係位於國立衛生研究院(National Institutes of Health)網站之國家生物技術資訊中心(National Center for Biotechnology Information)之基因庫(Genbank)及

GenPept資料庫。已知基因之編碼區可使用本文所揭示或如彼等熟習此項技術者已知之技術擴增及/或表現。或者，蛋白質、多肽及肽之多種商業製劑為彼等熟習此項技術者已知。

肽可容易地利用不含污染性細菌或動物物質之試劑化學合成(Merrifield RB: Solid phase peptide synthesis. I. The synthesis of a tetrapeptide. J. Am. Chem. Soc. 85:2149-54, 1963)。在某些實施例中，新抗原肽係藉由以下方式來製備：(1) 在多通道儀器上使用一致合成及裂解條件平行固相合成；(2) 在RP-HPLC管柱上純化且對管柱進行汽提；且在肽之間再洗滌，但不更換；之後(3) 用資訊最豐富之分析之有限組進行分析。優良藥品製造規範(Good Manufacturing Practices，GMP)足跡可界定在個別患者之肽組周圍，因此僅在不同患者之肽合成之間需要成套轉換程序。

或者，可使用編碼本發明新抗原肽之核酸(例如，多核苷酸)在活體外產生新抗原肽。多核苷酸可為例如單鏈及/或雙鏈之DNA、cDNA、PNA、CNA、RNA或多核苷酸之天然或經穩定形式(例如具有硫代磷酸酯主鏈之多核苷酸)或其組合，且其可含有或可不含有內含子，只要其編碼肽即可。在一個實施例中，使用活體外轉譯產生肽。熟習此項技術者可利用多種實例性系統(例如，Retic Lysate IVT套組，Life Technologies, Waltham, MA)。

亦可製備能表現多肽之表現載體。用於不同細胞類型之表現載體為業內所熟知且可不經過度實驗即選擇。通常，將DNA以適當取向及正確閱讀框插入表現載體(例如質體)中以供表現。若需要，則DNA可連接至期望宿主(例如，細菌)識別之適當轉錄及轉譯調節控制核苷酸序列，但該等控制一般可用於表現載體中。然後使用標準技術將載體引入用於選殖之宿主細菌中(例如，參見Sambrook等人(1989)

Molecular Cloning, A Laboratory Manual, Cold Spring Harbor Laboratory, Cold Spring Harbor, N.Y.)。

亦涵蓋包含經分離多核苷酸之表現載體以及含有該等表現載體之宿主細胞。新抗原肽可以編碼期望新抗原肽之RNA或cDNA分子形式來提供。本發明之一或多種新抗原肽可藉由單一表現載體來編碼。

術語「編碼多肽之多核苷酸」涵蓋僅包括多肽之編碼序列之多核苷酸以及包括其他編碼及/或非編碼序列之多核苷酸。多核苷酸可呈RNA形式或呈DNA形式。DNA包括cDNA、基因體DNA及合成DNA；且可為雙鏈或單鏈且若為單鏈則可為編碼鏈或非編碼(反義)鏈。

在實施例中，多核苷酸可包含腫瘤特異性新抗原肽之編碼序列，該編碼序列與輔助例如自宿主細胞表現及/或分泌多肽之多核苷酸(例如，用作控制自細胞轉運多肽之分泌序列之前導序列)融合於同一閱讀框中。具有前導序列之多肽係前體蛋白且可具有由宿主細胞裂解以形成該多肽之成熟形式之前導序列。

在實施例中，多核苷酸可包含腫瘤特異性新抗原肽之編碼序列，該編碼序列與容許例如純化所編碼多肽之標記序列融合於同一閱讀框中，然後可將其納入個人化贅瘤形成疫苗或免疫原性組合物中。舉例而言，在細菌宿主之情形中，標記序列可為由pQE-9載體供應之六組胺酸標籤以提供與該標記融合之成熟多肽之純化；或在使用哺乳動物宿主(例如，COS-7細胞)時，標記序列可為源自流行性感冒血球凝集素蛋白質之血球凝集素(HA)標籤。其他標籤包括(但不限於)攜鈣蛋白標籤、FLAG標籤、Myc標籤、S標籤、SBP標籤、Softag 1、Softag 3、V5標籤、Xpress標籤、Isopeptag、SpyTag、生物素羧基載體蛋白(BCCP)標籤、GST標籤、螢光蛋白標籤(例如，綠色螢光蛋白

標籤)、麥芽糖結合蛋白標籤、Nus標籤、Strep標籤、硫氧還蛋白標籤、TC標籤、Ty標籤及諸如此類。

在實施例中，多核苷酸可包含一或多種腫瘤特異性新抗原肽之編碼序列，該編碼序列融合於同一閱讀框中以產生能產生多種新抗原肽之單一多聯體化新抗原肽構築體。

在某些實施例中，可提供經分離核酸分子，其核苷酸序列與編碼本發明之腫瘤特異性新抗原肽之多核苷酸至少60%一致、至少65%一致、至少70%一致、至少75%一致、至少80%一致、至少85%一致、至少90%一致、至少95%一致或至少96%、97%、98%或99%一致。

核苷酸序列與參考核苷酸序列至少例如95%「一致」之多核苷酸欲指，該多核苷酸之核苷酸序列與參考序列一致，只是該多核苷酸序列可包括每100個參考核苷酸序列之核苷酸至多5個點突變。換言之，為獲得核苷酸序列與參考核苷酸序列至少95%一致之多核苷酸，參考序列中至多5%核苷酸可缺失或經另一核苷酸取代，或可將數目為參考序列中全部核苷酸之至多5%之核苷酸插入參考序列中。參考序列之該等突變可發生在參考核苷酸序列之胺基端或羧基端位置或在彼等末端位置之間之任何位置，其個別散佈於參考序列中之核苷酸之間或參考序列內之一或多個鄰接基團中。

作為實際問題，任一具體核酸分子是否與參考序列至少80%一致、至少85%一致、至少90%一致且在一些實施例中，至少95%、96%、97%、98%或99%一致可使用已知電腦程式(例如Bestfit程式(威斯康辛序列分析包，Unix用8版，Genetics Computer Group, University Research Park, 575 Science Drive, Madison, WI 53711))以習用方式來測定。Bestfit使用Smith及Waterman之局部同源性算法(Advances in

Applied Mathematics 2:482-489 (1981))來尋找兩個序列之間之最佳同源性區段。在使用Bestfit或任何其他序列比對程式來測定具體序列是否例如與本發明之參考序列95%一致時，設定各參數使得在參考核苷酸序列之全長範圍內計算一致性百分比，且容許佔參考序列之核苷酸總數至多5%之同源性空位。

本文所述之經分離腫瘤特異性新抗原肽可藉由業內已知之任何適宜方法在活體外(例如，在實驗室中)產生。該等方法涵蓋從直接蛋白質合成方法至構築編碼經分離多肽序列之DNA序列並在適宜轉變之宿主中表現彼等序列。在一些實施例中，使用重組技術藉由分離或合成編碼所關注野生型蛋白質之DNA序列來構築DNA序列。視情況，可藉由位點特異性誘變對序列進行誘變以提供其功能類似物。例如，參見Zoeller等人，Proc. Nat'l. Acad. Sci. USA 81:5662-5066 (1984)及美國專利第4,588,585號。

在實施例中，編碼所關注多肽之DNA序列可藉由化學合成使用寡核苷酸合成器來構築。該等寡核苷酸可基於期望多肽之胺基酸序列來設計且選擇彼等在產生所關注重組多肽之宿主細胞中有利之密碼子。可應用標準方法來合成編碼所關注經分離多肽之經分離多核苷酸序列。舉例而言，可使用完整胺基酸序列來構築反向轉譯基因。此外，可合成含有編碼具體經分離多肽之核苷酸序列之DNA寡聚物。舉例而言，可合成若干種編碼期望多肽之部分之小寡核苷酸且之後將其連接。個別寡核苷酸通常含有互補總成之5'或3'懸突。

在組裝(例如，藉由合成、定點誘變或另一方法)後，將編碼所關注具體經分離多肽之多核苷酸序列插入表現載體中並視情況可操作連接至適於在期望宿主中表現該蛋白質之表現控制序列。適當總成可藉由核苷酸測序、限制酶圖譜分析及生物活性多肽在適宜宿主中之表現

來確認。亦如業內已知，為在宿主中獲得高表現程度之轉染基因，可將該基因可操作連接至在所選表現宿主中起作用之轉錄及轉譯表現控制序列。

可使用重組表現載體擴增並表現編碼腫瘤特異性新抗原肽之DNA。重組表現載體係可複製DNA構築體，其具有編碼腫瘤特異性新抗原肽或生物等效類似物之合成或cDNA源DNA片段，該等DNA片段可操作連接至源自哺乳動物、微生物、病毒或昆蟲基因之適宜轉錄或轉譯調節元件。轉錄單元通常包含含以下之總成：(1) 在基因表現中具有調節作用之遺傳元件，例如轉錄啟動子或增強子，(2) 轉錄為mRNA且轉譯為蛋白質之結構或編碼序列，及(3) 適當轉錄及轉譯起始及終止序列，如本文所詳述。該等調節元件可包括操縱基因序列以控制轉錄。且可另外納入通常藉由複製起點賦予之在宿主中複製之能力及促進識別轉變體之選擇基因。DNA區域在功能上彼此相關時係可操作連接的。舉例而言，若信號肽(分泌前導序列)之DNA表現為參與多肽分泌之前體，則其可操作連接至該多肽之DNA；若啟動子控制編碼序列之轉錄，則該啟動子可操作連接至該序列；或若核糖體結合位點之定位允許轉譯，則其可操作連接至編碼序列。通常，可操作連接意指鄰接，且在分泌前導序列之情形中意指鄰接且在閱讀框中。意欲用於酵母表現系統中之結構元件包括使得宿主細胞能細胞外分泌經轉譯蛋白質之前導序列。或者，倘若在無前導序列或轉運序列之情況下表現重組蛋白，則其可包括N-末端甲硫胺酸殘基。此殘基隨後可視情況自所表現重組蛋白裂解以提供最終產物。

可用於真核宿主、尤其哺乳動物或人類之表現載體包括(例如)包含來自SV40、牛乳頭瘤病毒、腺病毒及巨細胞病毒之表現控制序列之載體。可用於細菌宿主之表現載體包括已知細菌質體，例如來自大

腸桿菌之質體(包括pCR 1、pBR322、pMB9及其衍生物)、更寬宿主範圍之質體(例如M13及絲狀單鏈DNA噬菌體)。

用於表現多肽之適宜宿主細胞包括在適當啟動子控制下之原核生物、酵母、昆蟲或高等真核細胞。原核生物包括革蘭氏陰性(gram negative)或革蘭氏陽性(gram positive)生物體，例如大腸桿菌或桿菌。高等真核細胞包括哺乳動物來源之已確立細胞系。亦可採用無細胞轉譯系統。與細菌、真菌、酵母及哺乳動物細胞宿主一起使用之適當選殖及表現載體為業內所熟知(參見Pouwels等人，Cloning Vectors: A Laboratory Manual, Elsevier, N.Y., 1985)。

亦有利地採用各種哺乳動物或昆蟲細胞培養系統來表現重組蛋白。可在哺乳動物細胞中實施重組蛋白之表現，此乃因該等蛋白質一般正確摺疊，經適當修飾且功能完整。適宜哺乳動物宿主細胞系之實例包括Gluzman闡述之猴腎細胞COS-7系(Cell 23:175, 1981)，及能表現適當載體之其他細胞系，包括例如L細胞、C127、3T3、中國倉鼠卵巢(CHO)、293、HeLa及BHK細胞系。哺乳動物表現載體可包含非轉錄元件，例如複製起點、連接至欲表現基因之適宜啟動子及增強子及其他5'或3'側翼非轉錄序列及5'或3'非轉譯序列，例如所需核糖體結合位點、多聚腺苷酸化位點、剪接供體及受體位點及轉錄終止序列。用於在昆蟲細胞中產生異源蛋白質之桿狀病毒系統綜述於Luckow及Summers, Bio/Technology 6:47 (1988)中。

經轉變宿主產生之蛋白質可根據任一適宜方法來純化。該等標準方法包括層析(例如，離子交換層析、親和層析及粒度分級管柱層析及諸如此類)、離心、差別溶解度或用於蛋白質純化之任何其他標準技術。親和性標籤(例如六組胺酸、麥芽糖結合結構域、流行性感冒外殼序列、麩胱甘肽-S-轉移酶及諸如此類)可附接至蛋白質以容許

藉由通過適當親和管柱容易地純化。亦可使用諸如蛋白分解、核磁共振及x射線結晶學等技術物理表徵經分離蛋白質。

舉例而言，來自將重組蛋白分泌至培養基中之系統之上清液可首先使用市售蛋白質濃縮過濾器(例如Amicon或Millipore Pellicon超濾裝置)來濃縮。在濃縮步驟後，可將濃縮物施加至適宜純化基質。或者，可採用陰離子交換樹脂，例如具有懸垂二乙基胺基乙基(DEAE)基團之基質或基材。基質可為丙烯醯胺、瓊脂醣、聚葡萄糖、纖維素或常用於蛋白質純化之其他類型。或者，可採用陽離子交換步驟。適宜陽離子交換器包括多種包含磺丙基或羧基甲基之不溶性基質。最後，可採用一或多個採用疏水RP-HPLC介質(例如具有懸垂甲基或其他脂肪族基團之矽膠)之反相高效液相層析(RP-HPLC)步驟進一步純化癌症幹細胞蛋白質-Fc組合物。亦可採用呈不同組合之一些或所有前述純化步驟來提供均質重組蛋白。

在細菌培養中產生之重組蛋白可藉由以下方式來分離：首先自細胞糰粒萃取，之後進行一或多個濃縮、鹽析、水性離子交換或粒徑篩析層析步驟。可採用高效液相層析(HPLC)進行最終純化步驟。用於表現重組蛋白之微生物細胞可藉由任何便捷方法來破裂，包括冷凍-解凍循環、超音波處理、機械破裂或使用細胞溶解劑。

活體內肽/多肽合成

本發明亦涵蓋使用核酸分子作為將新抗原肽/多肽活體內遞送至有需要之個體之媒劑，其呈例如DNA/RNA疫苗形式(例如，參見WO2012/159643及WO2012/159754，其係全文以引用方式併入本文中)。

在一個實施例中，可藉由使用質體將新抗原投與有需要之患者。該等質體係通常由強病毒啟動子組成以驅使所關注基因(或互補

DNA)之活體內轉錄及轉譯之質體(Mor,等人(1995). The Journal of Immunology 155 (4): 2039-2046)。有時可包括內含子A以改良mRNA穩定性並因此促進蛋白質表現(Leitner等人(1997).The Journal of Immunology 159 (12): 6112-6119)。質體亦包括強多聚腺苷酸化/轉錄終止信號，例如牛生長激素或兔β-球蛋白多聚腺苷酸化序列(Alarcon等人(1999). Adv. Parasitol. Advances in Parasitology 42: 343-410；Robinson等人(2000). Adv. Virus Res. Advances in Virus Research 55: 1-74；Böhm等人(1996). Journal of Immunological Methods 193 (1): 29-40.)。有時構築多順反子載體以表現一種以上免疫原，或表現免疫原及免疫刺激蛋白質(Lewis等人(1999). Advances in Virus Research (Academic Press) 54: 129-88)。

由於質體係自其表現免疫原之「媒劑」，最佳化載體設計以供最大蛋白質表現係必需的(Lewis等人(1999). Advances in Virus Research (Academic Press) 54: 129-88)。一種促進蛋白質表現之方式係最佳化真核細胞中病原性mRNA之密碼子使用。另一考慮因素係啟動子之選擇。該等啟動子可為SV40啟動子或勞斯肉瘤病毒(Rous Sarcoma Virus，RSV)。

可藉由多種不同方法將質體引入動物組織中。兩種最常用方法係使用標準皮下注射針注射鹽水中之DNA，及基因槍遞送。構築DNA疫苗質體及其隨後藉由該兩種方法遞送至宿主中之示意性概述闡釋於Scientific American (Weiner等人(1999) Scientific American 281 (1): 34-41)中。鹽水中之注射通常係以肌內(IM)方式在骨骼肌中實施，或以真皮內(ID)方式將DNA遞送至細胞外間隙中。此可藉由電穿孔用諸如布比卡因(bupivacaine)等肌肉毒素暫時損傷肌肉纖維來輔助；或藉由使用鹽水或蔗糖之高滲溶液來輔助(Alarcon等人(1999).

Adv. Parasitol. Advances in Parasitology 42: 343-410)。對此遞送方法之免疫反應可受多種因素影響，包括針類型、針對齊、注射速率、注射體積、肌肉類型及經注射動物之年齡、性別及生理狀況(Alarcon等人(1999). Adv. Parasitol. Advances in Parasitology 42: 343-410)。

另一種常用遞送方法基因槍遞送使用壓縮氦作為加速劑，以彈道學方式將已吸附至金或鎢微粒上之質體DNA (pDNA)加速遞送至靶細胞中(Alarcon等人(1999). Adv. Parasitol. Advances in Parasitology 42: 343-410；Lewis等人(1999). Advances in Virus Research (Academic Press) 54: 129-88)。

替代遞送方法可包括在黏膜表面上、例如鼻黏膜及肺黏膜上氣溶膠滴注裸DNA (Lewis等人(1999). Advances in Virus Research (Academic Press) 54: 129-88)以及將pDNA局部投與至眼及陰道黏膜(Lewis等人(1999) Advances in Virus Research (Academic Press) 54: 129-88)。黏膜表面遞送亦已使用陽離子脂質體-DNA製劑、生物可降解微球體、用於經口投與腸黏膜之減弱之志賀桿菌屬(Shigella)或李氏菌屬(Listeria)載體及重組腺病毒載體來達成。亦可在溫和機械破壞細胞膜，從而暫時可滲透化處理細胞後，將DNA或RNA遞送至細胞。對膜之此一溫和機械破壞可藉由溫和地迫使細胞穿過小縫隙來完成(Ex Vivo Cytosolic Delivery of Functional Macromolecules to Immune Cells, Sharei等人，PLOS ONE | DOI:10.1371/journal.pone.0118803 2015年4月13日)。

遞送方法決定產生有效免疫反應所需之DNA劑量。鹽水注射需要自10 μg至1 mg之可變量之DNA，而基因槍遞送產生有效免疫反應需要之DNA係肌肉鹽水注射之100分之一至1000分之一。通常，需要0.2 μg - 20 μg，但已報導低至16 ng之量。該等量隨物種而變，且例如

小鼠需要之DNA係靈長類動物之約10分之一。鹽水注射需要更多DNA，此乃因DNA係遞送至靶組織(通常肌肉)之細胞外間隙，其中在細胞將其吸收之前其必須克服物理屏障(僅舉幾個例子，例如基底層及大量結締組織)，而基因槍遞送將DNA直接轟擊至細胞中，產生較少「損耗」 (例如，參見Sedegah等人(1994). Proceedings of the National Academy of Sciences of the United States of America 91 (21): 9866–9870；Daheshia等人(1997). The Journal of Immunology 159 (4): 1945-1952；Chen等人(1998). The Journal of Immunology 160 (5): 2425-2432；Sizemore (1995) Science 270 (5234): 299-302；Fynan等人(1993) Proc. Natl. Acad. Sci. U.S.A. 90 (24): 11478-82)。

在一個實施例中，贅瘤形成疫苗或免疫原性組合物可包括編碼例如如根據本發明所鑑別之一或多種新抗原肽/多肽之單獨DNA質體。如本文所論述，表現載體之確切選擇可取決於欲表現之肽/多肽，且為熟習此項技術者所熟知。預期DNA構築體(例如，在肌肉細胞中呈游離型非複製非整合形式)之預期持久性提供延長之保護持續時間。

本發明之一或多種新抗原肽可在活體內使用基於病毒之系統(例如，腺病毒系統、腺相關病毒(AAV)載體、痘病毒或慢病毒)編碼並表現。在一個實施例中，贅瘤形成疫苗或免疫原性組合物可包括用於有需要之人類患者之基於病毒之載體，例如腺病毒(例如，參見Baden等人，First-in-human evaluation of the safety and immunogenicity of a recombinant adenovirus serotype 26 HIV-1 Env vaccine (IPCAVD 001). J Infect Dis. 2013年1月15日；207(2):240-7，其係全文以引用方式併入本文中)。先前已闡述可用於腺相關病毒、腺病毒及慢病毒遞送之質體(例如，參見美國專利第6,955,808號及第6,943,019號以及美國專

利申請案第20080254008號，其係以引用方式併入本文中)。

本發明之肽及多肽亦可藉由載體表現，例如如本文所論述之核酸分子(例如RNA或DNA質體)、病毒載體(例如痘病毒，例如正痘病毒、禽痘病毒；或腺病毒、AAV或慢病毒)。此方法涉及使用載體表現編碼本發明之肽之核苷酸序列。在引入急性或慢性感染之宿主中或引入未感染宿主中之後，載體表現免疫原性肽，且由此引發宿主CTL反應。

在可用於實踐本發明之載體中，使用反轉錄病毒基因轉移方法在細胞之宿主基因體中整合係可能的，通常導致長期表現所插入轉基因。在較佳實施例中，反轉錄病毒係慢病毒。另外，已在多種不同細胞類型及靶組織中觀察到高轉導效率。反轉錄病毒之向性可藉由納入外來套膜蛋白擴大靶細胞之潛在靶群體來改變。反轉錄病毒亦可經改造以容許所插入轉基因之條件性表現，使得僅某些細胞類型被慢病毒感染。可使用細胞類型特異性啟動子靶向在特定細胞類型中之表現。慢病毒載體係反轉錄病毒載體(且因此在本發明之實踐中可使用慢病毒及反轉錄病毒載體二者)。此外，慢病毒載體較佳，此乃因其能轉導或感染非分裂細胞並通常產生高病毒效價。反轉錄病毒基因轉移系統之選擇因此可取決於靶組織。反轉錄病毒載體包括具有對最高6-10 kb之外來序列之包裝容量之順式作用長末端重複序列。最小順式作用LTR足以用於複製並包裝載體，然後其用於將期望核酸整合至靶細胞中以提供持久表現。可用於實踐本發明之廣泛使用的反轉錄病毒載體包括基於以下之彼等：鼠類白血病病毒(MuLV)、長臂猿白血病病毒(GaLV)、猿猴免疫缺失病毒(SIV)、人類免疫缺失病毒(HIV)及其組合(例如，參見Buchscher等人(1992) J. Virol. 66:2731-2739；Johann等人(1992) J. Virol. 66:1635-1640；Sommnerfelt等人(1990) Virol. 176:58-

59；Wilson等人(1998) J. Virol. 63:2374-2378；Miller等人(1991) J. Virol. 65:2220-2224；PCT/US94/05700)。

亦可用於實踐本發明者係最小非靈長類動物慢病毒載體，例如基於馬傳染性貧血病毒(EIAV)之慢病毒載體(例如，參見Balagaan, (2006) J Gene Med； 8: 275 - 285, Published online 21 November 2005 in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/jgm.845)。載體可具有驅使靶基因表現之巨細胞病毒(CMV)啟動子。因此，本發明在可用於實踐本發明之載體中涵蓋：病毒載體，包括反轉錄病毒載體及慢病毒載體。

已揭示慢病毒載體，如在帕金森氏病(Parkinson's Disease)之治療中，例如，參見美國專利公開案第20120295960號及美國專利第7303910號及第7351585號。亦已揭示慢病毒載體用於遞送至腦，例如，參見美國專利公開案第US20110293571號；第US20040013648號、第US20070025970號、第US20090111106號及美國專利第US7259015號。在另一實施例中，使用慢病毒載體將載體遞送至彼等經治療疾病者之腦中。

關於可用於實踐本發明之慢病毒載體系統，提及美國專利第6428953號、第6165782號、第6013516號、第5994136號、第6312682號及第7,198,784號以及其中引用之文件。

在本文之一實施例中，經由慢病毒遞送。Zou等人藉由鞘內導管投與約10 μl效價為1 × 10^9轉導單位(TU)/ml之重組慢病毒。該等種類之劑量可針對在本發明中使用反轉錄病毒或慢病毒載體經調整或外推。對於在諸如腦等組織中之轉導，需要使用極小體積，因此藉由超速離心濃縮病毒製劑。所得製劑應具有至少10^8 TU/ml，較佳10^8至10^9 TU/ml，更佳至少10^9 TU/ml。可使用諸如超濾或結合至基質及自基質

溶析等其他濃縮方法。

在其他實施例中，作為用於75 kg普通人類或針對個體之體重及大小及物種經調節之總單一劑量，所投與慢病毒之量可為1.×.10^5或約1.×.10^5噬菌斑形成單位(PFU)、5.×.10^5或約5.×.10^5 PFU、1.×.10^6或約1.x10^6 PFU、5.×.10^6或約5.×.10^6 PFU、1.×.10^7或約1.×.10^7 PFU、5.×.10^7或約5.×.10^7 PFU、1.×.10^8或約1.×.10^8 PFU、5.×.10^8或約5.×.10^8 PFU、1.×.10^9或約1.×.10^9 PFU、5.×.10^9或約5.×.10^9 PFU、1.×.10^{10}或約1.×.10^{10} PFU或5.×.10^{10}或約5.×.10^{10} PFU。熟習此項技術者可確定適宜劑量。病毒之適宜劑量可憑經驗來確定。

亦可用於實踐本發明者係腺病毒載體。一個優點係重組腺病毒能在多種哺乳動物細胞及組織中在活體外及活體內有效轉移並表現重組基因，導致經轉移核酸之高表現。此外，有效感染靜止細胞之能力擴大了重組腺病毒載體之實用性。另外，高表現程度確保核酸產物將表現至足夠程度以生成免疫反應(例如，參見美國專利第7,029,848號，其以引用方式併入本文中)。

關於可用於實踐本發明之腺病毒載體，提及美國專利第6,955,808號。所用腺病毒載體可選自由以下組成之群：Ad5、Ad35、Ad11、C6及C7載體。腺病毒5 (「Ad5」)基因體之序列已公開。(Chroboczek, J.、Bieber, F.及Jacrot, B. (1992) The Sequence of the Genome of Adenovirus Type 5 and Its Comparison with the Genome of Adenovirus Type 2, Virology 186, 280-285；其內容係以引用方式併入本文中)。Ad35載體闡述於美國專利第6,974,695號、第6,913,922號及第6,869,794號中。Ad11載體闡述於美國專利第6,913,922號中。C6腺病毒載體闡述於美國專利第6,780,407號；第6,537,594號；第6,309,647號；第6,265,189號；第6,156,567號；第6,090,393號；第

5,942,235號及第5,833,975號中。C7載體闡述於美國專利第6,277,558號中。亦可使用E1-缺損或缺失、E3-缺損或缺失及/或E4-缺損或缺失之腺病毒載體。某些在E1區具有突變之腺病毒具有改良之安全界限，此乃因E1-缺損腺病毒突變體在非受納細胞中係複製缺損的，或至少經顯著減弱。在E3區具有突變之腺病毒可因破壞腺病毒借之下調I類MHC分子之機制而具有增強之免疫原性。具有E4突變之腺病毒可由於抑制晚期基因表現而具有降低之腺病毒載體之免疫原性。該等載體在期望利用相同載體反覆進行疫苗再接種時可尤其有用。在E1、E3、E4、E1及E3以及E1及E4中缺失或突變之腺病毒載體可根據本發明來使用。此外，其中所有病毒基因皆缺失之「無病毒基因的(gutless)」腺病毒載體亦可根據本發明來使用。該等載體需要輔助病毒進行其複製且需要表現E1a及Cre二者之特殊的人類293細胞系，此條件在自然環境中不存在。該等「無病毒基因的」載體無免疫原性且因此該等載體可多次接種用於疫苗再接種。「無病毒基因的」腺病毒載體可用於插入異源插入物/基因(例如本發明之轉基因)，且甚至可用於共遞送眾多種異源插入物/基因。

在本文之一實施例中，經由腺病毒遞送，該腺病毒可具有單一加強劑量，含有至少1×10^5個顆粒(亦稱為顆粒單位，pu)之腺病毒載體。在本文之實施例中，該劑量較佳為至少約1×10^6個顆粒(例如，約1×10^6-1×10^{12}個顆粒)，更佳至少約1×10^7個顆粒，更佳至少約1×10^8個顆粒(例如，約1×10^8-1×10^{11}個顆粒或約1×10^8-1×10^{12}個顆粒)，且最佳至少約1×10^9個顆粒(例如，約1×10^9-1×10^{10}個顆粒或約1×10^9-1×10^{12}個顆粒)或甚至至少約1×10^{10}個顆粒(例如，約1×10^{10}-1×10^{12}個顆粒)之腺病毒載體。或者，該劑量包含不多於約1×10^{14}個顆粒，較佳不多於約1×10^{13}個顆粒，甚至更佳不多於約$1 \times$

10^{12}個顆粒，甚至更佳不多於約1 × 10^{11}個顆粒，且最佳不多於約1 × 10^{10}個顆粒(例如，不多於約1 × 10^{9}個顆粒)。因此，該劑量可含有單一劑量之腺病毒載體，其具有例如，約1 × 10^{6}顆粒單位(pu)、約2 × 10^{6} pu、約4 × 10^{6} pu、約1 × 10^{7} pu、約2 × 10^{7} pu、約4 × 10^{7} pu、約1 × 10^{8} pu、約2 × 10^{8} pu、約4 × 10^{8} pu、約1 × 10^{9} pu、約2 × 10^{9} pu、約4 × 10^{9} pu、約1 × 10^{10} pu、約2 × 10^{10} pu、約4 × 10^{10} pu、約1 × 10^{11} pu、約2 × 10^{11} pu、約4 × 10^{11} pu、約1 × 10^{12} pu、約2 × 10^{12} pu或約4 × 10^{12} pu之腺病毒載體。例如，參見於2013年6月4日授予Nabel等人之美國專利第8,454,972 B2號中之腺病毒載體；該案係以引用方式併入本文中，及在其第29行，第36-58列之劑量。在本文之實施例中，腺病毒係經由多次劑量來遞送。

就活體內遞送而言，AAV由於低毒性及因未整合至宿主基因體中所致之引起插入誘變之低機率而較其他病毒載體係有利的。AAV之包裝極限為4.5或4.75 Kb。大於4.5或4.75 Kb之構築體導致顯著降低之病毒產生。有多種啟動子可用於驅使核酸分子表現。AAV ITR可用作啟動子且有利於消除對額外啟動子元件之需要。對於全身性表現，可使用以下啟動子：CMV、CAG、CBh、PGK、SV40、鐵蛋白重鏈或輕鏈等。對於腦表現，可使用以下啟動子：用於所有神經元之突觸蛋白I、用於興奮性神經元之CaMKIIα、用於γ-胺基丁酸能神經元(GABAergic neuron)之GAD67或GAD65或VGAT等。用於驅使RNA合成之啟動子可包括：Pol III啟動子，例如U6或H1。Pol II啟動子及內含子盒之使用可用於表現嚮導RNA (gRNA)。

關於可用於實踐本發明之AAV載體，提及美國專利第5658785號、第7115391號、第7172893號、第6953690號、第6936466號、第6924128號、第6893865號、第6793926號、第6537540號、第6475769

號及第6258595號以及其中引用之文件。

關於AAV，AAV可為AAV1、AAV2、AAV5或其任一組合。可針對欲靶向之細胞選擇AAV；例如，可選擇AAV血清型1、2、5或雜合衣殼AAV1、AAV2、AAV5或其任一組合用於靶向腦或神經元細胞；且可選擇AAV4用於靶向心臟組織。AAV8可用於遞送至肝。上述啟動子及載體係個別地較佳。

在本文之實施例中，經由AAV遞送。業內認為活體內遞送AAV至人類之治療有效劑量係在約20至約50 ml範圍內之鹽水溶液，其含有約1×10^{10}至約1×10^{50}功能性AAV/ml溶液。該劑量可經調節以針對任何副作用平衡治療益處。在本文之實施例中，AAV劑量通常在約1×10^{5}至1×10^{50}個基因體AAV、約1×10^{8}至1×10^{20}個基因體AAV、約1×10^{10}至約1×10^{16}個基因體或約1×10^{11}至約1×10^{16}個基因體AAV之濃度範圍內。人類劑量可為約1×10^{13}個基因體AAV。該等濃度可以約0.001 ml至約100 ml、約0.05至約50 ml或約10至約25 ml之載劑溶液來遞送。在較佳實施例中，AAV係以約2×10^{13}個病毒基因體/毫升之效價來使用，且小鼠之每個紋狀體半球接受一次500奈升注射。熟習此項技術者經由常規試驗建立劑量反應曲線可容易地確立其他有效劑量。例如，參見於2013年3月26日授予Hajjar等人之美國專利第8,404,658 B2號，第27行，第45-60列。

在另一實施例中，有效活化贅瘤形成疫苗或免疫原性組合物之細胞免疫反應可藉由在非病原性微生物中表現疫苗或免疫原性組合物中之相關新抗原來達成。該等微生物之熟知實例係牛分枝桿菌(Mycobacterium bovis) BCG、沙門桿菌屬(Salmonella)及假單胞菌屬(Pseudomona) (參見美國專利第6,991,797號，其係全文以引用方式併入本文中)。

在另一實施例中，痘病毒用於贅瘤形成疫苗或免疫原性組合物中。該等痘病毒包括正痘病毒、禽痘、牛痘、MVA、NYVAC、金絲雀痘、ALVAC、雞痘、TROVAC等(例如，參見Verardi等人., Hum Vaccin Immunother. 2012 Jul；8(7):961-70；及Moss, Vaccine. 2013；31(39): 4220-4222)。痘病毒表現載體闡述於1982年且不久即廣泛用於疫苗研發以及多種領域的研究。該等載體之優點包括簡單構築、能容納大量外來DNA及高表現程度。

關於可用於實踐本發明之痘病毒之資訊，例如脊椎動物痘病毒亞科(*Chordopoxvirinae*)痘病毒(脊椎動物之痘病毒)，例如正痘病毒及禽痘病毒，例如牛痘病毒(例如，惠氏(Wyeth)株、WR株(例如，ATCC® VR-1354)、哥本哈根(Copenhagen)株、NYVAC、NYVAC.1、NYVAC.2、MVA、MVA-BN)、金絲雀痘病毒(例如，惠特利(Wheatley) C93株、ALVAC)、雞痘病毒(例如，FP9株、韋伯斯特(Webster)株、TROVAC)、鴿痘、鴿痘、鵪鶉痘及浣熊痘，尤其其合成或非天然重組體、其用途及該等重組體之製備及使用方法可參見科學及專利文獻，例如：

- 美國專利第4,603,112號、第4,769,330號、第5,110,587號、第5,174,993號、第5,364,773號、第5,762,938號、第5,494,807號、第5,766,597號、第7,767,449號、第6,780,407號、第6,537,594號、第6,265,189號、第6,214,353號、第6,130,066號、第6,004,777號、第5,990,091號、第5,942,235號、第5,833,975號、第5,766,597號、第5,756,101號、第7,045,313號、第6,780,417號、第8,470,598號、第8,372,622號、第8,268,329號、第8,268,325號、第8,236,560號、第8,163,293號、第7,964,398號、第7,964,396號、第7,964,395號、第7,939,086號、第7,923,017號、第7,897,156號、第7,892,533號、第

7,628,980號、第7,459,270號、第7,445,924號、第7,384,644號、第7,335,364號、第7,189,536號、第7,097,842號、第6,913,752號、第6,761,893號、第6,682,743號、第5,770,212號、第5,766,882號及第5,989,562號，以及

- Panicali, D. Proc. Natl. Acad. Sci. 1982；79；4927-493, Panicali D. Proc. Natl. Acad. Sci. 1983；80(17): 5364-8, Mackett, M. Proc. Natl. Acad. Sci. 1982；79: 7415-7419, Smith GL. Proc. Natl. Acad. Sci. 1983；80(23): 7155-9, Smith GL. Nature 1983；302: 490-5, Sullivan VJ. Gen. Vir. 1987；68: 2587-98, Perkus M Journal of Leukocyte Biology 1995；58:1-13, Yilma TD. Vaccine 1989；7: 484-485, Brochier B. Nature 1991；354: 520-22, Wiktor, TJ. Proc. Natl Acd. Sci. 1984；81: 7194-8, Rupprecht, CE. Proc. Natl Acd. Sci. 1986；83: 7947-50, Poulet, H Vaccine 2007；25(Jul): 5606-12, Weyer J. Vaccine 2009；27(Nov): 7198-201, Buller, RM Nature 1985；317(6040): 813-5, Buller RM. J. Virol. 1988；62(3):866-74, Flexner, C. Nature 1987；330(6145): 259-62, Shida, H. J. Virol. 1988；62(12): 4474-80, Kotwal, GJ. J. Virol. 1989；63(2): 600-6, Child, SJ. Virology 1990；174(2): 625-9, Mayr A. Zentralbl Bakteriol 1978；167(5,6): 375-9, Antoine G. Virology. 1998；244(2): 365-96, Wyatt, LS. Virology 1998；251(2): 334-42, Sancho, MC. J. Virol. 2002；76(16)；8313-34, Gallego-Gomez, JC. J. Virol. 2003；77(19)；10606-22), Goebel SJ. Virology 1990；(a,b) 179: 247-66, Tartaglia, J. Virol. 1992；188(1): 217-32, Najera JL. J. Virol. 2006；80(12): 6033-47, Najera, JL. J. Virol. 2006；80: 6033-6047, Gomez, CE. J. Gen. Virol. 2007；88: 2473-78, Mooij, P. Jour. Of Virol. 2008；82: 2975-2988, Gomez, CE. Curr. Gene

Ther. 2011；11: 189-217, Cox,W. Virology 1993；195: 845-50, Perkus, M. Jour. Of Leukocyte Biology 1995；58: 1-13, Blanchard TJ. J Gen Virology 1998；79(5): 1159-67, Amara R. Science 2001；292: 69-74, Hel, Z., J. Immunol. 2001；167: 7180-9, Gherardi MM. J. Virol. 2003；77: 7048-57, Didierlaurent, A. Vaccine 2004；22: 3395-3403, Bissht H. Proc. Nat. Aca. Sci. 2004；101: 6641-46, McCurdy LH. Clin. Inf. Dis 2004；38: 1749-53, Earl PL. Nature 2004；428: 182-85, Chen Z. J. Virol. 2005；79: 2678-2688, Najera JL. J. Virol. 2006；80(12): 6033-47, Nam JH. Acta. Virol. 2007；51: 125-30, Antonis AF. Vaccine 2007；25: 4818-4827,B Weyer J. Vaccine 2007；25: 4213-22, Ferrier-Rembert A. Vaccine 2008；26(14): 1794-804, Corbett M. Proc. Natl. Acad. Sci. 2008；105(6): 2046-51, Kaufman HL., J. Clin. Oncol. 2004；22: 2122-32, Amato, RJ. Clin. Cancer Res. 2008；14(22): 7504-10, Dreicer R. Invest New Drugs 2009；27(4): 379-86, Kantoff PW.J. Clin. Oncol. 2010, 28, 1099-1105, Amato RJ. J. Clin. Can. Res. 2010；16(22): 5539-47, Kim, DW. Hum. Vaccine. 2010；6: 784-791, Oudard, S. Cancer Immunol. Immunother. 2011；60: 261-71, Wyatt, LS. Aids Res. Hum. Retroviruses. 2004；20: 645-53, Gomez, CE. Virus Research 2004；105: 11-22, Webster, DP. Proc. Natl. Acad. Sci. 2005；102: 4836-4, Huang, X. Vaccine 2007；25: 8874-84, Gomez, CE. Vaccine 2007a；25: 2863-85, Esteban M. Hum. Vaccine 2009；5: 867-871, Gomez, CE. Curr. Gene therapy 2008；8(2): 97-120, Whelan, KT. Plos one 2009；4(6): 5934, Scriba, TJ. Eur. Jour. Immuno. 2010；40(1): 279-90, Corbett, M. Proc. Natl. Acad. Sci. 2008；105: 2046-2051, Midgley, CM. J. Gen. Virol. 2008；89: 2992-97, Von Krempelhuber, A.

Vaccine 2010；28: 1209-16, Perreau, M. J. Of Virol. 2011；Oct: 9854-62, Pantaleo, G. Curr Opin HIV-AIDS. 2010；5: 391-396，

其各自以引用方式併入本文中。

在另一實施例中，在贅瘤形成疫苗或免疫原性組合物中使用牛痘病毒表現新抗原。(Rolph等人，Recombinant viruses as vaccines and immunological tools. Curr Opin Immunol 9:517-524, 1997)。重組牛痘病毒能在受感染宿主細胞之細胞質內複製且所關注多肽因此可誘導免疫反應。此外，痘病毒已廣泛用作疫苗或免疫原性組合物載體，此乃因其能藉由I類主要組織相容性複合體路徑藉由直接感染免疫細胞、尤其抗原呈遞細胞來靶向用於處理之所編碼抗原，但亦係由於其能自輔助。

在另一實施例中，在贅瘤形成疫苗或免疫原性組合物中使用ALVAC作為載體。ALVAC係可經修飾以表現外來轉基因之金絲雀痘病毒且已用作針對原核及真核抗原二者之疫苗接種方法(Horig H、Lee DS、Conkright W等人，Phase I clinical trial of a recombinant canarypoxvirus (ALVAC) vaccine expressing human carcinoembryonic antigen and the B7.1 co-stimulatory molecule. Cancer Immunol Immunother 2000；49:504-14；von Mehren M、Arlen P、Tsang KY等人，Pilot study of a dual gene recombinant avipox vaccine containing both carcinoembryonic antigen (CEA) and B7.1 transgenes in patients with recurrent CEA-expressing adenocarcinomas. Clin Cancer Res 2000；6:2219-28；Musey L、Ding Y、Elizaga M等人，HIV-1 vaccination administered intramuscularly can induce both systemic and mucosal T cell immunity in HIV-1-uninfected individuals. J Immunol 2003;171:1094–101；Paoletti E. Applications of pox virus vectors to

vaccination: an update. Proc Natl Acad Sci U S A 1996；93:11349-53；美國專利第7,255,862號)。在I期臨床試驗中，表現腫瘤抗原CEA之ALVAC病毒在所選患者中顯示優良安全性概況且導致增強之CEA特異性T細胞反應；然而，未觀察到客觀臨床反應(Marshall JL、Hawkins MJ、Tsang KY等人，Phase I study in cancer patients of a replication-defective avipox recombinant vaccine that expresses human carcinoembryonic antigen. J Clin Oncol 1999;17:332-7)。

在另一實施例中，可使用改良型安卡拉牛痘(MVA)病毒作為新抗原疫苗或免疫原性組合物之病毒載體。MVA係正痘病毒家族之成員且已藉由牛痘病毒之安卡拉株(CVA)在雞胚胎纖維母細胞上約570次連續傳代來生成(綜述參見Mayr, A.等人，Infection 3, 6-14, 1975)。由於該等傳代，所得MVA病毒所含基因體資訊與CVA相比少31千鹼基，且高度受限於宿主細胞(Meyer, H.等人，J. Gen. Virol. 72, 1031-1038, 1991)。MVA之特徵在於其極端減弱，即特徵為減小之毒力或感染能力，但仍保持優良免疫原性。當在多種動物模型中測試時，證實MVA無毒力，甚至在免疫抑制個體中亦無毒力。此外，MVA-BN®-HER2係候選免疫療法，其經設計用於治療HER-2陽性乳癌且目前處於臨床試驗中。(Mandl等人，Cancer Immunol Immunother. Jan 2012；61(1): 19-29)。已闡述製備及使用重組MVA之方法(例如，參見美國專利第8,309,098號及第5,185,146號，全文併入本文中)。

在另一實施例中，使用牛痘病毒之經修飾哥本哈根株、NYVAC及NYVAC變異形式作為載體(參見美國專利第7,255,862號；PCT WO 95/30018；美國專利第5,364,773號及第5,494,807號，其係全文以引用方式併入本文中)。

在一個實施例中，將疫苗或免疫原性組合物之重組病毒顆粒投

與有需要之患者。所表現新抗原之劑量可在幾微克至幾百微克範圍內，例如5 μg至500 μg。疫苗或免疫原性組合物可以任何適宜量投與以達成該等劑量下之表現。可將病毒顆粒以約至少$10^{3.5}$ pfu之量投與有需要之患者或轉染至細胞中；因此，較佳將病毒顆粒以至少約10^4 pfu至約10^6 pfu投與有需要或經感染之患者或轉染至細胞中；然而，可向有需要之患者投與至少約10^8 pfu，使得更佳投與量可為至少約10^7 pfu至約10^9 pfu。關於NYVAC之劑量適用於ALVAC、MVA、MVA-BN及禽痘(例如金絲雀痘及雞痘)。

疫苗或免疫原性組合物佐劑

有效疫苗或免疫原性組合物有利地包括強佐劑以起始免疫反應。如本文所述，TLR3及MDA5及RIG3之RNA解旋酶結構域之激動劑聚-ICLC已顯示若干種用於疫苗或免疫原性組合物佐劑之期望性質。該等性質包括在活體內誘導免疫細胞之局部及全身活化、產生刺激性趨化介素及細胞介素及刺激DC之抗原呈遞。此外，聚-ICLC可在人類中誘導持久CD4+及CD8+反應。重要的是，在經聚-ICLC疫苗接種之個體中及在已接受高度有效之複製勝任的黃熱病疫苗之志願者中觀察到轉錄及信號轉導路徑之上調中之顯著類似性。此外，在最近的1期研究中，>90%之經聚-ICLC與NY-ESO-1肽疫苗(除Montanide外)之組合免疫之卵巢癌患者顯示誘導CD4+及CD8+ T細胞以及針對該肽之抗體反應。同時，聚-ICLC迄今已在25個以上臨床試驗中廣泛測試且展現相對良性毒性概況。除了強效且特異性之免疫原外，新抗原肽可與佐劑(例如，聚-ICLC)或另一抗瘤劑組合。不受限於理論，預期該等新抗原可繞過中樞胸腺耐受性(因此容許更強抗腫瘤T細胞反應)，同時降低自身免疫性之潛力(例如，藉由避免靶向正常的自體抗原)。有效免疫反應有利地包括強佐劑以活化免疫系統(Speiser及Romero,

Molecularly defined vaccines for cancer immunotherapy, and protective T cell immunity Seminars in Immunol 22:144 (2010))。舉例而言，類鐸受體(TLR)已作為微生物及病毒病原體「危險信號」之強效感測器出現，有效誘導先天免疫系統且繼而誘導適應性免疫系統(Bhardwaj及Gnjatic, TLR AGONISTS: Are They Good Adjuvants? Cancer J. 16:382-391 (2010))。在TLR激動劑中，聚-ICLC (合成雙鏈RNA模擬物)係骨髓源樹突細胞之最有效活化劑之一。在人類志願者研究中，已顯示聚-ICLC安全且可在末梢血細胞中誘導與最有效減毒活病毒疫苗之一之黃熱病疫苗YF-17D所誘導相當之基因表現譜(Caskey等人，Synthetic double-stranded RNA induces innate immune responses similar to a live viral vaccine in humans J Exp Med 208:2357 (2011))。在較佳實施例中，利用由Oncovir, Inc製備之聚-ICLC之GMP製劑Hiltonol®作為佐劑。在其他實施例中，設想本文所述之其他佐劑。例如，水包油、油包水或多相W/O/W；例如，參見US 7,608,279及Aucouturier等人，Vaccine 19 (2001), 2666-2672，以及其中引用之文件。

適應症

可用本文件之療法治療之癌症及癌症病況之實例包括(但不限於)已診斷為患有癌症或具有發生癌症之風險之有需要之患者。該個體可患有實體腫瘤，例如乳房癌、卵巢癌、前列腺癌、肺癌、腎癌、胃癌、結腸癌、睪丸癌、頭頸部癌、胰臟癌、腦癌、黑色素瘤及組織器官之其他腫瘤；及血液腫瘤，例如淋巴瘤及白血病，包括急性骨髓性白血病、慢性骨髓性白血病、慢性淋巴球性白血病、T細胞淋巴球性白血病及B細胞淋巴瘤；腦及中樞神經系統腫瘤(例如，腦膜、腦、脊髓、腦神經及CNS其他部分之腫瘤，例如神經膠母細胞瘤或髓質母細胞瘤)；頭部及/或頸部癌症、乳房腫瘤、循環系統(例如，心臟、縱膈

及胸膜及其他胸廓內器官、血管腫瘤及腫瘤相關血管組織)腫瘤；血液及淋巴系統腫瘤(例如，霍奇金氏病、非霍奇金氏病淋巴瘤、柏基特氏淋巴瘤(Burkitt's lymphoma)、AIDS相關淋巴瘤、惡性免疫增生疾病、多發性骨髓瘤及惡性漿細胞瘤、淋巴性白血病、類骨髓性白血病、急性或慢性淋巴球性白血病、單核球性白血病、其他特定細胞類型之白血病、不明細胞類型之白血病、淋巴、造血及相關組織之未明性惡性腫瘤，例如瀰漫性大細胞淋巴瘤、T細胞淋巴瘤或皮膚T細胞淋巴瘤)；排泄系統(例如，腎、腎骨盆、輸尿管、膀胱及其他泌尿器官)腫瘤；胃腸道(例如，食管、胃、小腸、結腸、結腸直腸、直腸乙狀結腸連接部、直腸、肛門及肛管)腫瘤；涉及肝及肝內膽管、膽囊及膽道其他部分、胰臟及其他消化器官之腫瘤；口腔(例如，唇、舌、齒齦、口腔底、鰓、腮腺、唾液腺、扁桃體、口咽、鼻咽、梨狀隱窩、下嚥及口腔其他位點)腫瘤；生殖系統(例如，陰門、陰道、子宮頸、子宮、卵巢及與雌性生殖器官相關之其他位點、胎盤、陰莖、前列腺、睪丸及與雄性生殖器官相關之其他位點)腫瘤；呼吸道(例如，鼻腔、中耳、副鼻竇、喉、氣管、支氣管及肺，例如小細胞肺癌及非小細胞肺癌)腫瘤；骨骼系統(例如，肢體之骨及關節軟骨、骨關節軟骨及其他位點)腫瘤；皮膚腫瘤(例如，皮膚惡性黑色素瘤、非黑色素瘤皮膚癌、皮膚基底細胞癌、皮膚鱗狀細胞癌、間皮瘤、卡波西氏肉瘤(Kaposi's sarcoma))；及涉及其他組織(包括周圍神經及自主神經系統、結締組織及軟組織、腹膜後腔及腹膜、眼、甲狀腺、腎上腺及其他內分泌腺及相關結構)之腫瘤；淋巴結之繼發性及未明性惡性腫瘤、呼吸及消化系統之繼發性惡性瘤及其他位點之繼發性惡性瘤。因此，本文所述之個體群體可患有上述癌症類型中之一。在其他實施例中，個體群體可為患有實體腫瘤之所有個體，或患有液體腫瘤之所

有個體。

尤其關注著係對非霍奇金氏淋巴瘤(NHL)、透明細胞腎細胞癌(ccRCC)、轉移黑色素瘤、肉瘤、白血病或膀胱、結腸、腦、乳房、頭頸部、子宮內膜、肺、卵巢、胰臟或前列腺之癌症之治療。在某些實施例中，黑色素瘤係高風險黑色素瘤。

可使用本文所述療法治療之癌症可尤其包括使用其他化學治療劑之治療難治之情形。如本文所用術語「難治」係指癌症(及/或其轉移)，其在用另一化學治療劑治療後不顯示抗增殖反應或僅顯示弱抗增殖反應(例如，對腫瘤生長無抑制或僅有弱抑制)。該等癌症無法用其他化學治療劑滿意地治療。難治癌症不僅涵蓋(i) 在患者治療期間一或多種化學治療劑已失效之癌症，且亦涵蓋(ii) 可藉由其他方式(例如在化學治療劑存在下生檢及培養)顯示難治之癌症。

本文所述療法亦適用於治療先前尚未治療之有需要之患者。

本文所述療法亦適用於不具有可檢測贅瘤形成但具有疾病復發之高風險之個體。

亦尤其關注者係治療已經歷自體造血幹細胞移植(AHSCT)之有需要之患者，及尤其在經歷AHSCT後顯示殘存疾病之患者。AHSCT後環境之特徵在於低體積之殘存疾病、將免疫細胞灌注至穩態增殖之情形以及不存在任何標準復發延遲療法。該等特徵提供使用所主張之腫瘤疫苗或免疫原性組合物延遲疾病復發之唯一機會。

遞送之醫藥組合物/方法

本發明亦係關於包含有效量之如本文所述之一或多種新抗原肽(包括其醫藥上可接受之鹽)視情況與醫藥上可接受之載劑、賦形劑或添加劑之組合之醫藥組合物。

在作為組合投與時，治療劑(即新抗原肽)可調配為在同時或不同

時間給予之單獨組合物，或該等治療劑可作為單一組合物給予。

組合物可每天一次、每天兩次、每兩天一次、每三天一次、每四天一次、每五天一次、每六天一次、每七天一次、每兩週一次、每三週一次、每四週一次、每兩個月一次、每六個月一次或每年一次。給藥間隔可根據個別患者之需要來調節。對於較長投與間隔，可使用延長釋放或儲積調配物。

本發明組合物可用於治療急性疾病及病況，且亦可用於治療慢性病況。具體而言，本發明組合物用於治療或預防贅瘤形成之方法中。在某些實施例中，將本發明化合物投與以下時間段：超過2週、3週、1個月、2個月、3個月、4個月、5個月、6個月、1年、2年、3年、4年或5年、10年或15年；或例如在數天、數月或數年範圍內之任一時間段，其中該範圍之下限係介於14天與15年之間之任一時間段且該範圍之上限介於15天與20年之間(例如，4週與15年之間、6個月與20年之間)。在一些情形中，本發明化合物可有利的在患者剩餘壽命期間投與。在較佳實施例中，監測患者以檢查疾病或病症進展，並相應地調節劑量。在較佳實施例中，根據本發明治療可在至少2週、3週、1個月、2個月、3個月、4個月、5個月、6個月、1年、2年、3年、4年或5年、10年、15年、20年中或在個體之剩餘壽命中有效。

手術切除使用手術來移除癌症之異常組織，例如縱膈、神經性或生殖細胞瘤或胸腺瘤。在某些實施例中，組合物之投與係在腫瘤切除術之後起始。在其他實施例中，贅瘤形成疫苗或免疫原性組合物之投與係在腫瘤切除術後1、2、3、4、5、6、7、8、9、10、11、12、13、14、15週或更久時起始。較佳地，贅瘤形成疫苗或免疫原性組合物之投與係在腫瘤切除術後4、5、6、7、8、9、10、11或12週起始。

啟始/加強方案係指相繼投與疫苗或免疫原性或免疫組合物。在

某些實施例中，贅瘤形成疫苗或免疫原性組合物之投與係在啟始/加強給藥方案中，例如在第1、2、3或4週投與贅瘤形成疫苗或免疫原性組合物作為啟始且在第2、3或4個月投與贅瘤形成疫苗或免疫原性組合物作為加強。在另一實施例中，使用異質性啟始-加強策略來引發更強細胞毒性T細胞反應(參見Schneider等人，Induction of CD8+ T cells using heterologous prime-boost immunisation strategies, Immunological Reviews第170卷，第1期，第29-38頁，1999年8月)。在另一實施例中，使用編碼新抗原之DNA來啟始，之後進行蛋白質加強。在另一實施例中，使用蛋白質來啟始，之後用編碼新抗原之病毒加強。在另一實施例中，使用編碼新抗原之病毒來啟始並使用另一種病毒來加強。在另一實施例中，使用蛋白質來啟始並使用DNA來加強。在較佳實施例中，使用DNA疫苗或免疫原性組合物來啟始T細胞反應且使用重組病毒疫苗或免疫原性組合物來加強該反應。在另一較佳實施例中，將病毒疫苗或免疫原性組合物與蛋白質或DNA疫苗或免疫原性組合物共投與用作蛋白質或DNA疫苗或免疫原性組合物之佐劑。然後患者可經病毒疫苗或免疫原性組合物、蛋白質或DNA疫苗或免疫原性組合物加強(參見Hutchings等人，Combination of protein and viral vaccines induces potent cellular and humoral immune responses and enhanced protection from murine malaria challenge. Infect Immun. 2007年12月；75(12):5819-26. Epub 2007年10月1日)。

醫藥組合物可根據習用製藥方法來加工以產生用於投與有需要之患者(包括人類及其他哺乳動物)之醫藥劑。

對新抗原肽之修飾可影響該等肽之溶解度、生物利用度及代謝速率，由此提供對活性物質之遞送之控制。溶解度可藉由製備新抗原肽並根據業內常規從業者熟知之已知方法測試來評價。

在醫藥組合物某些實施例中，醫藥上可接受之載劑包含水。在某些實施例中，醫藥上可接受之載劑進一步包含右旋糖。在某些實施例中，醫藥上可接受之載劑進一步包含二甲亞碸。在某些實施例中，醫藥組合物進一步包含免疫調節劑或佐劑。在某些實施例中，免疫調節劑或佐劑選自由以下組成之群：聚-ICLC、STING激動劑、1018 ISS、鋁鹽、Amplivax、AS15、BCG、CP-870,893、CpG7909、CyaA、dSLIM、GM-CSF、IC30、IC31、咪喹莫特、ImuFact IMP321、IS貼片(Patch)、ISS、ISCOMATRIX、JuvImmune、LipoVac、MF59、單磷醯脂質A、Montanide IMS 1312、Montanide ISA 206、Montanide ISA 50V、Montanide ISA-51、OK-432、OM-174、OM-197-MP-EC、ONTAK、PEPTEL、載體系統、PLGA微粒、雷西莫特、SRL172、病毒體及其他類病毒顆粒、YF-17D、VEGF trap、R848、β-葡聚糖、Pam3Cys及Aquila's QS21刺激子。在某些實施例中，免疫調節劑或佐劑包含聚-ICLC。

亦可使用吖酮衍生物(例如Vadimezan或AsA404 (亦稱為5,6-二甲基吖酮-4-乙酸(DMXAA)))作為本發明實施例之佐劑。或者，該等衍生物亦可與本發明之疫苗或免疫原性組合物平行投與(例如經由全身或腫瘤內遞送)以在腫瘤位點刺激免疫性。不受限於理論，據信該等吖酮衍生物藉由經IFN基因(STING)受體之刺激物刺激干擾素(IFN)產生來起作用(例如，參見Conlon等人(2013) Mouse, but not Human STING, Binds and Signals in Response to the Vascular Disrupting Agent 5,6-Dimethylxanthenone-4-Acetic Acid, Journal of Immunology, 190:5216-25；及Kim等人(2013) Anticancer Flavonoids are Mouse-Selective STING Agonists, 8:1396-1401)。

疫苗或免疫組合物亦可包括選自以下之佐劑化合物：丙烯酸或

甲基丙烯酸聚合物及馬來酸酐共聚物及烯基衍生物。其尤其係與糖或多元醇之聚烯基醚交聯(卡波姆(carbomer))、尤其與烯丙基蔗糖或與烯丙基新戊四醇交聯之丙烯酸或甲基丙烯酸聚合物。其亦可係與例如二乙烯基醚交聯之馬來酸酐及乙烯之共聚物(參見美國專利第6,713,068號，其係全文以引用方式併入本文中)。

在某些實施例中，pH調節劑可穩定如本文所述之佐劑或免疫調節劑。

在某些實施例中，醫藥組合物包含：1至5種肽、二甲亞碸(DMSO)、右旋糖、水、琥珀酸鹽、聚I:聚C、聚-L-離胺酸、羧甲基纖維素及氯化物。在某些實施例中，該1至5種肽各自以300 μg/ml之濃度存在。在某些實施例中，醫藥組合物包含以體積計≤ 3% DMSO。在某些實施例中，醫藥組合物包含3.6 - 3.7%右旋糖水溶液。在某些實施例中，醫藥組合物包含3.6 - 3.7 mM琥珀酸鹽(例如，如琥珀酸鈉)或其鹽。在某些實施例中，醫藥組合物包含0.5 mg/ml聚I:聚C。在某些實施例中，醫藥組合物包含0.375 mg/ml聚-L-離胺酸。在某些實施例中，醫藥組合物包含1.25 mg/ml羧甲基纖維素鈉。在某些實施例中，醫藥組合物包含0.225%氯化鈉。

醫藥組合物包含治療本文已闡述之疾病及病況(例如，贅瘤形成/腫瘤)之治療有效量之本文所述腫瘤特異性新抗原肽視情況與醫藥上可接受之添加劑、載劑及/或賦形劑之組合。熟習此項技術者根據本揭示內容及業內知識將得知，本發明之一或多種化合物之治療有效量可隨以下因素而變：欲治療病況、其嚴重度、欲採用之治療方案、所用藥劑之藥物動力學以及所治療患者(動物或人類)。

為製備本發明醫藥組合物，較佳將治療有效量之本發明之一或多種化合物與醫藥上可接受之載劑根據習用醫藥複合技術充分混合以

產生劑量。載劑可端視投與期望之製劑形式呈眾多種形式，例如經眼、經口、局部或非經腸，尤其包括凝膠、乳膏、軟膏劑、洗劑及緩釋可植入製劑。在製備呈經口劑型之醫藥組合物中，可使用常用醫藥介質中之任一者。因此，對於液體經口製劑(例如懸浮液、酏劑及溶劑)，可使用適宜載劑及添加劑，包括水、二醇、油、醇、矯味劑、防腐劑、著色劑及諸如此類。對於固體經口製劑(例如粉末、錠劑、膠囊)且對於固體製劑(例如栓劑)，可使用適宜載劑及添加劑，包括澱粉、糖載劑(例如右旋糖、甘露醇、乳糖及相關載劑)、稀釋劑、造粒劑、潤滑劑、黏合劑、崩解劑及諸如此類。若期望，錠劑或膠囊可藉由標準技術包腸衣或持續釋放。

活性化合物以足以向患者遞送針對期望適應症之治療有效量，且不在所治療患者中引起嚴重毒性效應之量包括於醫藥上可接受之載劑或稀釋劑中。

經口組合物通常包括惰性稀釋劑或可食用載劑。其可封裝於明膠膠囊中或壓製為錠劑。出於經口治療性投與之目的，活性化合物或其前藥衍生物可用賦形劑納入並以錠劑、糖錠劑或膠囊形式使用。可包括醫藥上相容之黏合劑及/或佐劑材料作為組合物之一部分。

錠劑、丸劑、膠囊、糖錠劑等可含有任一以下成份或具有相似性質之化合物：黏合劑，例如微晶纖維素、黃蓍膠或明膠；賦形劑，例如澱粉或乳糖；分散劑，例如海藻酸或玉米澱粉；潤滑劑，例如硬脂酸鎂；助流劑，例如膠質二氧化矽；甜味劑，例如蔗糖或糖精；或矯味劑，例如薄荷、柳酸甲酯或橙味矯味劑。在劑量單位形式係膠囊時，其除本文所論述材料外亦可含有諸如脂肪油等液體載劑。另外，劑量單位形式可含有修飾劑量單位之物理形式之各種其他材料，例如，糖、蟲膠及腸溶劑之包衣。

本發明中適用於經口投與之調配物可以以下形式呈現：各自含有預定量活性劑之離散單位，例如膠囊、扁囊劑或錠劑；粉末或顆粒；於水性液體或非水性液體中之溶液或懸浮液；或水包油液體乳液或油包水乳液及濃注物等。

錠劑可藉由壓製或模製視需要使用一或多種輔助成份來製備。壓製錠劑可藉由在適宜機器中壓製呈自由流動形式(例如粉末或顆粒)之活性成份來製備，該活性成份視情況與黏合劑、潤滑劑、惰性稀釋劑、防腐劑、表面活性劑或分散劑混合。模製錠劑可藉由在適宜機器中模製經惰性液體稀釋劑潤濕之化合物粉末混合物來製備。錠劑可視情況經包衣或刻痕且可視情況經調配以提供其中之活性成份之緩慢或控制釋放。

調配醫藥活性成份之該等緩慢或控制釋放組合物之方法為業內已知且闡述於若干個已頒佈之美國專利中，其中一些包括(但不限於)美國專利第3,870,790號、第4,226,859號、第4,369,172號、第4,842,866號及第5,705,190號，其揭示內容係全文以引用方式併入本文中。可使用包衣將化合物遞送至腸中(例如，參見美國專利第6,638,534號、第5,541,171號、第5,217,720號及第6,569,457號及其中引用之參考文獻)。

活性化合物或其醫藥上可接受之鹽亦可作為酏劑、懸浮液、糖漿、薄片、口香糖或諸如此類。糖漿除活性化合物外亦可含有作為甜味劑之蔗糖或果糖及某些防腐劑、染料及著色及矯味劑。

用於經眼、非經腸、真皮內、皮下或局部施加之溶液或懸浮液可包括以下組份：無菌稀釋劑，例如注射用水、鹽水溶液、不揮發油、聚乙二醇、甘油、丙二醇或其他合成溶劑；抗細菌劑，例如苄醇或對羥基苯甲酸甲酯；抗氧化劑，例如抗壞血酸或亞硫酸氫鈉；螯合

劑，例如乙二胺四乙酸；緩衝劑，例如乙酸鹽、檸檬酸鹽或磷酸鹽；及用於調節張力之試劑，例如氯化鈉或右旋糖。

在某些實施例中，醫藥上可接受之載劑係水性溶劑，即包含水之溶劑，視情況具有額外共溶劑。實例性醫藥上可接受之載劑包括水、緩衝水溶液(例如磷酸鹽緩衝鹽水(PBS)及5%右旋糖水溶液(D5W)。在某些實施例中，水性溶劑進一步包含二甲亞碸(DMSO)，例如其量為約1-4%或1-3%。在某些實施例中，醫藥上可接受之載劑係等滲的(即，具有與諸如血漿等體液實質上相同之滲透壓)。

在一個實施例中，活性化合物係用保護化合物以免自身體快速消除之載劑來製備，例如控制釋放調配物，包括植入物及微囊化遞送系統。可使用生物可降解之生物相容聚合物，例如乙烯基乙酸乙烯酯、聚酸酐、聚乙醇酸、膠原、聚原酸酯、聚乳酸及聚乳酸共乙醇酸(PLGA)。製備該等調配物之方法在熟習此項技術者根據本揭示內容及業內知識之範圍內。

熟習此項技術者自本揭示內容及業內知識瞭解，除了錠劑以外，可調配其他劑型以提供活性成份之緩慢或控制釋放。該等劑型包括(但不限於)膠囊、粒化及凝膠膠囊。

脂質體懸浮液亦可係醫藥上可接受之載劑。該等懸浮液可根據熟習此項技術者已知之方法來製備。舉例而言，脂質體調配物可藉由將適當脂質溶解於無機溶劑中來製備，然後該無機溶劑蒸發，在容器表面上留下經乾燥脂質之薄膜。然後將活性化合物之水溶液引入容器中。然後手動使容器渦旋以自容器側壁釋放脂質材料並分散脂質聚集體，由此形成脂質體懸浮液。熟習此項技術者熟知之其他製備方法亦可在本發明之此態樣中使用。

調配物可便捷地以單位劑型呈現且可藉由習用醫藥技術來製

備。該等技術包括使活性成份與醫藥載劑或賦形劑結合之步驟。一般而言，調配物係藉由使活性成份與液體載劑或微細固體載劑或二者均勻且充分地結合且然後(若需要)使產物成型來製備。

適於口中局部投與之調配物及組合物包括菱形錠劑，其包含於矯味基質(通常為蔗糖及阿拉伯膠或黃蓍膠)中之成份；軟錠劑，其包含於惰性基質(例如，明膠及甘油，或蔗糖及阿拉伯膠)中之活性成份；及漱口劑，其包含於適宜液體載劑中之欲投與成份。

適於局部投與皮膚之調配物可呈現為軟膏劑、乳膏、凝膠及糊劑，其於醫藥上可接受之載劑中包含欲投與成份。較佳局部遞送系統係含有欲投與成份之經皮貼劑。

用於直腸投與之調配物可呈現為具有適宜基質之栓劑，其包含例如可可脂或柳酸酯。

適於經鼻投與之調配物(其中載劑係固體)包括粒徑例如在20至500微米範圍內之粗粉末，其係以投與鼻煙之方式來投與，即經由鼻道自保持緊靠鼻子之粉末容器快速吸入。適於作為例如鼻噴霧或作為滴鼻劑投與之調配物(其中載劑係液體)包括活性成份之水溶液或油溶液。

適於陰道投與之調配物可呈現為子宮托、塞子、乳膏、凝膠、糊劑、發泡體或噴霧劑調配物，其除活性成份外亦含有如業內已知適當之載劑。

非經腸製劑可封裝於由玻璃或塑膠製成之安瓿、拋棄式注射器或多劑量小瓶中。若靜脈內投與，則較佳載劑包括(例如)生理鹽水或磷酸鹽緩衝鹽水(PBS)。

對於非經腸調配物，載劑通常包含無菌水或氯化鈉水溶液，但可包括其他成份，包括輔助分散之彼等。當然，倘若欲使用無菌水且

維持為無菌，則組合物及載劑亦經滅菌。亦可製備可注射懸浮液，在該情形中可採用適當液體載劑、懸浮劑及諸如此類。

適於非經腸投與之調配物包括水性及非水性無菌注射溶液，其可含有抗氧化劑、緩衝液、抑菌劑及使調配物與既定接受者之血液等滲之溶質；及水性及非水性無菌懸浮液，其可包括懸浮劑及增稠劑。調配物可以單位劑量或多劑量容器(例如，密封安瓿及小瓶)呈現，且其可存儲於冷凍乾燥(凍乾)條件下，僅需在即將使用前添加無菌液體載劑(例如，注射用水)。臨時注射溶液及懸浮液可自先前所述種類之無菌粉末、顆粒及錠劑來製備。

活性化合物之投與可介於連續(靜脈點滴)至每天若干次經口投與(例如，Q.I.D.)範圍內且除了其他投與途徑外，可包括經口、局部、經眼或眼部、非經腸、肌內、靜脈內、皮下、經皮(其可包括滲透促進劑)、經頰及栓劑投與，包括經由眼或眼部途徑。

贅瘤形成疫苗或免疫原性組合物及任何其他藥劑可藉由注射、經口、非經腸、藉由吸入噴霧劑、經直腸、經陰道或經局部以含有習用醫藥上可接受之載劑、佐劑及媒劑之劑量單位調配物投與。如本文所用術語非經腸包括至一或多個淋巴結中、皮下、靜脈內、肌內、胸骨內、輸注技術、腹膜內、經眼或眼部、玻璃體內、頰內、經皮、鼻內、至腦中(包括顱內及硬膜內)、至關節中(包括踝、膝、髖、肩、肘、腕)、直接至腫瘤中及諸如此類，以及以栓劑形式。

在某些實施例中，疫苗或免疫原性組合物係靜脈內或皮下投與。可使用各種技術在目標位點提供標題組合物，例如注射、使用導管、套針、彈丸、普流尼克凝膠(pluronic gel)、支架、持續藥物釋放聚合物或提供內部途徑之其他裝置。倘若器官或組織由於自患者移除而可及，則可將該器官或組織浸泡於含有標題組合物之介質中，可將

標的組合物塗至器官上，或可以任一便捷方式施加。

腫瘤特異性新抗原肽可經由裝置投與，該裝置適於控制及持續釋放有效獲得期望局部或全身生理或藥理學效應之組合物。該方法包括將持續釋放藥物遞送系統定位於其中期望釋放藥劑之區域且容許藥劑通過該裝置到達期望治療區域。

腫瘤特異性新抗原肽可與至少一種已知其他治療劑或該藥劑之醫藥上可接受之鹽組合利用。可用於組合療法之已知治療劑之實例包括(但不限於)皮質類固醇(例如，可體松(cortisone)、普賴松(prednisone)、地塞米松(dexamethasone))、非類固醇消炎藥(NSAIDS)(例如，布洛芬(ibuprofen)、塞來昔布(celecoxib)、阿斯匹林(aspirin)、吲哚美辛(indomethacin)、萘普生(naproxen))、烷基化劑(例如白消安(busulfan)、順鉑(cis-platin)、絲裂黴素C (mitomycin C)及卡鉑(carboplatin))；抗有絲分裂劑(例如秋水仙鹼(colchicine)、長春鹼(vinblastine)、太平洋紫杉醇(paclitaxel)及多西他賽(docetaxel))；拓撲異構酶I抑制劑(例如喜樹鹼(camptothecin)及托泊替康(topotecan))；拓撲異構酶II抑制劑(例如多柔比星(doxorubicin)及依託泊苷(etoposide))；及/或RNA/DNA抗代謝物(例如5-氮胞苷、5-氟尿嘧啶及胺甲喋呤(methotrexate))；DNA抗代謝物(例如5-氟-2´-去氧-尿苷、阿糖胞苷(ara-C)、羥基脲及硫鳥嘌呤)；抗體(例如賀癌平(HERCEPTIN)及瑞圖宣(RITUXAN))。

應理解，考慮到所述調配物之類型，除本文特別提及之成份外，本發明調配物亦可包括業內習用之其他藥劑，例如適於經口投與之彼等藥劑可包括矯味劑。

醫藥上可接受之鹽形式可係包括於本發明醫藥組合物中之本發明化合物之較佳化學形式。

本發明化合物或其衍生物(包括該等藥劑之前藥形式)可以醫藥上可接受之鹽的形式提供。如本文所用術語醫藥上可接受之鹽或複合體係指本發明活性化合物之適當鹽或複合體，其保留母化合物之期望生物活性並展現對正常細胞之有限毒物學效應。該等鹽之非限制性實例係(a) 與無機酸(例如，鹽酸、氫溴酸、硫酸、磷酸、硝酸及諸如此類)形成之酸加成鹽；及與有機酸(尤其例如乙酸、草酸、酒石酸、琥珀酸、蘋果酸、抗壞血酸、苯甲酸、單寧酸、撲酸、海藻酸及聚麩胺酸)形成之鹽；(b) 與金屬陽離子(尤其例如鋅、鈣、鈉、鉀及諸如此類)形成之鹼加成鹽。

本文之化合物可自市場購得或可合成。如熟習此項技術者可瞭解，合成本文中各式化合物之其他方法為彼等熟習此項技術者已知。另外，可以交替序列或順序實施各個合成步驟以得到期望化合物。可用於合成本文所述化合物之合成化學轉變及保護基團方法(保護及去保護)為業內已知且包括(例如)彼等闡述於例如以下文獻中者：R. Larock, Comprehensive Organic Transformations，第2版，Wiley-VCH Publishers (1999)；T.W. Greene及P.G.M. Wuts, Protective Groups in Organic Synthesis，第3版，John Wiley and Sons (1999)；L. Fieser及M. Fieser, Fieser and Fieser's Reagents for Organic Synthesis, John Wiley and Sons (1999)；及L. Paquette編輯，Encyclopedia of Reagents for Organic Synthesis, John Wiley and Sons (1995)，以及其後續版本。

可與本發明腫瘤特異性新抗原肽一起包括之其他藥劑可含有一或多個不對稱中心，且由此作為外消旋物及外消旋混合物、單一鏡像異構物、個別非鏡像異構物及非鏡像異構混合物而存在。該等化合物之所有該等異構形式皆明確包括於本發明中。本發明化合物亦可以多種互變異構形式表示，在該等情況中，本發明明確包括本文所述化合

物之所有互變異構形式(例如，環系統之烷基化可導致在多個位點烷基化，本發明明確包括所有此類反應產物)。該等化合物之所有該等異構形式皆明確包括於本發明中。本文所述化合物之所有晶體形式皆明確包括於本發明中。

劑量

在將本文所述藥劑作為醫藥劑投與人類或動物時，其可以本身或作為醫藥組合物給予，該醫藥組合物含有活性成份與醫藥上可接受之載劑、賦形劑或稀釋劑之組合。

投與本發明醫藥組合物中之活性成份之實際劑量及時程可變，以獲得活性成份可對於具體患者、組合物及投與模式有效達成期望治療反應且對患者無毒之量。通常，本發明之藥劑或醫藥組合物係以足以減少或消除與贅瘤形成(例如癌症或腫瘤)相關之症狀之量來投與。

藥劑之較佳劑量係患者可耐受且不產生嚴重或不可接受之副作用之最大量。實例性劑量範圍包括0.01 mg至250 mg/日、0.01 mg至100 mg/日、1 mg至100 mg/日、10 mg至100 mg/日、1 mg至10 mg/日及0.01 mg至10 mg/日。藥劑之較佳劑量係患者可耐受且不產生嚴重或不可接受之副作用之最大量。在實施例中，藥劑係以約10微克至約100 mg/公斤體重/日、約0.1至約10 mg/kg/日或約1.0 mg至約10 mg/kg體重/日之濃度投與。

在實施例中，醫藥組合物包含介於1與10 mg之間之範圍內(例如1、2、3、4、5、6、7、8、9或10 mg)之量之藥劑。

在實施例中，治療有效劑量產生約0.1 ng/ml至約50-100 mg/ml之藥劑血清濃度。醫藥組合物5通常應提供約0.001 mg至約2000 mg化合物/公斤體重/天之劑量。舉例而言，全身投與人類患者之劑量可介於以下範圍內：1-10 mg/kg、20-80 mg/kg、5-50 mg/kg、75-150

mg/kg、100-500 mg/kg、250-750 mg/kg、500-1000 mg/kg、1-10 mg/kg、5-50 mg/kg、25-75 mg/kg、50-100 mg/kg、100-250 mg/kg、50-100 mg/kg、250-500 mg/kg、500-750 mg/kg、750-1000 mg/kg、1000-1500 mg/kg、1500-2000 mg/kg、5 mg/kg、20 mg/kg、50 mg/kg、100 mg/kg、500 mg/kg、1000 mg/kg、1500 mg/kg或2000 mg/kg。製備醫藥劑量單位形式以提供約1 mg至約5000 mg、例如約100至約2500 mg化合物或必需成份之組合/劑量單位形式。

在實施例中，將約50 nM至約1 μM藥劑投與個體。在相關實施例中，將約50-100 nM、50-250 nM、100-500 nM、250-500 nM、250-750 nM、500-750 nM、500 nM至1 μM或750 nM至1 μM藥劑投與個體。

彼等熟習此項技術者可尤其依據本文所提供詳細揭示內容熟練確定有效量。通常，藥劑之有效量係藉由以下方式來確定：首先投與低劑量之藥劑，然後逐漸增加投與劑量直至在所治療個體中觀察到期望效應(例如，減少或消除與病毒感染或自體免疫疾病相關之症狀)且毒性副作用極小或可接受為止。確定投與本發明醫藥組合物之適當劑量及給藥時間表之適用方法闡述於例如以下文獻中：Goodman and Gilman's The Pharmacological Basis of Therapeutics，Goodman等人編輯，第11版，McGraw-Hill 2005；及Remington: The Science and Practice of Pharmacy, 第20版及第21版，Gennaro及University of the Sciences in Philadelphia編輯，Lippencott Williams & Wilkins (2003及2005)，其各自以引用方式併入本文中。

較佳單位劑量調配物係如本文所論述含有日劑量或單位、每日子劑量或其適當部分之活性成份之彼等。

用本發明腫瘤特異性新抗原肽及/或本發明組合物治療病症或疾

病之劑量方案係基於多種因素，包括疾病類型、患者之年齡、體重、性別、醫學病況、病況之嚴重度、投與途徑及所用具體化合物。因此，劑量方案可在很大範圍內改變，但可使用標準方法常規地確定。

投與個體之量及劑量方案可取決於多種因素，例如投與模式、所治療病況之性質、所治療個體之體重及開方醫師之判斷；所有該等因素皆在熟習此項技術者根據本揭示內容及業內知識之範圍內。

包括在本發明治療活性調配物內之化合物之量係治療疾病或病況之有效量。一般而言，劑型中本發明較佳化合物之治療有效量通常介於患者之略低於約0.025 mg/kg/日至約2.5 g/kg/日範圍內，較佳約0.1 mg/kg/日至約100 mg/kg/日或顯著較高，端視所用化合物、所治療病況或感染以及投與途徑而定，但此劑量範圍之例外情況可涵蓋與本發明中。在其最佳形式中，本發明化合物係以介於約1 mg/kg/日至約100 mg/kg/日範圍內之量投與。化合物之劑量可取決於所治療之病況、具體化合物及其他因素，例如患者之體重及狀況以及化合物之投與途徑。應理解，本發明可應用於人類及獸醫用途二者。

對於經口投與人類，介於約0.1至100 mg/kg/日之間、較佳介於約1與100 mg/kg/日之間之劑量一般足夠。

倘若藥物遞送係全身性而非局部性，則此劑量範圍通常在患者血液中產生介於小於約0.04至約400微克/cc範圍內或更大之有效血液含量之活性化合物濃度。化合物便捷地以任何適宜單位劑型投與，包括(但不限於)含有0.001至3000 mg、較佳0.05至500 mg活性成份/單位劑型者。10-250 mg之經口劑量通常係便捷的。

根據某些實例性實施例，疫苗或免疫原性組合物係以約10 μg至1 mg之每種新抗原肽之劑量投與。根據某些實例性實施例，疫苗或免疫原性組合物係以約10 μg至2000 μg之每種新抗原肽之平均每週劑量

來投與。

藥物組合物中活性化合物之濃度將取決於藥物之吸收、分佈、不活化及排泄速率以及熟習此項技術者已知之其他因素。應注意，劑量值亦將隨欲緩解之病況之嚴重度而變。應進一步瞭解，對於任一具體個體，應根據個體需要及投與組合物或監督組合物投與之個人的專業判斷隨時調整特定劑量方案，且本文所述濃度範圍僅為實例性且不欲限制所主張組合物之範疇或實踐。活性成份可一次性投與，或可分成多個較小劑量以按可變時間間隔投與。

本發明提供醫藥組合物，其含有至少一種本文所述之腫瘤特異性新抗原。在實施例中，醫藥組合物含有醫藥上可接受之載劑、賦形劑或稀釋劑，其包括自身不誘導對接受該組合物之個體有害之免疫反應之產生的任一醫藥劑，且其投與可不產生過度毒性。如本文所用術語「醫藥上可接受的」意指已由聯邦或州政府管理機構核準或已列於美國藥典、歐洲藥典或其他公認藥典中用於哺乳動物、且更具體而言人類中。該等組合物可用於治療及/或預防病毒感染及/或自體免疫疾病。

對醫藥上可接受之載劑、稀釋劑及其他賦形劑之充分論述呈現於Remington's Pharmaceutical Sciences (第17版，Mack Publishing Company)及Remington: The Science and Practice of Pharmacy (第21版，Lippincott Williams & Wilkins)中，其係以引用方式併入本文中。醫藥組合物之調配物應適合投與模式。在實施例中，醫藥組合物適於投與人類，且可為無菌、無粒子及/或非熱原性。

醫藥上可接受之載劑、賦形劑或稀釋劑包括(但不限於)鹽水、緩衝鹽水、右旋糖、水、甘油、乙醇、無菌等滲水性緩衝液及其組合。

潤濕劑、乳化劑及潤滑劑(例如月桂基硫酸鈉及硬脂酸鎂)以及著

色劑、釋放劑、包衣劑、甜味劑、矯味及加香劑、防腐劑及抗氧化劑亦可存於組合物中。

醫藥上可接受之抗氧化劑之實例包括但不限於：(1) 水溶性抗氧化劑，例如抗壞血酸、氫氯酸半胱胺酸、硫酸氫鈉、偏亞硫酸氫鈉、亞硫酸鈉及諸如此類；(2) 油溶性抗氧化劑，例如棕櫚酸抗壞血酯、丁基化羥基苯甲醚(BHA)、丁基化羥基甲苯(BHT)、卵磷脂、沒食子酸丙酯、α-生育酚及諸如此類；及(3) 金屬螯合劑，例如檸檬酸、乙二胺四乙酸(EDTA)、山梨醇、酒石酸、磷酸及諸如此類。

在實施例中，醫藥組合物係以適於復原之固體形式(例如凍乾粉末)、液體溶液、懸浮液、乳液、錠劑、丸劑、膠囊、持續釋放調配物或粉末提供。

在實施例中，醫藥組合物係以液體形式供應，例如在密封容器中，該容器指示醫藥組合物中活性成份之量及濃度。在相關實施例中，醫藥組合物之液體形式係於氣密密封容器中供應。

調配本發明醫藥組合物之方法係習用方法且為業內所熟知(參見Remington and Remington's)。熟習此項技術者可容易地調配具有期望特徵(例如，投與途徑、生物安全性及釋放曲線)之醫藥組合物。

製備醫藥組合物之方法包括使活性成份與醫藥上可接受之載劑及視情況一或多種輔助成份結合之步驟。醫藥組合物可藉由使活性成份與液體載劑或微細固體載劑或二者均勻且充分地結合且然後(若需要)使產物成型來製備。製備醫藥組合物(包括製備多層劑型)之另一方法闡述於Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems (第9版，Lippincott Williams & Wilkins)中，其係以引用方式併入本文中。

適於經口投與之醫藥組合物可呈以下形式：膠囊、扁囊劑、丸

劑、錠劑、菱形錠劑(使用矯味基質，通常為蔗糖及阿拉伯膠或黃著膠)、粉末、顆粒；或作為存於水性或非水性液體中之溶液或懸浮液；或作為水包油或油包水液體乳液；或作為酏劑或糖漿；或作為軟錠劑(使用惰性基質，例如明膠及甘油、或蔗糖及阿拉伯膠)；及/或作為漱口劑及諸如此類，其各自含有預定量之本文所述化合物、其衍生物或其醫藥上可接受之鹽或前藥作為活性成份。活性成份亦可作為濃注物、舐劑或糊劑投與。

在用於經口投與之固體劑型(膠囊、錠劑、丸劑、糖衣錠、粉末、顆粒及諸如此類)中，將活性成份與一或多種醫藥上可接受之載劑、賦形劑或稀釋劑(例如檸檬酸鈉或磷酸二鈣)及/或以下中之任一者混合：(1) 填充劑或增量劑，例如澱粉、乳糖、蔗糖、葡萄糖、甘露醇及/或矽酸；(2) 黏合劑，例如羧甲基纖維素、海藻酸鹽、明膠、聚乙烯吡咯啶酮、蔗糖及/或阿拉伯膠；(3) 保濕劑，例如甘油；(4) 崩解劑，例如瓊脂、碳酸鈣、馬鈴薯或木薯澱粉、海藻酸、某些矽酸鹽及碳酸鈉；(5) 溶液阻滯劑，例如石蠟；(6) 吸收加速劑，例如四級銨化合物；(7) 潤濕劑，例如乙醯醇及甘油單硬脂酸酯；(8) 吸收劑，例如高嶺土及膨潤土；(9) 潤滑劑，例如滑石、硬脂酸鈣、硬脂酸鎂、固體聚乙二醇、月桂基硫酸鈉及其混合物；及(10) 著色劑。在膠囊、錠劑及丸劑之情形中，醫藥組合物亦可包含緩衝劑。亦可使用軟填充及硬填充明膠膠囊中之填充劑及諸如乳糖(lactose)或乳糖(milk sugar)以及高分子量聚乙二醇等賦形劑製備類似類型之固體組合物。

錠劑可藉由壓製或模製視情況使用一或多種輔助成份來製備。壓製錠劑可使用黏合劑(例如，明膠或羥丙基甲基纖維素)、潤滑劑、惰性稀釋劑、防腐劑、崩解劑(例如，羥乙酸澱粉鈉或交聯羧甲基纖

維素鈉)、表面活性劑或分散劑來製備。模製錠劑可藉由在適宜機器中模製經惰性液體稀釋劑潤濕之活性成份粉末混合物來製備。

錠劑及其他固體劑型(例如糖衣錠、膠囊、丸劑及顆粒)可視情況刻痕或製備有包衣及外殼，例如腸溶包衣及業內熟知之其他包衣。

在一些實施例中，為延長活性成份之效應，期望減慢來自皮下或肌內注射之藥物吸收。此可藉由使用具有弱水溶性之結晶或非晶形材料之液體懸浮液來完成。則活性成份之吸收速率取決於其溶解速率，而溶解速率又可取決於晶體大小及結晶型。或者，非經腸投與之活性成份之延遲吸收係藉由將化合物溶解或懸浮於油媒劑中來完成。此外，可注射醫藥形式之延長吸收可藉由包括延遲吸收之試劑(例如，單硬脂酸鋁及明膠)來實現。

控制釋放非經腸組合物可呈水性懸浮液、微球體、微膠囊、磁性微球體、油溶液、油懸浮液、乳液形式，或可將活性成份納入生物相容性載劑、脂質體、奈米顆粒、植入物或輸注裝置中。

用於製備微球體及/或微膠囊之材料包括生物可降解/生物蝕解性聚合物，例如羥乙酸乳酸聚酯、聚-(異丁基氰基丙烯酸酯)、聚(2-羥基乙基-L-麩醯胺酸)及聚(乳酸)。

在調配控制釋放非經腸調配物時可用之生物相容性載劑包括碳水化合物(例如聚葡萄糖)、蛋白質(例如白蛋白、脂蛋白或抗體)。

用於植入物之材料可為生物不可降解的，例如聚二甲基矽氧烷；或可為生物可降解的，例如聚(己內酯)、聚(乳酸)、聚(乙醇酸)或聚(原酸酯)。

在實施例中，活性成份係藉由氣溶膠投與。此係藉由製備含有化合物之水性氣溶膠、脂質體製劑或固體顆粒來完成。可使用非水性(例如，氟碳推進劑)懸浮液。醫藥組合物亦可使用音波霧化器來投

與，該音波霧化器可使可導致化合物降解之藥劑在剪切中之暴露最小化。

通常，水性氣溶膠係藉由將活性成份之水溶液或懸浮液與習用醫藥上可接受之載劑及穩定劑調配在一起來製備。載劑及穩定劑隨具體化合物之要求而變，但通常包括非離子型表面活性劑(Tweens、Pluronics或聚乙二醇)、無害蛋白質(如血清白蛋白)、去水山梨醇酯、油酸、卵磷脂、胺基酸(例如甘胺酸)、緩衝液、鹽、糖或糖醇。氣溶膠通常係自等滲溶液製備。

用於局部或經皮投與活性成份之劑型包括粉末、噴霧劑、軟膏劑、糊劑、乳膏、洗劑、凝膠、溶液、貼劑及吸入劑。活性成份可在無菌條件下與醫藥上可接受之載劑混合，且若適當與任何防腐劑、緩衝液或推進劑混合。

適用於本發明之經皮貼劑揭示於以下文獻中：Transdermal Drug Delivery: Developmental Issues and Research Initiatives (Marcel Dekker Inc., 1989)及美國專利第4,743,249號、第4,906,169號、第5,198,223號、第4,816,540號、第5,422,119號、第5,023,084號，其係以引用方式併入本文中。經皮貼劑亦可係業內熟知之任何經皮貼劑，包括經陰囊貼劑。該等經皮貼劑中之醫藥組合物可含有一或多種業內熟知之吸收促進劑或皮膚滲透促進劑(例如，參見美國專利第4,379,454號及第4,973,468，其係以引用方式併入本文中)。用於本發明之經皮治療系統可係基於離子電滲、擴散或該兩種效應之組合。

經皮貼劑具有將活性成份控制遞送至身體之額外優勢。該等劑型可藉由將活性成份溶解或分散於適當介質中來製備。亦可使用吸收促進劑來增加活性成份跨越皮膚之通量。該通量之速率可藉由提供速率控制膜或將活性成份分散於聚合物基質或凝膠中來控制。

該等醫藥組合物可呈以下形式：乳膏、軟膏劑、洗劑、擦劑、凝膠、水凝膠、溶液、懸浮液、棒劑、噴霧劑、糊劑、硬膏劑及其他種類之經皮藥物遞送系統。組合物亦可包括醫藥上可接受之載劑或賦形劑，例如乳化劑、抗氧化劑、緩衝劑、防腐劑、保濕劑、滲透促進劑、螯合劑、膠凝劑、軟膏基、香料及皮膚保護劑。

乳化劑之實例包括(但不限於)天然樹膠(例如阿拉伯樹膠或黃蓍膠)、天然磷脂(例如大豆卵磷脂及大豆單油酸酯衍生物)。

抗氧化劑之實例包括(但不限於)丁基化羥基茴香醚(BHA)、抗壞血酸及其衍生物、生育酚及其衍生物及半胱胺酸。

防腐劑之實例包括(但不限於)對羥苯甲酸酯(例如對羥基苯甲酸甲酯或對羥基苯甲酸丙酯)及氯化苄烷銨。

保濕劑之實例包括(但不限於)甘油、丙二醇、山梨醇及尿素。

滲透促進劑之實例包括(但不限於)丙二醇、DMSO、三乙醇胺、N,N-二甲基乙醯胺、N,N-二甲基甲醯胺、2-吡咯啶酮及其衍生物、四氫糠醇、丙二醇、二乙二醇單乙醚或單甲醚及丙二醇單月桂酸酯或月桂酸甲酯、桉油醇、卵磷脂、TRANSCUTOL及AZONE。

螯合劑之實例包括(但不限於) EDTA鈉、檸檬酸及磷酸。

膠凝劑之實例包括(但不限於)卡波姆、纖維素衍生物、膨潤土、海藻酸鹽、明膠及聚乙烯基吡咯啶酮。

除活性成份外，本發明之軟膏劑、糊劑、乳膏及凝膠可含有賦形劑，例如動物及植物脂肪、油、蠟、石蠟、澱粉、黃蓍膠、纖維素衍生物、聚乙二醇、聚矽氧、膨潤土、矽酸、滑石粉及氧化鋅或其混合物。

粉末及噴霧劑可含有賦形劑，例如乳糖、滑石粉、矽酸、氫氧化鋁、矽酸鈣及聚醯胺粉末或該等物質之混合物。噴霧劑可另外含有

常規推進劑，例如氯氟烴及未經取代之揮發性烴類，例如丁烷及丙烷。

可注射儲積形式係藉由在生物可降解聚合物(例如聚乳酸-聚乙交酯)中形成本發明化合物之微囊基質來製備。端視化合物對聚合物之比率及所用具體聚合物之性質，可控制化合物之釋放速率。其他生物可降解聚合物之實例包括聚(原酸酯)及聚(酸酐)。可注射儲積調配物亦係藉由將藥物包裹於與身體組織相容之脂質體或微乳液中來製備。

皮下植入物為業內所熟知且適用於本發明。皮下植入方法較佳無刺激且具有機械彈性。植入物可為基質型、儲存器型或其雜合物。在基質型裝置中，載劑材料可為多孔或無孔，固體或半固體，且對活性化合物可滲透或不可滲透。載劑材料可為生物可降解或可在投與後緩慢侵蝕。在一些情況中，基質不可降解，而係依賴於活性化合物穿過載劑材料基質之擴散以降解。替代皮下植入物方法利用儲存器裝置，其中活性化合物經速率控制膜圍繞，例如與組份濃度無關之膜(具有零級動力學)。由速率控制膜圍繞之基質組成之裝置以適於使用。

儲存器型及基質型裝置二者可含有多種材料，例如聚二甲基矽氧烷，例如SILASTIC或其他聚矽氧橡膠。基質材料可為不溶性聚丙烯、聚乙烯、聚氯乙烯、乙基乙酸乙烯酯、聚苯乙烯及聚甲基丙烯酸酯，以及硬脂酸棕櫚酸甘油酯型、硬脂酸甘油酯型及山嵛酸甘油酯型甘油酯。材料可為疏水或親水聚合物且視情況含有增溶劑。

皮下植入物裝置可為由任何適宜聚合物製得之緩釋膠囊，例如如美國專利第5,035,891號及第4,210,644號中所述，其係以引用方式併入本文中。

一般而言，至少4種不同方法適用於對藥物化合物之釋放及經皮

滲透提供速率控制。該等方法係：膜控釋系統、黏著劑擴散控制系統、基質分散型系統及微儲存器系統。據瞭解，控制釋放經皮及/或局部組合物可藉由使用該等方法之適宜混合方法來獲得。

在膜控釋系統中，活性成份存於儲存器中，該儲存器完全囊封於自藥物不可滲透之積層(例如金屬塑膠積層)及速率控制聚合膜(例如微多孔或無孔聚合膜，例如乙烯-乙酸乙烯酯共聚物)模製之淺隔室中。活性成份穿過速率控制聚合膜釋放。在藥物儲存器中，活性成份可分散於固體聚合物基質中或懸浮於不可浸出之黏稠液體介質(例如聚矽氧流體)中。在聚合膜之外表面上，施加黏著劑聚合物之薄層以達成經皮系統與皮膚表面之緊密接觸。黏著劑聚合物較佳係低過敏原性且與活性原料藥相容之聚合物。

在黏著劑擴散控制系統中，活性成份之儲存器係藉由以下方式來形成：將活性成份直接分散於黏著劑聚合物中，然後藉由例如溶劑澆鑄將含有活性成份之黏著劑鋪展於實質上藥物不可滲透之金屬塑膠背襯之平片上以形成薄藥物儲存器層。

基質分散型系統之特徵在與，活性成份之儲存器係藉由將活性成份實質上均勻地分散於親水或親脂性聚合物基質中來形成。然後將含有藥物之聚合物模製為具有明確界定之表面積及控制厚度之碟狀物。沿圓周鋪展黏著劑聚合物以形成圍繞碟狀物之黏著劑帶。

微儲存器系統可視為儲存器與基質分散型系統之組合。在此情形中，活性物質之儲存器係藉由以下方式來形成：首先使藥物固體懸浮於水溶性聚合物之水溶液中，然後將藥物懸浮液分散於親脂性聚合物中以形成藥物儲存器之多個不可浸出之微小球體。

本文所述之控制釋放、延長釋放及持續釋放組合物中之任一者可經調配以在約30分鐘至約1週中、在約30分鐘至約72小時中、在約

30分鐘至24小時中、在約30分鐘至12小時中、在約30分鐘至6小時中、在約30分鐘至4小時中及在約3小時至10小時中釋放活性成份。在實施例中，在將醫藥組合物投與個體後，活性成份之有效濃度在個體中持續4小時、6小時、8小時、10小時、12小時、16小時、24小時、48小時、72小時或更久。

疫苗或免疫原性組合物

本發明在一些態樣中係關於適於預防或治療癌症之醫藥組合物。在一個實施例中，組合物包含至少能產生特異性T細胞反應之免疫原性組合物，例如贅瘤形成疫苗或免疫原性組合物。贅瘤形成疫苗或免疫原性組合物包含對應於如本文所述之腫瘤特異性新抗原之新抗原肽及/或新抗原性多肽。

適宜贅瘤形成疫苗或免疫原性組合物較佳可含有複數種腫瘤特異性新抗原肽。在實施例中，疫苗或免疫原性組合物可包括介於1組與100組之間之肽，更佳介於1組與50組之間之該等肽，甚至更佳介於10組與30組之間之肽，甚至更佳介於15組與25組之間之肽。根據另一較佳實施例，疫苗或免疫原性組合物可包括至少一種肽，更佳2、3、4或5種肽。在某些實施例中，疫苗或免疫原性組合物可包含5、6、7、8、9、10、11、12、13、14、15、16、17、18、19、20、21、22、23、24、25、26、27、28、29或30種不同肽。

欲包括於疫苗或免疫原性組合物中之每種肽之最佳量及最佳給藥方案可由熟習此項技術者不經過度實驗即確定。舉例而言，可製備肽或其變體用於靜脈內(i.v.)注射、皮下(s.c.)注射、真皮內(i.d.)注射、腹膜內(i.p.)注射、肌內(i.m.)注射。較佳肽注射方法包括s.c、i.d.、i.p.、i.m.及i.v.。較佳DNA注射方法包括i.d.、i.m.、s.c、i.p.及i.v.。舉例而言，可給予介於1 mg與500 mg之間、50 μg與1.5 mg之

間、較佳10 μg至500 μg之肽或DNA且可端視各別肽或DNA而定。此範圍之劑量成功用於先前試驗中(Brunsvig P F等人，Cancer Immunol Immunother. 2006；55(12): 1553- 1564；M. Staehler等人，ASCO meeting 2007；摘要編號3017)。疫苗或免疫原性組合物之其他投與方法為熟習此項技術者已知。

在本發明之一個實施例中，選擇不同腫瘤特異性新抗原肽及/或多肽用於贅瘤形成疫苗或免疫原性組合物中，以使在群體之大部分個體中生成針對贅瘤形成/腫瘤之免疫攻擊之可能性最大化。不受限於理論，據信包括多種腫瘤特異性新抗原肽可生成針對贅瘤形成/腫瘤之大規模免疫攻擊。在一個實施例中，所選腫瘤特異性新抗原肽/多肽係藉由誤義突變編碼。在第二實施例中，所選腫瘤特異性新抗原肽/多肽係藉由誤義突變與neoORF突變之組合編碼。在第三實施例中，所選腫瘤特異性新抗原肽/多肽係藉由neoORF突變編碼。

在其中所選腫瘤特異性新抗原肽/多肽係藉由誤義突變編碼之一個實施例中，肽及/或多肽係基於其與群體中大部分個體之MHC分子結合之能力來選擇。源自neoORF突變之肽/多肽亦可基於其與患者群體之MHC分子結合之能力來選擇。

疫苗或免疫原性組合物能產生特異性細胞毒性T細胞反應及/或特異性輔助T細胞反應。

疫苗或免疫原性組合物可進一步包含佐劑及/或載劑。可用佐劑及載劑之實例給出於本文中。組合物中之肽及/或多肽可與載劑(例如蛋白質或抗原呈遞細胞，例如能將肽呈遞至T細胞之樹突細胞(DC))結合。

佐劑係任何物質，將其混合至疫苗或免疫原性組合物中增加或以其他方式修改針對突變體肽之免疫反應。載劑係新抗原肽能與其結

合之支架結構，例如多肽或多醣。視情況，佐劑共價或非共價偶聯至本發明之肽或多肽。

佐劑增加針對抗原之免疫反應之能力通常表現為免疫介導之反應顯著增加，或疾病症狀減少。舉例而言，體液性免疫性增加通常表現為針對抗原產生之抗體之效價顯著增加，且T細胞活性之增強通常表現為增強之細胞增殖、或細胞毒性、或細胞介素分泌。佐劑亦可例如藉由使原發性體液性或Th2反應變為原發性細胞或Th1反應來改變免疫反應。

適宜佐劑包括但不限於1018 ISS、鋁鹽、Amplivax、AS15、BCG、CP-870,893、CpG7909、CyaA、dSLIM、GM-CSF、IC30、IC31、咪喹莫特、ImuFact IMP321、IS貼片(Patch)、ISS、ISCOMATRIX、Juvlmmune、LipoVac、MF59、單磷醯脂質A、Montanide IMS 1312、Montanide ISA 206、Montanide ISA 50V、Montanide ISA-51、OK-432、OM-174、OM-197-MP-EC、ONTAK、PEPTEL、載體系統、PLG微粒、雷西莫特、SRL172、病毒體及其他類病毒顆粒、YF-17D、VEGF trap、R848、β-葡聚糖、Pam3Cys、源自皂素、分枝桿菌提取物及合成細菌細胞壁模擬物之Aquila's QS21刺激子(Aquila Biotech, Worcester, Mass., USA)及其他專利性佐劑(例如Ribi's Detox、Quil或Superfos。先前已闡述若干種對樹突細胞及其製劑具有特異性之免疫佐劑(例如，MF59) (Dupuis M等人，Cell Immunol. 1998；186(1): 18-27；Allison A C；Dev Biol Stand. 1998；92:3-11)。亦可使用細胞介素。若干種細胞介素與影響樹突細胞移動至淋巴組織(例如，TNF-α)、加快樹突細胞成熟為T-淋巴球之有效抗原呈遞細胞(例如，GM-CSF、IL-1及IL-4) (美國專利第5,849,589號，其係全文以引用方式明確併入本文中)及起免疫佐劑作用(例如，IL-

12) (Gabrilovich D I等人，J Immunother Emphasis Tumor Immunol. 1996 (6):414-418)直接相關。

亦可使用類鐸受體(TLR)作為佐劑，且其係模式識別受體(PRR)家族之重要成員，該受體家族識別多種微生物共有之稱為「病原體相關分子模式」 (PAMPS)之保守基序。識別該等「危險信號」活化先天及適應性免疫系統中之多個元件。TLR係由先天及適應性免疫系統之細胞(例如樹突細胞(DC)、巨噬細胞、T細胞及B細胞、肥胖細胞及顆粒球)表現且位於不同細胞隔室中，例如質膜、溶酶體、胞內體及內溶酶體。不同TLR識別不同PAMPS。舉例而言，TLR4由細菌細胞壁中所含LPS活化，TLR9由未甲基化細菌或病毒CpG DNA活化，且TLR3由雙鏈RNA活化。TLR配體結合導致一或多個細胞內信號傳導路徑之活化，最終導致產生與發炎及免疫性相關之多種關鍵分子(尤其轉錄因子NF-κB及I型干擾素)。TLR介導之DC活化導致增強之DC活化、吞噬作用、活化及共刺激標記(例如CD80、CD83及CD86)之上調、容許DC移動至引流淋巴結並促進抗原呈遞至T細胞之CCR7之表現，以及增加細胞介素(例如I型干擾素、IL-12及IL-6)之分泌。所有該等下游事件皆對於誘導適應性免疫反應係關鍵的。

在當前臨床研發中最有前景之癌症疫苗或免疫原性組合物佐劑中係TLR9激動劑CpG及合成雙鏈RNA (dsRNA) TLR3配體聚-ICLC。在臨床前研究中，與LPS及CpG相比時，由於聚-ICLC誘導促發炎細胞介素且缺少IL-10之刺激以及在DCs1中維持高含量之共刺激分子，聚-ICLC似乎係最有效TLR佐劑。此外，最近將聚-ICLC與CpG在非人類靈長類動物(恒河獼猴(rhesus macaques))中作為由人類乳頭瘤病毒(HPV)16次蛋白衣組成之蛋白質疫苗或免疫原性組合物之佐劑直接相比(Stahl-Hennig C、Eisenblatter M、Jasny E等人，Synthetic double-

stranded RNAs are adjuvants for the induction of T helper 1 and humoral immune responses to human papillomavirus in rhesus macaques. PLoS pathogens. 2009年4月；5(4))。

亦已報導CpG免疫刺激性寡核苷酸可增強佐劑在疫苗或免疫原性組合物環境中之效應。不受限於理論，CpG寡核苷酸藉由經由類鐸受體(TLR，即TLR9)活化先天(非適應性)免疫系統來起作用。CpG觸發之TLR9活化增強針對眾多種抗原之抗原特異性體液性及細胞反應，該等抗原包括預防性及治療性疫苗二者中之肽或蛋白質抗原、活的或經殺滅病毒、樹突細胞疫苗、自體細胞疫苗及多醣偶聯物。更重要的是，其促進樹突細胞成熟及分化，導致促進Th1細胞之活化及強細胞毒性T-淋巴球(CTL)生成(即使在CD4 T輔助細胞不存在下)。TLR9刺激誘導之Th1偏差即使在通常促進Th2偏差之疫苗佐劑(例如明礬(alum)或不完全弗氏佐劑(IFA))存在下亦可維持。CpG寡核苷酸在與其他佐劑一起調配或共投與時或在諸如微粒、奈米顆粒、脂質乳液或類似調配物等調配物中顯示甚至更強之佐劑活性，其尤其為在抗原相對較弱時誘導強反應所需。其亦加快免疫反應並使得能將抗原劑量減小約兩個數量級，且在一些實驗中抗體反應與不含CpG之全劑量疫苗相當(Arthur M. Krieg, Nature Reviews, Drug Discovery, 2006年6月5日, 471-484)。美國專利第6,406,705 B1號闡述組合使用CpG寡核苷酸、非核酸佐劑及抗原以誘導抗原特異性免疫反應。市售CpG TLR9拮抗劑係dSLIM (雙莖環免疫調節劑) (Mologen，Berlin, GERMANY)，其係本發明醫藥組合物之較佳組份。亦可使用其他TLR結合分子(例如RNA結合TLR 7、TLR 8及/或TLR 9)。

可用佐劑之其他實例包括(但不限於)經化學修飾之CpG (例如CpR, Idera)、聚(I:C) (例如聚i:CI2U)、非CpG細菌DNA或RNA以及免

疫活性小分子及抗體，例如環磷醯胺、舒尼替尼(sunitinib)、貝伐珠單抗(bevacizumab)、西樂葆(celebrex)、NCX-4016、西地那非(sildenafil)、他達拉非(tadalafil)、伐地那非(vardenafil)、索拉菲尼(sorafinib)、XL-999、CP-547632、帕唑帕尼(pazopanib)、ZD2171、AZD2171、伊匹單抗、曲美目單抗及SC58175，其可起治療作用及/或起佐劑作用。可用於本發明情況中之佐劑及添加劑之量及濃度可由熟習此項技術者不經過度實驗即容易地確定。其他佐劑包括群落刺激因子，例如顆粒球巨噬細胞群落刺激因子(GM-CSF、沙格司亭(sargramostim))。

聚-ICLC係由平均長度約5000個核苷酸之聚I及聚C鏈組成之合成方式製備之雙鏈RNA，其已藉由添加聚離胺酸及羧甲基纖維素針對熱變性及血清核酸酶水解穩定化。該化合物活化TLR3及MDA5之RNA解旋酶結構域(PAMP家族之兩個成員)，導致DC及天然殺傷(NK)細胞活化及I型干擾素、細胞介素及趨化介素之「天然混合物」之產生。此外，聚-ICLC發揮更直接之廣泛宿主靶向抗感染且可能抗腫瘤效應，由兩種IFN可誘導核酶系統(即2'5'-OAS及P1/eIF2a激酶，亦稱為PKR(4-6)以及RIG-I解旋酶及MDA5)介導。

在齧齒類動物及非人類靈長類動物中，顯示聚-ICLC可增強針對病毒抗原之T細胞反應、交叉啟動及對腫瘤、病毒及自體抗原特異性CD8+ T細胞之誘導。在近期於非人類靈長類動物中之研究中，發現聚-ICLC為生成針對DC靶向或非靶向HIV Gag p24蛋白質之抗體反應及T細胞免疫性所必需，從而強調其作為疫苗佐劑之有效性。

在人類個體中，對連續全血樣品之轉錄分析揭示在接受一次單一皮下投與聚-ICLC之8名健康人類志願者之間類似的基因表現譜，及在該8名個體對4名接受安慰劑之個體之間多達212個基因之差異性表

現。值得注意的是，對聚-ICLC基因表現資料與來自經高效黃熱病疫苗YF17D免疫之志願者之先前資料之比較顯示，大量轉錄及信號轉導經典路徑(包括先天免疫系統之彼等)在峰值時間點類似地上調。

最近，報導關於處於第二次或第三次完全臨床消退中之患有卵巢癌、輸卵管癌及原發性腹膜癌之患者之免疫分析，該等患者係在皮下疫苗接種之1期研究中經治療，該皮下疫苗接種使用單獨的來自癌症睪丸抗原NY-ESO-1之合成重疊長肽(OLP)，或使用Montanide-ISA-51，或使用1.4 mg聚-ICLC及Montanide。與單獨之OLP或OLP及Montanide相比，在添加聚-ICLC及Montanide時，NY-ESO-1特異性CD4+及CD8+ T細胞及抗體反應之生成顯著增強。

本發明之疫苗或免疫原性組合物可包含一種以上不同佐劑。此外，本發明涵蓋治療組合物，其包含任何佐劑物質，包括本文所論述之彼等中之任一者。亦涵蓋肽或多肽及佐劑可以任何適當序列分開投與。

載劑可獨立於佐劑而存在。載劑可共價連接至抗原。亦可藉由將編碼載劑之DNA插入具有編碼抗原之DNA之框中將載劑添加至抗原。載劑之功能可例如係賦予穩定性，增強生物活性，或延長血清半衰期。半衰期之延長可幫助減少施加次數並降低劑量，因此出於治療以及經濟原因係有益的。此外，載劑可幫助將肽呈遞至T細胞。載劑可為熟習此項技術者已知之任何適宜載劑，例如蛋白質或抗原呈遞細胞。載體蛋白可為但不限於鑰孔帽貝血藍蛋白、血清蛋白(例如運鐵蛋白、牛血清白蛋白、人類血清白蛋白)、甲狀腺球蛋白或卵白蛋白、免疫球蛋白或激素(例如胰島素)或棕櫚酸。對於人類之免疫，載劑可為人類可接受且安全之生理上可接受之載劑。然而，在本發明之一個實施例中，破傷風類毒素及/或白喉類毒素係適宜載劑。或者，

載劑可為聚葡萄糖，例如瓊脂醣凝膠。

細胞毒性T細胞(CTL)識別呈結合至MHC分子之肽之形式的抗原而非完整外來抗原自身。MHC分子自身位於抗原呈遞細胞之細胞表面處。因此，CTL之活化僅在存在肽抗原、MHC分子及APC之三元複合體時才可能。相應地，若不僅使用肽活化CTL，且若另外添加APC及各別MHC分子，則其可增強免疫反應。因此，在一些實施例中，本發明之疫苗或免疫原性組合物另外含有至少一種抗原呈遞細胞。

抗原呈遞細胞(或刺激細胞)通常在其表面上具有I類或II類MHC分子，且在一個實施例中，自身實質上不能用所選抗原加載I類或II類MHC分子。如本文中更詳細地闡述，I類或II類MHC分子在活體外可容易地經所選抗原加載。

CD8+細胞活性可經由使用CD4+細胞來增強。對腫瘤抗原之CD4 T+細胞表位之鑑別已引人關注，此乃因若使用CD8+及CD4+ T淋巴球二者靶向患者之腫瘤，則多種基於免疫之癌症療法可更有效。CD4+細胞能增強CD8 T細胞反應。多種動物模型研究已明確顯示，在CD4+及CD8+ T細胞二者皆參與抗腫瘤反應時，結果更佳(例如，參見Nishimura等人(1999) Distinct role of antigen-specific T helper type 1 (TH1) and Th2 cells in tumor eradication in vivo. J Ex Med 190:617-27)。已鑑別通用CD4+ T細胞表位，其適用於研發針對不同類型之癌症之療法(例如，參見Kobayashi等人(2008) Current Opinion in Immunology 20:221-27)。舉例而言，來自破傷風類毒素之HLA-DR限制之輔助肽用於黑色素瘤疫苗中以非特異性活化CD4+ T細胞(例如，參見Slingluff等人(2007) Immunologic and Clinical Outcomes of a Randomized Phase II Trial of Two Multipeptide Vaccines for Melanoma in the Adjuvant Setting, Clinical Cancer Research 13(21):6386-95)。在

本發明範圍內涵蓋，該等CD4+細胞可在3個其腫瘤特異性變化之程度上適用：1) 廣泛程度，其中通用CD4+表位(例如，破傷風類毒素)可用於增強CD8+細胞；2) 中間程度，其中天然腫瘤相關CD4+表位可用於增強CD8+細胞；及3) 患者特異性程度，其中新抗原CD4+表位可用於以患者特異性方式增強CD8+細胞。儘管當前用於預測CD4表位之算法之準確度有限，但可合理地預期，多種含有所預測CD8新表位之長肽亦將包括CD4表位。CD4表位長於CD8表位且通常長度為10-12個胺基酸，但一些可更長(Kreiter等人，Mutant MHC Class II epitopes drive therapeutic immune responses to cancer, Nature (2015))。因此，本文所述呈長肽(>25個胺基酸)形式或編碼該等長肽之核酸形式之新抗原性表位亦可以腫瘤及患者特異性方式加強CD4反應(上文程度(3))。

CD8+細胞免疫性亦可用經新抗原加載之樹突細胞(DC)疫苗來生成。DC係起始T細胞免疫性之有效抗原呈遞細胞且可在經一或多種目標肽加載(藉由直接肽注射)時用作癌症疫苗。舉例而言，顯示新近經診斷患有轉移黑色素瘤之患者針對3種HLA-A*0201限制之gp100黑色素瘤抗原源肽使用自體肽脈衝CD40L/IFN-g活化之成熟DC經由產生IL-12p70之患者DC疫苗免疫(例如，參見Carreno等人(2013) L-12p70-producing patient DC vaccine elicits Tc1-polarized immunity, Journal of Clinical Investigation, 123(8):3383-94；及Ali等人(2009) In situ regulation of DC subsets and T cells mediates tumor regression in mice, Cancer Immunotherapy, 1(8):1-10)。在本發明範圍內涵蓋，經新抗原加載之DC可使用合成TLR 3激動劑聚肌苷酸-聚胞苷酸-聚-L-離胺酸羧甲基纖維素(聚-ICLC)刺激DC來製備。聚-ICLC係人類DC之有效個別成熟刺激物，如藉由CD83及CD86之上調、介白素-12 (IL-12)、腫瘤

壞死因子(TNF)、干擾素γ-誘導蛋白質10 (IP-10)、介白素1 (IL-1)及I型干擾素(IFN)之誘導以及最低介白素10 (IL-10)產生來評價。DC可自藉由白血球分離獲得之冷凍末梢血單核細胞(PBMC)分化，而PBMC可藉由Ficoll梯度離心分離並按等份冷凍。

說明性地，可使用以下7天活化方案。第1天—將PBMC解凍並平鋪至組織培養燒瓶上，以在37℃下在組織培養培育器中培育1-2 hr後選擇黏附至塑膠表面之單核球。在培育後，洗除淋巴球並將黏附單核球在介白素-4 (IL-4)及顆粒球巨噬細胞-群落刺激因子(GM-CSF)存在下培養5天以分化至不成熟DC。在第6天，用鑰孔帽貝血藍蛋白(KLH)蛋白質對不成熟DC進行脈衝處理，該蛋白質用作疫苗品質之對照且可加強疫苗之免疫原性。將DC刺激至成熟，用肽抗原加載，並培育過夜。在第7天，洗滌細胞，並使用控制速率冷凍器以含有4-20 × 10(6)個細胞之1 ml等份冷凍。可在將DC注射至患者中之前對多批DC實施批次釋放測試以滿足最低規格(例如，參見Sabado等人(2013) Preparation of tumor antigen-loaded mature dendritic cells for immunotherapy, J. Vis Exp. Aug 1；(78). doi: 10.3791/50085)。

可將DC疫苗納入支架系統中以促進遞送至患者。用DC疫苗治療性治療患者贅瘤形成可利用生物材料系統，該系統將招募宿主樹突細胞之因子釋放至裝置中，藉由在釋放抗原的同時局部呈遞佐劑(例如，危險信號)使駐留不成熟DC分化，且促進將經活化的加載有抗原之DC釋放至淋巴結(或期望作用位點)，其中DC可與T細胞相互作用以生成針對癌症新抗原之有效細胞毒性T淋巴球反應。可使用可植入生物材料以患者特異性方式生成針對贅瘤形成之有效細胞毒性T淋巴球反應。然後可藉由使其暴露於與自生物材料釋放抗原一致之模擬危險信號之感染來活化生物材料-駐留樹突細胞。然後經活化樹突細胞自

生物材料移動至淋巴結以誘導細胞毒性T效應物反應。先前已在使用自腫瘤生檢製備之裂解物之臨床前研究中顯示此方法可導致已建立黑色素瘤之消退(例如，參見Ali等人(2209) In situ regulation of DC subsets and T cells mediates tumor regression in mice, Cancer Immunotherapy 1(8):1-10；Ali等人(2009) Infection-mimicking materials to program dendritic cells in situ. Nat Mater 8:151-8)，且此一疫苗目前正在I期臨床試驗中測試，該I期臨床試驗最近在Dana-Farber Cancer Institute起始。亦已在當前建議中使用C6大鼠神經膠質瘤模型.24顯示此方法可導致神經膠母細胞瘤消退，以及誘導有效記憶反應以防止復發。此一可植入生物基質疫苗遞送支架增強並維持腫瘤特異性樹突細胞活化之能力可導致較藉由傳統皮下或結內疫苗投與可達成者更穩健之抗腫瘤免疫致敏。

本發明可包括將新抗原肽加載至樹突細胞上之任何方法。適用於本發明之一種此類方法係微流體細胞內遞送系統。該等系統藉由人類及小鼠免疫細胞之快速機械變形引起短暫膜破壞，從而容許細胞內遞送生物分子(Sharei等人，2015, PLOS ONE)。

較佳地，抗原呈遞細胞係樹突細胞。適宜地，樹突細胞係經新抗原肽脈衝處理之自體樹突細胞。肽可為產生適當T細胞反應之任何適宜肽。使用經來自腫瘤相關抗原之肽脈衝處理之自體樹突細胞之T細胞療法揭示於以下文獻中：Murphy等人(1996) The Prostate 29, 371-380及Tjua等人(1997) The Prostate 32, 272-278。在某些實施例中，使用CD141、DEC205或XCR1標記靶向樹突細胞。CD141+XCR1+ DC被鑑別為可更適合誘導抗腫瘤反應之亞組(Bachem等人，J. Exp. Med. 207, 1273-1281 (2010)；Crozat等人，J. Exp. Med. 207, 1283-1292 (2010)；及Gallois & Bhardwaj, Nature Med. 16, 854-856 (2010))。

因此，在本發明之一個實施例中，用一或多種本發明肽對含有至少一種抗原呈遞細胞之疫苗或免疫原性組合物進行脈衝處理或加載。或者，可將自患者分離之末梢血單核細胞(PBMC)用肽離體加載並注射回至患者中。作為替代，抗原呈遞細胞包含編碼本發明肽之表現構築體。多核苷酸可為任何適宜多核苷酸且較佳其能轉導樹突細胞，由此導致肽之呈遞及免疫性之誘導。

本發明醫藥組合物可經編譯使得組合物中存在之肽之選擇、數目及/或數量覆蓋群體中之大部分個體。該選擇可取決於癌症之特定類型、疾病狀態、初期治療方案及當然存於患者群體中之HLA-單倍型。

可將包含本發明之肽之醫藥組合物投與已患有癌症之個體。在治療性應用中，將組合物以足以引發針對腫瘤抗原之有效CTL反應並治癒或至少部分阻止症狀及/或併發症之量投與患者。足以達成此目的之量定義為「治療有效劑量」。有效用於此用途之量可取決於例如肽組合物、投與方式、所治療疾病之階段及嚴重度、患者之體重及一般健康狀態以及開方醫師之判斷，但對於70 kg患者，對於初始免疫(此係用於治療性或預防性投與)介於約1.0 μg至約50,000 μg肽範圍內，之後端視患者反應及病況及可能依據量測患者血液中之特定CTL活性，經數週至數月投與加強劑量或依據加強方案約1.0 μg至約10,000 μg肽。應牢記，本發明之肽及組合物一般可用於嚴重疾病狀態中，亦即威脅生命或可能威脅生命之情況，尤其在癌症已轉移時。對於治療性使用，投與應在檢測或手術移除腫瘤後儘可能快地開始。此後投與加強劑量直至至少症狀實質上減輕且持續之後一時段。

用於治療性治療之醫藥組合物(例如，疫苗組合物)意欲用於非經腸、局部(topical)、經鼻、經口或局部(local)投與。較佳地，醫藥組

合物係非經腸投與，例如靜脈內、皮下、真皮內或肌內投與。組合物可在手術切除位點投與以誘導針對腫瘤之局部免疫反應。本發明提供用於非經腸投與之組合物，其包含肽及疫苗或免疫原性組合物溶解於或懸浮於可接受之載劑、較佳水性載劑中之溶液。可使用多種水性載劑，例如水、緩衝水、0.9%鹽水、0.3%甘胺酸、玻尿酸及諸如此類。該等組合物可藉由習用熟知滅菌技術滅菌，或可經無菌過濾。所得水性溶液可經包裝按原樣使用，或經凍乾，將凍乾製劑在投與前與無菌溶液組合。組合物可根據適宜生理條件之需要含有醫藥上可接受之輔助物質，例如pH調節及緩衝劑、張力調節劑、潤濕劑及諸如此類，例如乙酸鈉、乳酸鈉、氯化鈉、氯化鉀、氯化鈣、去水山梨醇單月桂酸酯、三乙醇胺油酸酯等。

含有肽之脂質體懸浮液可以靜脈內、局部(locally)、局部(topically)等方式以尤其根據投與方式、所遞送肽及所治療疾病之階段而變之劑量來投與。對於靶向免疫細胞，可經配體(例如對期望免疫系統細胞之細胞表面決定子具有特異性之抗體或其片段)納入脂質體中。

對於固體組合物，可使用習用或奈米顆粒無毒固體載劑，其包括例如醫藥級甘露醇、乳糖、澱粉、硬脂酸鎂、糖精鈉、滑石粉、纖維素、葡萄糖、蔗糖、碳酸鎂及諸如此類。對於經口投與，醫藥上可接受之無毒組合物係藉由納入通常採用之賦形劑(例如先前所列示之彼等載劑)中之任一者及通常10-95%、且更佳25%-75%濃度之活性成份(亦即一或多種本發明肽)來形成。

對於氣溶膠投與，免疫原性肽較佳以微細形式與表面活性劑及推進劑一起供應。肽之典型百分比係以重量計0.01%-20%，較佳1%-10%。當然，表面活性劑可無毒，且較佳可溶於推進劑中。代表性之

此類藥劑係含有6至22個碳原子之脂肪酸(例如己酸、辛酸、月桂酸、棕櫚酸、硬脂酸、亞油酸、亞麻酸、油硬脂酸及油酸)與脂肪族多元醇或其環酐之酯或部分酯。可採用混合酯(例如混合或天然甘油酯)。表面活性劑以重量計可佔組合物之0.1%-20%，較佳0.25-5%。組合物之其餘部分通常係推進劑。亦可視需要包括載劑(如同例如卵磷脂)用於鼻內遞送。

本發明之肽及多肽可利用不含污染性細菌或動物物質之試劑容易地化學合成(Merrifield RB: Solid phase peptide synthesis. I. The synthesis of a tetrapeptide. J. Am. Chem. Soc. 85:2149-54, 1963)。

本發明之肽及多肽亦可藉由載體來表現，該載體例如如本文所論述之核酸分子，例如RNA或DNA質體、病毒載體，例如痘病毒(例如正痘病毒、禽痘病毒)或腺病毒、AAV或慢病毒。此方法涉及使用載體來表現編碼本發明之肽之核苷酸序列。在引入急性或慢性感染宿主或引入未感染宿主後，載體表現免疫原性肽，且由此引發宿主CTL反應。

出於治療或免疫目的，編碼本發明之肽及視情況一或多種本文所述之肽之核酸亦可投與患者。便捷地使用多種方法將核酸遞送至患者。例如，核酸可作為「裸DNA」直接遞送。此方法闡述於例如以下文獻中：Wolff等人，Science 247: 1465-1468 (1990)以及美國專利第5,580,859號及第5,589,466號。核酸亦可使用彈道式遞送來投與，如例如美國專利第5,204,253號中所述。可投與僅包括DNA之顆粒。或者，DNA可黏附至顆粒，例如金顆粒。通常，用於疫苗或免疫組合物之質體可包含編碼抗原(例如，一或多種新抗原)之DNA，其可操作連接至控制抗原自宿主細胞(例如哺乳動物細胞)之表現或表現及分泌之調節序列；例如自上游之下游，用於啟動子(例如哺乳動物病毒啟動

子，例如，CMV啟動子，例如hCMV或mCMV啟動子，例如立即早期啟動子或SV40啟動子，參見本文中針對可用啟動子引用或納入之文件)之DNA、用於分泌用真核前導肽(例如，組織纖維蛋白溶酶原活化劑)之DNA、用於新抗原之DNA及編碼終止子(例如，來自編碼牛生長激素或bGH 多A之基因之3' UTR轉錄終止子)之DNA。組合物可含有一種以上質體或載體，其中每一載體含有並表現不同新抗原。亦可提及Wasmoen美國專利第5,849,303號及Dale美國專利第5,811,104號，其文本可用。DNA或DNA質體調配物可用陽離子脂質來調配或調配於陽離子脂質內部；且關於陽離子脂質以及佐劑，亦可提及Loosmore美國專利申請案第2003/0104008號。同樣，Audonnet美國專利第6,228,846號及第6,159,477號中之教示可依賴於DNA質體教示，其可用於構築及使用活體內含有及表現之DNA質體。

核酸亦可與陽離子化合物、例如陽離子脂質複合遞送。脂質介導之基因遞送方法闡述於例如以下文獻中：WO1996/18372；WO 1993/24640；Mannino & Gould-Fogerite , BioTechniques 6(7): 682-691 (1988)；美國專利第5,279,833號；WO 1991/06309；及Feigner等人，Proc. Natl. Acad. Sci. USA 84: 7413-7414 (1987)。

編碼目標肽之RNA (例如，mRNA)亦可用於遞送(例如，參見Kiken等人，2011；Su等人，2011；亦參見US 8278036；Halabi等人J Clin Oncol (2003) 21:1232-1237；Petsch等人，Nature Biotechnology 2012 Dec 7；30(12):1210-6)。

如本文所述之病毒載體亦可用於遞送本發明之新抗原肽。可投與載體以具有類似於藉由抗原投與引發之劑量及/或反應之活體內表現及反應。

投與編碼本發明之肽之核酸之較佳方式使用編碼多個表位之袖

珍基因構築體。為產生用於在人類細胞中表現之編碼所選CTL表位之DNA序列(袖珍基因)，反轉譯表位之胺基酸序列。使用人類密碼子使用表引導每一胺基酸之密碼子選擇。將該等表位編碼DNA序列直接聯接，產生連續多肽序列。為了最佳化表現及/或免疫原性，可將其他元件納入袖珍基因設計中。可反轉譯並包括於袖珍基因序列中之胺基酸序列之實例包括：輔助T淋巴球、表位、前導(信號)序列及內質網滯留信號。另外，CTL表位之MHC呈遞可藉由包括毗鄰CTL表位之合成(例如聚丙胺酸)或天然側翼序列來改良。

藉由組裝編碼袖珍基因正鏈及負鏈之寡核苷酸來使袖珍基因序列轉化為DNA。在適當條件下使用熟知技術合成重疊寡核苷酸(長30-100個鹼基)，使其磷酸化、純化並退火。使用T4 DNA連接酶接合寡核苷酸之末端。然後可將此編碼CTL表位多肽之合成袖珍基因選殖至期望表現載體中。

彼等熟習此項技術者熟知之標準調節序列包括於載體中以確保靶細胞中之表現。需要若干個載體元件：具有用於袖珍基因插入之下游選殖位點之啟動子；用於有效轉錄終止之多聚腺苷酸化信號；大腸桿菌複製起點；及大腸桿菌可選標記物(例如胺苄青黴素(ampicillin)或康黴素(kanamycin)抗性)。多種啟動子可用於此目的，例如人類巨細胞病毒(hCMV)啟動子。其他適宜啟動子序列參見美國專利第5,580,859號及第5,589,466號。

可期望其他載體修飾以最佳化袖珍基因表現及免疫原性。在一些情形中，有效基因表現需要內含子，且可將一或多種合成或天然內含子納入袖珍基因之轉錄區域中。對於促進袖珍基因表現亦可考慮包括mRNA穩定序列。最近已建議，免疫刺激性序列(ISS或CpG)在DNA疫苗之免疫原性中起作用。若發現可增強免疫原性，則該等序列可包

括於載體中，位於袖珍基因編碼序列外部。

在一些實施例中，可使用雙順反子表現載體以容許產生袖珍基因編碼之表位且包括第二蛋白質以增強或降低免疫原性。若共表現可有益地增強免疫反應之蛋白質或多肽之實例包括細胞介素(例如，IL2、IL12、GM-CSF)、細胞介素誘導分子(例如LeIF)或共刺激分子。輔助(HTL)表位可接合至細胞內靶向信號並與CTL表位分開表現。此將容許將HTL表位引導至與CTL表位不同之細胞隔室。若需要，此刻促進HTL表位更有效進入II類MHC路徑中，由此改良CTL誘導。與CTL相反，藉由免疫抑制分子(例如TGF-β)之共表現特異性降低免疫反應可在某些疾病中有益。

在選擇表現載體後，可立即將袖珍基因選殖至啟動子下游之多連接體區域中。將此質體轉變為適當的大腸桿菌株，且使用標準技術製備DNA。使用限制酶圖譜分析及DNA序列分析來確認袖珍基因以及包括於載體中之所有其他元件之取向及DNA序列。具有正確質體之細菌細胞可作為種源細胞庫及工作細胞庫來儲存。

可製備純化質體DNA用於使用多種調配物來注射。該等調配物中最簡單者係在無菌磷酸鹽緩衝鹽水(PBS)中復原凍乾DNA。已闡述多種方法，且可使用新技術。如本文所述，便捷地用陽離子脂質調配核酸。另外，亦可將醣酯、促融脂質體(fusogenic liposome)、肽及統稱為保護性、相互作用性、非凝聚(PINC)之化合物複合至純化質體DNA以影響諸如穩定性、肌內分散或至特定器官或細胞類型之運輸等變量。

靶細胞致敏可用作袖珍基因編碼之CTL表位之表現及I類MHC呈遞之功能分析。將質體DNA引入適宜作為標準CTL鉻釋放分析之靶之哺乳動物細胞系中。所用轉染方法取決於最終調配物。電穿孔可用於

「裸」DNA，而陽離子脂質容許直接活體外轉染。質體表現綠色螢光蛋白(GFP)可經共轉染以容許使用螢光活化細胞分選(FACS)濃集經轉染細胞。然後該等細胞經鉻-51標記並用作表位特異性CTL系之靶細胞。藉由51 Cr釋放檢測之細胞溶解指示產生袖珍基因編碼之CTL表位之MHC呈遞。

活體內免疫原性係袖珍基因DNA調配物之功能測試之第二種方法。用DNA產物對表現適當人類MHC分子之轉基因小鼠進行免疫。投與劑量及途徑取決於調配物(例如IM用於PBS中之DNA，IP用於脂質複合之DNA)。在免疫後21天，收穫脾細胞並在編碼所測試每一表位之肽存在下再刺激1週。使用標準技術分析該等效應細胞(CTL)之加載肽之鉻-51標記之靶細胞之細胞溶解。藉由對應於袖珍基因編碼之表位之肽的MHC加載致敏之靶細胞之溶解證實DNA疫苗在活體內誘導CTL之功能。

肽亦可用於離體引發CTL。可使用所得CTL來治療對其他習用形式之療法無反應或對肽疫苗治療方法無反應之有需要之患者之慢性腫瘤。針對具體腫瘤抗原之離體CTL反應係藉由在組織培養中將患者之CTL前體細胞(CTLp)與抗原呈遞細胞(APC)及適當肽之來源一起培育來誘導。在適當培育時間(通常1-4週，其中CTLp活化並成熟且擴增為效應物CTL)後，將該等細胞輸注回至患者中，其中其破壞其特異性靶細胞(即，腫瘤細胞)。為了最優化生成特異性細胞毒性T細胞之活體外條件，在適當無血清培養基中維持刺激細胞之培養。

在將刺激細胞與欲活化細胞(例如前體CD8+細胞)一起培育之前，將一定量之抗原肽添加至刺激細胞培養物，其量足以加載至欲在刺激細胞表面上表現之人類I類分子上。在本發明中，肽之足量係容許用欲在每一刺激細胞表面上表現之肽加載約200個、且較佳200或更

多個人類I類MHC分子之量。較佳地，刺激細胞係與>2 μg/ml肽一起培育。舉例而言，刺激細胞係與> 3、4、5、10、15 μg/ml或更多肽一起培育。

然後將休眠或前體CD8+細胞在培養中與適當刺激細胞一起培育足以活化CD8+細胞之時間段。較佳地，CD8+細胞係以抗原特異性方式活化。休眠或前體CD8+ (效應物)細胞對刺激細胞之比率可隨個體而變且可進一步取決於諸如以下等變量：個體之淋巴球對培養條件之順從性及病況或對於其使用所述範圍內之治療方式之病況之性質及嚴重度。然而，較佳地，淋巴球:刺激細胞比率在約30:1至300:1範圍內。可將效應物/刺激物培養維持刺激治療可用或有效數目之CD8+細胞所需之時間長度。

活體外誘導CTL需要特異性識別結合至APC上之等位基因特異性I類MHC分子之肽。每個APC之特異性MHC/肽複合體之數目對於刺激CTL、尤其在初級免疫反應中至關重要。儘管每個細胞少量肽/MHC複合物足以使細胞對藉由CTL溶解敏感，或足以刺激次級CTL反應，但在初級反應期間順利活化CTL前體(pCTL)需要顯著更大數目之MHC/肽複合體。細胞上之空主要組織相容性複合體分子之肽加載容許誘導初級細胞毒性T淋巴球反應。

由於突變體細胞系不存在每種人類MHC等位基因，故使用某技術自APC表面移除內源MHC結合肽，之後用目標免疫原性肽加載所得空MHC分子係有利的。對於針對離體CTL療法之研發之CTL誘導方案之設計，可期望使用患者之未轉變(非致瘤)之未感染細胞且較佳自體細胞作為APC。本申請揭示用於自APC表面剝離內源MHC結合肽之後加載期望肽之方法。

穩定I類MHC分子係由以下元件形成之三元複合體：1) 通常具有

8 - 10個殘基之肽，2) 在其a1及a2結構域具有肽結合位點之跨膜重質多形性蛋白質鏈，及3) 非共價結合之非多形性輕鏈p2微球蛋白。自複合體移除所結合肽及/或解離p2微球蛋白使I類MHC分子無功能且不穩定，導致快速降解。所有自PBMC分離之I類MHC分子皆具有與其結合之內源肽。因此，第一個步驟係移除所有結合至APC上之I類MHC分子之內源肽且在可將外源肽添加至其之前不引起其降解。

兩種釋放結合肽之I類MHC分子之可能方式包括使培養溫度自37℃降低至26℃過夜以使p2微球蛋白去穩定並使用溫和酸處理自細胞剝離內源肽。該等方法將先前結合之肽釋放至細胞外環境，容許新的外源肽結合至空I類分子。低溫培育方法使得外源肽能有效結合至MHC複合體，但需要在26℃下過夜培育，此可減慢細胞之代謝速率。不主動合成MHC分子之細胞(例如，休眠PBMC)亦可能不會藉由低溫程序產生大量空表面MHC分子。

苛性酸剝離涉及用三氟乙酸(pH 2)萃取肽，或使免疫親和純化之I類-肽複合體酸變性。該等方法不適用於CTL誘導，此乃因在保持APC之存活及最佳代謝狀態(其對於抗原呈遞很關鍵)的同時移除內源肽非常重要。已使用pH 3之溫和酸溶液(例如甘胺酸或檸檬酸鹽-磷酸鹽緩衝液)來鑑別內源肽並鑑別腫瘤相關T細胞表位。該處理尤其有效，此乃因僅I類MHC分子經去穩定(並釋放結合肽)，而其他表面抗原保持完整，包括II類MHC分子。最重要的是，用溫和酸溶液處理細胞不影響細胞之存活或代謝狀態。溫和酸處理係快速的，此乃因剝離內源肽在4℃下發生在2分鐘內，且APC在加載適當肽後已準備好實施其功能。在本文中利用該技術來製備肽特異性APC以供生成初級抗原特異性CTL。所得APC可有效誘導肽特異性CD8+ CTL。

可使用多種已知方法之一自刺激細胞有效分離經活化CD8+細

胞。舉例而言，可利用對刺激細胞、對加載至刺激細胞上之肽、或對CD8+細胞(或其區段)具有特異性之單株抗體來結合其適當互補配體。然後可經由適當方式(例如經由熟知的免疫沈澱或免疫分析方法)自刺激物-效應細胞混合物萃取抗體標記之分子。

經活化CD8+細胞之有效細胞毒性量可在活體外及活體內使用之間變化，以及隨該等殺傷細胞之最終靶細胞之量及類型而變。該量亦可端視患者之病況而變且應由開業醫師經由考慮所有適當因素後確定。然而，較佳地，對於成年人類，利用約1×10^6至約1×10^{12}、更佳約1×10^8至約1×10^{11}、且甚至更佳約1×10^9至約1×10^{10}個經活化CD8+細胞，與之相比在小鼠中使用約$5 \times 10^6 - 5 \times 10^7$個細胞。

較佳地，如本文所論述，在將CD8+細胞投與所治療個體之前，自細胞培養收穫經活化CD8+細胞。然而，重要的是應注意，與其他當前及建議治療方式不同，本發明方法使用不致瘤之細胞培養系統。因此，若未達成刺激細胞及經活化CD8+細胞之完全分離，則不存在已知與投與少數刺激細胞相關之固有危險，而投與哺乳動物促瘤細胞可極端危險。

再引入細胞組份之方法為業內已知且包括例如例示於頒予Honsik等人之美國專利第4,844,893號及頒予Rosenberg之美國專利第4,690,915號中之程序之程序。舉例而言，經由靜脈內輸注投與經活化CD8+細胞係適當的。

除非另外指示，否則本發明之實踐採用分子生物學(包括重組技術)、微生物學、細胞生物學、生物化學及免疫學之習用技術，其為熟習此項技術者所熟知。該等技術充分解釋於文獻中，例如「Molecular Cloning: A Laboratory Manual」，第二版(Sambrook, 1989)；「Oligonucleotide Synthesis」 (Gait, 1984)；「Animal Cell

Culture」 (Freshney, 1987)；「Methods in Enzymology」「Handbook of Experimental Immunology」 (Wei, 1996)；「Gene Transfer Vectors for Mammalian Cells」 (Miller及Calos, 1987)；「Current Protocols in Molecular Biology」 (Ausubel, 1987)；「PCR: The Polymerase Chain Reaction」, (Mullis, 1994)；「Current Protocols in Immunology」 (Coligan, 1991)。該等技術適用於產生本發明之多核苷酸及多肽，且因此可在製備及實踐本發明中考慮。尤其可用於具體實施例之技術論述於下文章節中。

治療方法

本發明提供藉由向個體投與複數種本發明之新抗原肽或組合物在個體中誘導贅瘤形成/腫瘤特異性免疫反應、針對贅瘤形成/腫瘤進行疫苗接種、治療及/或緩和個體之癌症症狀之方法。

根據本發明，本文所述之贅瘤形成疫苗或免疫原性組合物可用於已診斷為患有癌症或具有發生癌症之風險之患者。

本發明所主張之組合係以足以誘導CTL反應之量來投與。

其他療法

本文所述之腫瘤特異性新抗原肽及醫藥組合物亦可以與額外藥劑(例如治療劑)之組合療法投與。在某些實施例中，額外藥劑可為但不限於化學治療劑、抗血管生成劑及降低免疫抑制之藥劑。

贅瘤形成疫苗或免疫原性組合物可在投與額外藥劑之前、期間或之後投與。在實施例中，贅瘤形成疫苗或免疫原性組合物係在第一次投與額外藥劑之前投與。在其他實施例中，贅瘤形成疫苗或免疫原性組合物係在第一次投與額外治療劑之後(例如，1、2、3、4、5、6、7、8、9、10、11、12、13、14天或更久)投與。在實施例中，贅瘤形成疫苗或免疫原性組合物係與第一次投與額外治療劑同時投與。

治療劑係例如化學治療劑或生物治療劑、輻射或免疫療法。可投與針對具體癌症之任何適宜治療性治療。化學治療劑及生物治療劑之實例包括(但不限於)血管生成抑制劑，例如羥基血管抑素K1-3、DL-α-二氟甲基-鳥胺酸、內皮抑素、煙麴黴素(fumagillin)、金雀異黃酮(genistein)、米諾四環素(minocycline)、星狀孢菌素(staurosporine)及沙利竇邁(thalidomide)；DNA嵌入劑/交聯劑，例如博來黴素(Bleomycin)、卡鉑、卡莫司汀(Carmustine)、氮芥苯丁酸(Chlorambucil)、環磷醯胺、順-二氯二胺鉑(II) (順鉑)、美法侖(Melphalan)、米托蒽醌(Mitoxantrone)及奧沙利鉑(Oxaliplatin)；DNA合成抑制劑，例如(±)-甲氨蝶呤(Amethopterin) (胺甲喋呤)、3-胺基-1,2,4-苯并三嗪1,4-二氧化物、胺喋呤(Aminopterin)、胞嘧啶β-D-呋喃阿拉伯糖苷、5-氟-5'-去氧尿苷、5-氟尿嘧啶、更昔洛韋(Ganciclovir)、羥基脲及絲裂黴素C；DNA-RNA轉錄調節劑，例如放線菌素D (Actinomycin D)、道諾黴素(Daunorubicin)、多柔比星、高三尖杉酯鹼(Homoharringtonine)及伊達比星(Idarubicin)；酶抑制劑，例如S(+)-喜樹鹼、薑黃素(Curcumin)、(-)-魚藤素((-)-Deguelin)、5,6-二氯苯并咪唑1-β-D-呋喃核糖苷、依託泊苷、福美坦(Formestane)、福司曲星(Fostriecin)、西司皮定(Hispidin)、2-亞胺基-1-咪唑啶乙酸(環肌酸)、莫維諾林(Mevinolin)、曲古抑菌素A (Trichostatin A)、酪胺酸磷酸化抑制劑AG 34及酪胺酸磷酸化抑制劑AG 879；基因調節劑，例如5-氮雜-2'-去氧胞苷、5-氮胞苷、膽鈣化醇(Cholecalciferol)(維生素 D3)、4-羥基他莫昔芬、褪黑激素、美服培酮(Mifepristone)、雷洛昔芬(Raloxifene)、所有反式-視黃醛(維生素A醛)、所有反式-視黃酸(維生素A酸)、9-順式-視黃酸、13-順式-視黃酸、視黃醇(維生素A)、他莫昔芬(Tamoxifen)及曲格列酮

(Troglitazone)；微管抑制劑，例如秋水仙鹼、多西他賽、多拉斯他汀15 (Dolastatin 15)、諾考達唑(Nocodazole)、太平洋紫杉醇、鬼臼毒素(Podophyllotoxin)、利索新(Rhizoxin)、長春鹼、長春新鹼(Vincristine)、長春地辛(Vindesine)及長春瑞濱(Vinorelbine) (溫諾平(Navelbine))；及未分類治療劑，例如17-(烯丙基胺基)-17-去甲氧基格爾德黴素、4-胺基-1,8-萘二甲醯亞胺、芹菜配質(Apigenin)、佈雷菲德菌素A (Brefeldin A)、希美替定(Cimetidine)、二氯亞甲基-二膦酸、柳培林(Leuprolide) (亮丙瑞林(Leuprorelin))、黃體促素釋放激素、皮斐松-α (Pifithrin-α)、雷帕黴素(Rapamycin)、性激素結合球蛋白、毒胡蘿蔔內酯(Thapsigargin)及尿胰蛋白酶抑制劑片段(比庫寧蛋白(Bikunin))。治療劑可為六甲蜜胺(altretamine)、阿米福汀(amifostine)、天冬醯胺酶、卡培他濱(capecitabine)、克拉屈濱(cladribine)、西沙比利(cisapride)、阿糖胞苷(cytarabine)、達卡巴嗪(dacarbazine) (DTIC)、放線菌素(dactinomycin)、四氫大麻酚(dronabinol)、依泊亭α (epoetin α)、非格司亭、氟達拉濱(fludarabine)、吉西他濱(gemcitabine)、格拉司瓊(granisetron)、異環磷醯胺、伊立替康(irinotecan)、蘭索拉唑(lansoprazole)、左旋咪唑(levamisole)、甲醯四氫葉酸(leucovorin)、甲地孕酮(megestrol)、美司鈉(mesna)、甲氧氯普胺(metoclopramide)、米托坦(mitotane)、奧美拉唑(omeprazole)、昂丹司瓊(ondansetron)、毛果芸香鹼(pilocarpine)、丙氯拉嗪(prochlorperazine)或托泊替康鹽酸鹽。治療劑可為單株抗體或小分子，例如利妥昔單抗(rituximab) (Rituxan®)、阿倫單抗(alemtuzumab) (Campath®)、貝伐珠單抗(Avastin®)、西妥昔單抗(Cetuximab) (Erbitux®)、帕尼單抗(panitumumab) (Vectibix®)及曲妥珠單抗(Herceptin®)、威羅菲尼(Zelboraf®)、甲磺酸伊馬替尼

(Gleevec®)、厄洛替尼(Tarceva®)、吉非替尼(Iressa®)、維莫德吉(Vismodegib) (Erivedge™)、90Y-替伊莫單抗(ibritumomab tiuxetan)、131I-托西莫單抗(tositumomab)、阿多-曲妥珠單抗艾坦辛(ado-trastuzumab emtansine)、拉帕替尼(lapatinib) (Tykerb®)、帕妥珠單抗(pertuzumab) (Perjeta™)、阿多-曲妥珠單抗艾坦辛(Kadcyla™)、瑞格菲尼(regorafenib) (Stivarga®)、舒尼替尼(Sutent®)、地諾單抗(Denosumab) (Xgeva®)、索拉菲尼(sorafenib) (Nexavar®)、帕唑帕尼(Votrient®)、阿西替尼(axitinib) (Inlyta®)、達沙替尼(dasatinib) (Sprycel®)、尼羅替尼(nilotinib) (Tasigna®)、伯舒替尼(bosutinib) (Bosulif®)、奧法木單抗(ofatumumab) (Arzerra®)、奧妥珠單抗(obinutuzumab) (Gazyva™)、依魯替尼(Imbruvica™)、艾代拉裡斯(idelalisib) (Zydelig®)、克唑替尼(crizotinib) (Xalkori®)、厄洛替尼(Tarceva®)、雙馬來酸鹽阿法替尼(afatinib dimaleate) (Gilotrif®)、色瑞替尼(ceritinib) (LDK378/Zykadia)、托西莫單抗及131I-托西莫單抗(Bexxar®)、替伊莫單抗(Zevalin®)、貝倫妥單抗維多汀(brentuximab vedotin) (Adcetris®)、硼替佐米(bortezomib) (Velcade®)、司妥昔單抗(siltuximab) (Sylvant™)、曲美替尼(trametinib) (Mekinist®)、達拉菲尼(dabrafenib) (Tafinlar®)、派姆單抗(pembrolizumab) (Keytruda®)、卡非佐米(carfilzomib) (Kyprolis®)、雷莫蘆單抗(Ramucirumab) (Cyramza™)、卡博替尼(Cabozantinib) (Cometriq™)、凡德他尼(vandetanib) (Caprelsa®)。視情況，治療劑係新抗原。治療劑可為細胞介素，例如干擾素(INF)、介白素(IL)或造血生長因子。治療劑可為INF-α、IL-2、阿地介白素(Aldesleukin)、IL-2、促紅血球生成素、顆粒球-巨噬細胞群落刺激因子(GM-CSF)或顆粒球群落刺激因子。治療劑可為靶向療法，例如托瑞米芬(toremifene) (Fareston®)、氟維司群

(fulvestrant) (Faslodex®)、阿那曲唑(anastrozole) (Arimidex®)、依西美坦(exemestane) (Aromasin®)、來曲唑(letrozole) (Femara®)、ziv-阿柏西普(ziv-aflibercept) (Zaltrap®)、阿曲諾英(Alitretinoin) (Panretin®)、替西羅莫司(temsirolimus) (Torisel®)、維甲酸(Tretinoin) (Vesanoid®)、地尼白介素2 (denileukin diftitox) (Ontak®)、伏立諾他(vorinostat) (Zolinza®)、羅米地辛(romidepsin) (Istodax®)、貝沙羅汀(bexarotene) (Targretin®)、普拉曲沙(pralatrexate) (Folotyn®)、雷利竇邁(lenaliomide) (Revlimid®)、貝林司他(belinostat) (Beleodaq™)、雷利竇邁(Revlimid®)、泊馬竇邁(pomalidomide) (Pomalyst®)、卡巴他賽(Cabazitaxel) (Jevtana®)、恩雜魯胺(enzalutamide) (Xtandi®)、乙酸阿比特龍(abiraterone acetate) (Zytiga®)、氯化鐳223 (Xofigo®)或依維莫司(everolimus) (Afinitor®)。另外，治療劑可為後生靶向藥物，例如HDAC抑制劑、激酶抑制劑、DNA甲基轉移酶抑制劑、組織蛋白去甲基酶抑制劑或組織蛋白甲基化抑制劑。後生藥物可為阿紮胞苷(Azacitidine) (Vidaza)、地西他濱(Decitabine) (Dacogen)、伏立諾他(Zolinza)、羅米地辛(Istodax)或魯索替尼(Ruxolitinib) (Jakafi)。對於前列腺癌治療，可與抗CTLA-4組合之較佳化學治療劑係太平洋紫杉醇(TAXOL)。

在某些實施例中，一或多種額外藥劑係一或多種抗糖皮質激素誘導之腫瘤壞死因子家族受體(GITR)激動性抗體。GITR係T淋巴球之共刺激分子，調節先天及適應性免疫系統且已發現其參與多種免疫反應及發炎過程。GITR最初在自經地塞米松處理之鼠類T細胞雜交瘤選殖後由Nocentini等人闡述(Nocentini等人，Proc Natl Acad Sci USA 94:6216–6221.1997)。與CD28及CTLA-4不同，GITR在天然CD4+及CD8+ T細胞上具有極低基礎表現(Ronchetti等人，Eur J Immunol

34:613–622. 2004)。觀察到GITR刺激在活體外具有免疫刺激效應且在活體內誘導自身免疫性，此促進對觸發此路徑之抗腫瘤功效之研究。關於調節Ctla 4及Gitr用於癌症免疫療法之綜述可參見Cancer Immunology and Immunotherapy (Avogadri等人，Current Topics in Microbiology and Immunology 344. 2011)。可有助於緩解免疫抑制之其他藥劑包括靶向CD28/CTLA4 Ig超家族之另一成員(例如BTLA、LAG3、ICOS、PDL1或KIR)之檢查點抑制劑(Page等人，Annual Review of Medicine 65:27 (2014))。在其他實施例中，檢查點抑制劑靶向TNFR超家族之成員，例如CD40、OX40、CD137、GITR、CD27或TIM-3。在一些情形中，靶向檢查點抑制劑習用抑制性抗體或類似分子來完成。在其他情形中，其可用靶之激動劑來完成；此類別之實例包括刺激性靶OX40及GITR。

在某些實施例中，一或多種額外藥劑具有協同性此乃因其在處理後增加免疫原性。在一個實施例中，由於額外治療劑或本文所述組合療法之任何組份之較低劑量，額外藥劑容許較低毒性及/或較低不適。在另一實施例中，額外藥劑導致較長壽命，此乃因增加本文所述組合療法之有效性。已綜述增強患者之免疫反應之化學治療性治療(Zitvogel等人，Immunological aspects of cancer chemotherapy. Nat Rev Immunol. 2008 Jan;8(1):59-73)。另外，化學治療劑可用免疫療法安全投與而不抑制疫苗特異性T細胞反應(Perez等人，A new era in anticancer peptide vaccines. Cancer May 2010)。在一個實施例中，投與額外藥劑以提高本文所述療法之效能。在一個實施例中，額外藥劑係化學療法治療。在一個實施例中，低劑量之化學療法產生延遲型過敏性(DTH)反應。在一個實施例中，化學治療劑靶向調節性T細胞。在一個實施例中，環磷醯胺係治療劑。在一個實施例中，環磷醯胺係

在疫苗接種之前投與。在一個實施例中，環磷醯胺係在疫苗接種之前作為單一劑量投與(Walter等人，Multipeptide immune response to cancer vaccine IMA901 after single-dose cyclophosphamide associates with longer patient survival. Nature Medicine；18:8 2012)。在另一實施例中，環磷醯胺係根據節拍器式程式投與，其中經一個月投與每日劑量(Ghiringhelli等人，Metronomic cyclophosphamide regimen selectively depletes CD4+CD25+ regulatory T cells and restores T and NK effector functions in end stage cancer patients. Cancer Immunol Immunother 2007 56:641–648)。在另一實施例中，在疫苗接種之前投與紫杉烷已增強T細胞及NK細胞功能(Zitvogel等人，2008)。在另一實施例中，低劑量之化學治療劑係與本文所述療法一起投與。在一個實施例中，化學治療劑係雌氮芥。在一個實施例中，癌症係激素難治性前列腺癌。在8.7%之僅投與個人化疫苗接種之晚期激素難治性前列腺癌患者中觀察到血清前列腺特異性抗原(PSA)減少≥50%，而在54%之個人化疫苗接種與低劑量之雌氮芥組合投與之患者中觀察到此一減少(Itoh等人，Personalized peptide vaccines: A new therapeutic modality for cancer. Cancer Sci 2006；97: 970-976)。在另一實施例中，糖皮質激素係與本文所述療法一起投與或在其之前投與(Zitvogel等人，2008)。在另一實施例中，在本文所述療法之後投與糖皮質激素。在另一實施例中，吉西他濱在本文所述療法之前、同時或之後投與以提高腫瘤特異性CTL前體之頻率(Zitvogel等人，2008)。在另一實施例中，5-氟尿嘧啶係與本文所述療法一起投與，此乃因觀察到與基於肽之疫苗具有協同效應(Zitvogel等人，2008)。在另一實施例中，使用Braf之抑制劑(例如威羅菲尼)作為額外藥劑。已顯示Braf抑制可與所治療患者之腫瘤中之黑色素瘤抗原表現及T細胞浸潤之增加以及

免疫抑制細胞介素之減少相關(Frederick等人，BRAF inhibition is associated with enhanced melanoma antigen expression and a more favorable tumor microenvironment in patients with metastatic melanoma. Clin Cancer Res. 2013；19:1225-1231)。在另一實施例中，使用酪胺酸激酶之抑制劑作為額外藥劑。在一個實施例中，酪胺酸激酶抑制劑係在用本文所述療法疫苗接種之前使用。在一個實施例中，酪胺酸激酶抑制劑係與本文所述療法同時使用。在另一實施例中，使用酪胺酸激酶抑制劑產生免疫更寬容之環境。在另一實施例中，酪胺酸激酶抑制劑係舒尼替尼或甲磺酸伊馬替尼。先前已顯示，可藉由依序投與舒尼替尼及重組疫苗之連續每日給藥來達成有利結果(Farsaci等人，Consequence of dose scheduling of sunitinib on host immune response elements and vaccine combination therapy. Int J Cancer; 130: 1948-1959)。亦已顯示舒尼替尼可使用50 mg/日之日劑量逆轉1型免疫抑制(Finke等人，Sunitinib Reverses Type-1 Immune Suppression and Decreases T-Regulatory Cells in Renal Cell Carcinoma Patients. Clin Cancer Res 2008;14(20))。在另一實施例中，靶向療法與本文所述療法組合投與。先前已闡述靶向療法之劑量(Alvarez, Present and future evolution of advanced breast cancer therapy. Breast Cancer Research 2010, 12(增刊2):S1)。在另一實施例中，替莫唑胺係與本文所述療法一起投與。在一個實施例中，替莫唑胺係以200 mg/日投與，每四週之與本文所述療法之組合療法投與5天。已顯示類似策略之結果具有低毒性(Kyte等人，Telomerase Peptide Vaccination Combined with Temozolomide: A Clinical Trial in Stage IV Melanoma Patients. Clin Cancer Res; 17(13) 2011)。在另一實施例中，該療法係與導致淋巴球減少症之額外治療劑一起投與。在一個實施例中，額外藥劑係替莫唑

胺。在該等條件下仍可誘導免疫反應(Sampson等人，Greater chemotherapy-induced lymphopenia enhances tumor-specific immune responses that eliminate EGFRvIII-expressing tumor cells in patients with glioblastoma. Neuro-Oncology 13(3):324-333, 2011)。

有需要之患者可接受一系列使用腫瘤特異性肽之混合物之啟動疫苗接種。另外，經4週時間之啟動後可在維持期期間進行兩次加強。所有疫苗接種皆係皮下遞送。評估疫苗或免疫原性組合物在患者中之安全性、耐受性、免疫反應及臨床效應以及產生疫苗或免疫原性組合物且在適當時間範圍內順利起始疫苗接種之可行性。第一隊列可由5名患者組成，且在充分證實安全性之後，另一隊列之10名患者可入選。廣泛監測末梢血之肽特異性T細胞反應且跟蹤患者長達2年以評價疾病復發。

投與符合照護標準之組合療法

在另一態樣中，本文所述療法提供選擇適當點來投與與有需要之患者之所治療癌症之照護標準相關且在該照護標準內之組合療法。本文所述研究顯示，組合療法可甚至在包括手術、輻射或化學療法之照護標準內有效投與。大多數常見癌症之照護標準可參見國家癌症研究院網站(www.cancer.gov/cancertopics)。照護標準係醫學專家接受作為某一類型疾病之適當治療且為保健專業人員廣泛使用的當前治療。照護標準亦稱為最佳實踐、標準醫療照護及標準療法。癌症之照護標準一般包括手術、淋巴結移除、輻射、化學療法、靶向療法、靶向腫瘤之抗體及免疫療法。免疫療法可包括檢查點阻斷劑(CBP)、嵌合抗原受體(CAR)及過繼性T細胞療法。本文所述組合療法可在照護標準內納入。本文所述組合療法亦可在照護標準已因醫學進展而變化之情況下投與。

本文所述組合療法之納入可取決於照護標準中可導致免疫系統活化之治療步驟。本文已闡述可活化組合療法並與該組合療法協同作用之治療步驟。該療法可有利地與活化免疫系統之治療同時投與或在其之後投與。

本文所述組合療法之納入可取決於照護標準中引起免疫系統被抑制之治療步驟。該等治療步驟可包括輻照、高劑量之烷基化劑及/或胺甲喋呤、類固醇(例如類皮質醣)、手術(例如用於移除淋巴結)、甲磺酸伊馬替尼、高劑量之TNF及紫杉烷(Zitvogel等人，2008)。組合療法可在該等步驟之前投與或可在其之後投與。

在一個實施例中，組合療法可在骨髓移植及末梢血幹細胞移植後投與。骨髓移植及末梢血幹細胞移植係恢復因高劑量之化學療法及/或輻射療法受到破壞之幹細胞之程序。在經高劑量抗癌藥物及/或輻射治療後，患者接受所收穫之幹細胞，其移行至骨髓且開始產生新血球。「袖珍移植」使用毒性較小之較低劑量之化學療法及/或輻射來製備患者之移植物。「二次移植」涉及兩次高劑量化學療法及幹細胞移植之依序過程。在自體移植中，患者接受其自身之幹細胞。在同基因移植中，患者接受來自其同卵雙胞胎之幹細胞。在同種異體移植中，患者接受來自其兄弟、姊妹或父母之幹細胞。亦可使用與患者無關之人(無關供體)。在一些類型之白血病中，在同種異體BMT及PBSCT後發生之移植物抗腫瘤(GVT)效應對治療有效性至關重要。在來自供體(移植物)之白血球將在化學療法及/或輻射療法後保留在患者體內之癌細胞(腫瘤)鑑別為外來細胞並攻擊該等癌細胞時，GVT發生。使用本文所述組合療法之免疫療法可藉由在移植後疫苗接種利用此效應。另外，經轉染細胞可在移植前經本文所述組合療法之新抗原呈遞。

在一個實施例中，將組合療法投與患有需要手術之癌症之有需要之患者。在一個實施例中，將本文所述組合療法投與患有癌症之有需要之患者，該癌症之照護標準主要係手術後治療以移除可能的微小轉移，例如乳癌。乳癌一般係基於癌症之階段及等級藉由手術、輻射療法、化學療法及激素療法之各種組合來治療。乳癌之輔助療法係在主要療法後給予之任何用於增大長期存活機會之治療。前導性療法係在主要療法之前給予之治療。乳癌之輔助療法係在主要療法後給予之任何用於增大長期無疾病存活之機會之治療。主要療法係用於減小或消除癌症之主要治療。乳癌之主要療法通常包括手術，即乳房切除術(移除乳房)或乳房腫瘤切除術(移除腫瘤及其周圍少量正常組織之手術；一類保留乳房之手術)。在任一類型之手術期間，亦移除一或多個附近淋巴結以觀察癌細胞是否已擴散至淋巴系統。在女性進行保留乳房之手術時，主要療法幾乎總是包括輻射療法。即使在早期乳癌中，細胞亦可脫離原發性腫瘤並擴散至身體其他部分(轉移)。因此，醫生給予輔助療法來殺傷任何已擴散之癌細胞，即使藉由成像或實驗室測試無法檢測到該等已擴散癌細胞。

在一個實施例中，投與符合導管原位癌(DCIS)之照護標準之組合療法。此乳癌類型之照護標準係：

1. 保留乳房之手術及輻射療法，使用或不使用他莫昔芬。
2. 完全乳房切除術，使用或不使用他莫昔芬。
3. 保留乳房之手術，不使用輻射療法。

組合療法可在保留乳房之手術或完全乳房切除術之前投與以在手術前縮小腫瘤。在另一實施例中，組合療法可作為輔助療法投與以移除任何殘留癌細胞。

在另一實施例中，用如本文所述之組合療法治療經診斷患有I

期、II期、IIIA期及可手術IIIC期乳癌之患者。此乳癌類型之照護標準係：

1. 局部區域治療：

● 保留乳房之療法(乳房腫瘤切除術、乳房輻射及腋淋巴結手術分期)。

● 改良型根治性乳房切除術(移除完整乳房及I-II級腋窩廓清)，進行或不進行乳房重構。

● 前哨淋巴結生檢。

2. 腋窩淋巴結陽性腫瘤中之乳房切除術後輔助輻射療法：

● 對於1至3個淋巴結：區域輻射之不明確作用(鎖骨下/鎖骨上淋巴結、內乳淋巴結、腋窩淋巴結及胸壁)。

● 對於4個以上淋巴結或結外涉及：建議區域輻射。

3. 輔助全身性療法

在一個實施例中，投與組合療法作為前導性療法以縮小腫瘤。在另一實施例中，投與組合作為輔助全身性療法。

在另一實施例中，用如本文所述之組合療法治療經診斷患有不可手術之IIIB期或IIIC期或發炎性乳癌之患者。此乳癌類型之照護標準係：

1. 以治癒性目的遞送之多科性療法係患有臨床IIIB期疾病之患者之照護標準。

2. 首次手術通常限於生檢以允許測定組織學、雌激素-受體(ER)及助孕酮-受體(PR)含量及人類表皮生長因子受體2 (HER2/neu)過表現。使用基於蒽環之化學療法及/或基於紫杉烷之療法之首次治療係標準。對於對前導性化學療法有反應之患者，局部療法可由完全乳房切除術及腋窩淋巴結廓清及之後針對胸壁及局部淋巴之手術後輻射

療法組成。在對前導性化學療法具有良好的部分或完全反應之患者中可考慮保留乳房之療法。後續全身性療法可由另一化學療法組成。應將激素療法投與腫瘤為ER陽性或未知之患者。所有患者皆應視為臨床試驗之候選者以評估投與多科性方案之各種組份之最適當方式。

在一個實施例中，投與組合療法作為多科性方案之各種組份之一部分。在另一實施例中，組合療法係在多科性方案之前、與其同時或在其之後投與。在另一實施例中，組合療法係基於多科之間之協同作用來投與。在另一實施例中，組合療法係在用基於蒽環之化學療法及/或基於紫杉烷之療法治療後投與(Zitvogel等人，2008)。投與組合療法後之治療可對區分效應物T細胞產生負面影響。組合療法亦可在輻射後投與。

在另一實施例中，本文所述之組合療法用於治療照護標準主要並非手術且主要基於全身治療之癌症，例如慢性淋巴球性白血病(CLL)。

在另一實施例中，用如本文所述之組合療法治療經診斷患有I期、II期、III期及IV期慢性淋巴球性白血病之患者。此癌症類型之照護標準係：

1. 觀察無症狀或受影響極小之患者
2. 利妥昔單抗
3. 奧法木單抗
4. 口服烷基化劑，含有或不含有皮質類固醇
5. 氟達拉濱、2-氯去氧腺苷或噴司他汀
6. 苯達莫司汀(Bendamustine)
7. 雷利竇邁
8. 組合化學療法。

組合化學療法方案包括以下：

○ 氟達拉濱加環磷醯胺加利妥昔單抗。

○ 氟達拉濱加利妥昔單抗，如在CLB-9712及CLB-9011試驗中所見。

○ 氟達拉濱加環磷醯胺對氟達拉濱加環磷醯胺加利妥昔單抗。

○ 噴司他汀加環磷醯胺加利妥昔單抗，例如如在MAYO-MC0183試驗中所見。

○ 奧法木單抗加氟達拉濱加環磷醯胺。

○ CVP：環磷醯胺加長春新鹼加普賴松。

○ CHOP：環磷醯胺加多柔比星加長春新鹼加普賴松。

○ 氟達拉濱加環磷醯胺對氟達拉濱，例如如在E2997試驗[NCT00003764]及LRF-CLL4試驗中所見。

○ 氟達拉濱加氮芥苯丁酸，例如如在CLB-9011試驗中所見。

9. 累及野輻射療法。

10. 阿倫單抗

11. 骨髓及周圍幹細胞移植處於臨床評估中。

12. 依魯替尼

在一個實施例中，組合療法係在使用利妥昔單抗或奧法木單抗之治療之前、與其同時或在其之後投與。由於該等療法係靶向B細胞之單株抗體，使用組合療法之治療可係協同治療。在另一實施例中，組合療法係在使用含有或不含有皮質類固醇及氟達拉濱、2-氯去氧腺苷或噴司他汀之經口烷基化劑之治療後投與，此乃因該等治療若在之前投與可對免疫系統系統造成負面影響。在一個實施例中，苯達莫司汀係基於本文所述之前列腺癌之結果以低劑量與組合療法一起投與。在一個實施例中，組合療法係在使用苯達莫司汀之治療之後投與。

在另一實施例中，靶向包括細胞外結構域之基因中之特定頻發突變之療法用於治療患有癌症之有需要之患者中。該等基因可有利地為表現良好之基因。表現良好可表述為「每百萬轉錄物」 (TPM)。TPM大於100視為表現良好。表現良好之基因可為FGFR3、ERBB3、EGFR、MUC4、PDGFRA、MMP12、TMEM52及PODXL。該等療法可為能結合至細胞外新抗原表位之配體。該等配體為業內所熟知且可包括治療性抗體或其片段、抗體-藥物偶聯物、經改造T細胞或適配體。經改造T細胞可為嵌合抗原受體(CAR)。抗體可經完全人類化、人類化或嵌合。抗體片段可為奈米抗體、Fab、Fab'、(Fab')2、Fv、ScFv、雙價抗體、三價抗體、四價抗體、雙-scFv、微小抗體、Fab2或Fab3片段。抗體可使用業內已知技術針對腫瘤特異性新表位來研發。

過繼性細胞轉移(ACT)

本發明之多個態樣涉及對所選抗原(例如腫瘤相關抗原)具有特異性之免疫系統細胞(例如T細胞)之過繼性轉移(參見Maus等人，2014, Adoptive Immunotherapy for Cancer or Viruses, Annual Review of Immunology，第32卷: 189-225；Rosenberg及Restifo, 2015, Adoptive cell transfer as personalized immunotherapy for human cancer, Science 第348卷第6230期第62-68頁；Restifo等人，2015, Adoptive immunotherapy for cancer: harnessing the T cell response. Nat. Rev. Immunol. 12(4): 269-281；及Jenson及Riddell，2014, Design and implementation of adoptive therapy with chimeric antigen receptor-modified T cells. Immunol Rev. 257(1): 127-144)。可採用例如多種策略藉由改變T細胞受體(TCR)之特異性來對T細胞進行遺傳修飾，例如藉由引入具有所選肽特異性之新TCR α及β鏈來改變其特異性(參見美

國專利第8,697,854號；PCT專利公開案：WO2003020763、WO2004033685、WO2004044004、WO2005114215、WO2006000830、WO2008038002、WO2008039818、WO2004074322、WO2005113595、WO2006125962、WO2013166321、WO2013039889、WO2014018863、WO2014083173；美國專利第8,088,379號)。

作為TCR修飾之替代或或補充，可使用嵌合抗原受體(CAR)以用眾多種已闡述之受體嵌合體構築體生成對所選靶(例如惡性細胞)具有特異性之免疫反應細胞(例如T細胞)(參見美國專利第5,843,728號、第5,851,828號、第5,912,170號、第6,004,811號、第6,284,240號、第6,392,013號、第6,410,014號、第6,753,162號、第8,211,422號及PCT公開案WO9215322)。替代CAR構築體之特徵可為屬連續世代。第一代CAR通常由對抗原具有特異性之抗體之單鏈可變片段組成，例如包含特定抗體之連接至V_H之V_L，其藉由撓性連接體、例如藉由CD8α鉸鏈結構域及CD8α跨膜結構域連接至CD3ζ或FcRγ之跨膜及細胞內信號傳導結構域(scFv-CD3ζ或scFv-FcRγ；參見美國專利第7,741,465號；美國專利第5,912,172號；美國專利第5,906,936號)。第二代CAR納入一或多種共刺激分子之細胞內結構域，例如CD28、OX40 (CD134)或4-1BB (CD137)在胞內結構域內(例如scFv-CD28/OX40/4-1BB-CD3ζ；參見美國專利第8,911,993號、第8,916,381號、第8,975,071號、第9,101,584號、第9,102,760號、第9,102,761號)。第三代CAR包括共刺激胞內結構域、例如CD3ζ-鏈、CD97、GDI la-CD18、CD2、ICOS、CD27、CD154、CDS、OX40、4-1BB或CD28信號傳導結構域之組合(例如scFv-CD28-4-1BB-CD3ζ或scFv-CD28-OX40-CD3ζ；參見美國專利第8,906,682號；美國專利第8,399,645號；美國專利第5,686,281

號；PCT公開案第WO2014134165號；PCT公開案第WO2012079000號)。或者，共刺激可藉由在抗原特異性T細胞中表現CAR來編排，經選擇以在嚙合其天然αβTCR後例如藉由專職性抗原呈遞細胞上之抗原來活化及擴增，且伴隨共刺激。另外，可在免疫反應細胞上提供其他經改造受體，以例如改良T細胞攻擊之靶向及/或最小化副作用。

可使用替代技術來轉變靶免疫反應細胞，例如原生質體融合、脂轉染、轉染或電穿孔。可使用眾多種載體，例如反轉錄病毒載體、慢病毒載體、腺病毒載體、腺相關病毒載體、質體或轉位子，例如睡美人(Sleeping Beauty)轉位子(參見美國專利第6,489,458號、第7,148,203號、第7,160,682號、第7,985,739號、第8,227,432號)可用於例如使用第2代抗原特異性CAR信號傳導經由CD3ζ及CD28或CD137引入CAR。病毒載體可例如包括基於HIV、SV40、EBV、HSV或BPV之載體。

針對轉變靶向之細胞可例如包括T細胞、天然殺傷(NK)細胞、細胞毒性T淋巴球(CTL)、調節性T細胞、人類胚胎幹細胞、腫瘤浸潤性淋巴球(TIL)或可自其分化淋巴樣細胞之多潛能幹細胞。表現期望CAR之T細胞可例如經由與γ-輻照活化並繁殖之細胞(AaPC)共培養來選擇，其共表現癌症抗原及共刺激分子。經改造CAR T細胞可藉由在AaPC上在諸如IL-2及IL-21等可溶性因子存在下共培養來擴增。例如可實施此擴增以提供記憶CAR+ T細胞(其可例如藉由非酶數位陣列及/或多面板流式細胞術來分析)。以此方式，可提供具有針對具有抗原之腫瘤之特異性細胞毒性活性(視情況結合期望趨化介素(例如干擾素-γ)之產生)之CAR T細胞。此類CAR T細胞可例如用於動物模型，例如用於治療腫瘤異種移植。

諸如上述等方法可經調整以提供藉由例如投與有效量之免疫反

應細胞來治療患有疾病(例如贅瘤形成)之個體及/或提高該個體之存活率之方法，該免疫反應細胞包含結合所選抗原之抗原識別受體，其中該結合活化該免疫反應細胞，由此治療或預防該疾病(例如贅瘤形成、病原體感染、自體免疫病症或同種異體移植反應)。

在一個實施例中，可將治療投與經歷免疫抑制治療之患者。可使細胞或細胞群體由於編碼免疫抑制劑之受體之基因之不活化而抵抗至少一種免疫抑制劑。不受限於理論，免疫抑制治療應有助於患者體內本發明之免疫反應細胞或T細胞之選擇及擴增。

本發明之細胞或細胞群體之投與可以便捷方式實施，包括氣溶膠吸入、注射、攝取、轉輸、植入或移植。可將細胞或細胞群體經皮下、真皮內、腫瘤內、結內、髓內、肌內、藉由靜脈內或淋巴內注射或腹膜內投與患者。在一個實施例中，本發明之細胞組合物較佳藉由靜脈內注射投與。

細胞或細胞群體之投與可由10^4-10^9個細胞/kg體重、較佳10^5至10^6個細胞/kg體重(包括彼等範圍內之細胞數之所有整數值)之投與組成。CAR T細胞療法中之給藥可例如涉及投與10^6至10^9個細胞/kg，伴隨或不伴隨例如使用環磷醯胺之淋巴清除過程。細胞或細胞群體可以一或多次劑量投與。在另一實施例中，有效量之細胞係作為單一劑量投與。在另一實施例中，有效量之細胞係作為一次以上劑量經一段時間投與。投與之定時由管理醫師來判斷且取決於患者之臨床狀況。細胞或細胞群體可得自任何來源，例如血庫或供體。儘管個體需求各不相同，但具體疾病或病況之給定細胞類型之有效量的最佳範圍的確定為熟習此項技術者所熟知。有效量意指提供治療性或預防性益處之量。所投與劑量將取決於接受者之年齡、健康及體重、並行治療(若存在)之種類、治療頻率及所期望效應之性質。

在另一實施例中，有效量之細胞或包含彼等細胞之組合物係非經腸投與。該投與可為靜脈內投與。該投與可藉由在腫瘤內注射直接實施。

為防止可能的不良反應，經改造免疫反應細胞可配備有轉基因安全開關，其呈使細胞易受暴露於特定信號之攻擊之轉基因的形式。舉例而言，單純皰疹病毒胸苷激酶(TK)基因可以此方式使用，例如在幹細胞移植後引入用作供體淋巴球輸注物之同種異體T淋巴球中(Greco等人，Improving the safety of cell therapy with the TK-suicide gene. Front. Pharmacol. 2015；6: 95)。在該等細胞中，投與核苷前藥(例如更昔洛韋或阿昔洛韋)引起細胞死亡。替代安全開關構築體包括可誘導半胱天冬酶9，例如因投與小分子二聚體而被觸發，該小分子二聚體將兩個無功能icasp9分子聚合在一起形成活性酶。已闡述眾多種用於實踐細胞增殖控制之替代方法(參見美國專利公開案第20130071414號；PCT專利公開案WO2011146862；PCT專利公開案WO2014011987；PCT專利公開案WO2013040371；Zhou等人，BLOOD, 2014, 123/25:3895 - 3905；Di Stasi等人，The New England Journal of Medicine 2011；365:1673-1683；Sadelain M, The New England Journal of Medicine 2011；365:1735-173；Ramos等人，Stem Cells 28(6):1107-15 (2010))。

在過繼性療法之進一步精製中，可使用基因體編輯來使免疫反應細胞適應替代性實踐，例如提供經編輯CAR T細胞(參見Poirot等人，2015, Multiplex genome edited T-cell manufacturing platform for "off-the-shelf" adoptive T-cell immunotherapies, Cancer Res 75 (18): 3853)。細胞可使用任何DNA靶向蛋白來編輯，包括但不限於如業內已知之CRISPR系統、鋅指結合蛋白、TALE或TALEN。可藉由業內已

知之任一方法將DNA靶向蛋白遞送至免疫細胞。在較佳實施例中，細胞係離體編輯並轉移至有需要之個體中。免疫反應細胞CAR T細胞或用於過繼性細胞轉移之任何細胞可經編輯。可實施編輯以消除潛在的同種異體反應性T細胞受體(TCR)，破壞化學治療劑之靶，阻斷免疫檢查點，活化T細胞及/或促進功能衰竭或功能障礙之CD8+ T細胞之分化及/或增殖(參見PCT專利公開案：WO2013176915、WO2014059173、WO2014172606、WO2014184744及WO2014191128)。編輯可導致基因不活化。

藉由使基因不活化，目標基因意欲不以功能蛋白質形式來表現。在具體實施例中，CRISPR系統特異性催化一種所靶向基因中之裂解，由此使該所靶向基因不活化。所引起之核酸鏈斷裂一般經由同源重組或非同源末端接合(NHEJ)之獨特機制來修復。然而，NHEJ係不完善之修復過程，其通常導致裂解位點處之DNA序列變化。經由非同源末端接合(NHEJ)修復通常導致小型插入或缺失(Indel)且可用於產生特異性基因剔除。其中已發生裂解誘導誘變事件之細胞可藉由業內熟知之方法鑑別及/或選擇。

T細胞受體(TCR)係參與T細胞因應抗原呈遞之活化之細胞表面受體。TCR通常係自雙鏈α及β製得，其組裝形成異二聚體並與CD3-轉導亞單位結合形成存於細胞表面上之T細胞受體複合體。TCR之α及β鏈各自由免疫球蛋白樣N-末端可變(V)及恆定(C)區、疏水跨膜結構域及短胞質區組成。對於免疫球蛋白分子，α及β鏈之可變區係藉由V(D)J重組來生成，其在T細胞群體內產生眾多種抗原特異性。然而，與識別完整抗原之免疫球蛋白不同，T細胞係由結合MHC分子之經處理肽片段活化，該MHC分子將額外維度引入T細胞之抗原識別中，稱為MHC限制。經由T細胞受體對供體與接受者之間之MHC差異之識別導

致T細胞增殖及移植抗宿主病(GVHD)之潛在發展。TCRα或TCRβ之不活化可導致自T細胞表面消除TCR，此妨礙同種異體抗原之識別，且從而妨礙對GVHD之識別。然而，TCR破壞通常導致消除CD3信號傳導組份且改變進一步擴增T細胞之方式。

同種異體細胞迅速被宿主免疫系統排斥。已顯示，存於未經輻照之血液產物中之同種異體白血球將持續不超過5至6天(Boni, Muranski等人，2008 Blood 1；112(12):4746-54)。因此，為防止同種異體細胞之排斥，通常不得不將宿主之免疫系統抑制至某一程度。然而，在過繼性細胞轉移之情形中，使用免疫抑制藥物對所引入之治療性T細胞亦具有有害效應。因此，為在該等情況中有效使用過繼性免疫療法，所引入細胞將需要可抵抗免疫抑制治療。因此，在具體實施例中，本發明進一步包含修飾T細胞以使其對免疫抑制劑具有抗性之步驟，較佳藉由使至少一種編碼免疫抑制劑之靶之基因不活化來修飾。免疫抑制劑係藉由若干種作用機制中之一種抑制免疫功能之藥劑。免疫抑制劑可為但不限於鈣調神經磷酸酶抑制劑、雷帕黴素之靶、介白素-2受體α-鏈阻斷劑、肌苷一磷酸去氫酶抑制劑、二氫葉酸還原酶抑制劑、皮質類固醇或免疫抑制抗代謝物。本發明容許藉由使T細胞中免疫抑制劑之靶不活化將免疫抑制抗性賦予用於免疫療法之T細胞。作為非限制性實例，免疫抑制劑之靶可為免疫抑制劑之受體，例如：CD52、糖皮質激素受體(GR)、FKBP家族基因成員及親環素家族基因成員。

免疫檢查點係減慢或停止免疫反應且防止免疫細胞之失控活性造成過多組織損傷之抑制性路徑。在某些實施例中，所靶向之免疫檢查點係程式性死亡-1 (PD-1或CD279)基因(*PDCD1*)。在其他實施例中，所靶向之免疫檢查點係細胞毒性T-淋巴球相關抗原(CTLA-4)。在

其他實施例中，所靶向之免疫檢查點係CD28及CTLA4 Ig超家族之另一成員，例如BTLA、LAG3、ICOS、PDL1或KIR。在其他實施例中，所靶向之免疫檢查點係TNFR超家族之成員，例如CD40、OX40、CD137、GITR、CD27或TIM-3。

其他免疫檢查點包括含有Src同源性2結構域之蛋白質酪胺酸磷酸酶1 (SHP-1) (Watson HA等人，SHP-1: the next checkpoint target for cancer immunotherapy? Biochem Soc Trans. 2016年4月15日；44(2):356-62)。SHP-1係廣泛表現之抑制性蛋白質酪胺酸磷酸酶(PTP)。在T細胞中，其係抗原依賴性活化及增殖之負調節劑。其係胞質蛋白，且因此不適於抗體介導之療法，但其在活化及增殖中之作用使其在過繼性轉移策略(例如嵌合抗原受體(CAR) T細胞)中成為有吸引力之遺傳操縱靶。免疫檢查點亦可包括具有Ig及ITIM結構域之T細胞免疫受體(TIGIT/Vstm3/WUCAM/VSIG9)及VISTA (Le Mercier I等人(2015) Beyond CTLA-4 and PD-1, the generation Z of negative checkpoint regulators. Front. Immunol. 6:418)。

WO2014172606係關於使用MT1及/或MT1抑制劑促進耗竭CD8+ T細胞之增殖及/或活性及降低CD8+ T細胞耗竭(例如，減少功能性耗竭之或無反應性CD8+免疫細胞)。在某些實施例中，藉由過繼性轉移之T細胞中之基因編輯靶向金屬硫蛋白。

在某些實施例中，基因編輯之靶可為至少一個參與免疫檢查點蛋白之表現之所靶向基因座。該等靶可包括但不限於CTLA4、PPP2CA、PPP2CB、PTPN6、PTPN22、PDCD1、ICOS (CD278)、PDL1、KIR、LAG3、HAVCR2、BTLA、CD160、TIGIT、CD96、CRTAM、LAIR1、SIGLEC7、SIGLEC9、CD244 (2B4)、TNFRSF10B、TNFRSF10A、CASP8、CASP10、CASP3、CASP6、

CASP7、FADD、FAS、TGFBRII、TGFRBRI、SMAD2、SMAD3、SMAD4、SMAD10、SKI、SKIL、TGIF1、IL10RA、IL10RB、HMOX2、IL6R、IL6ST、EIF2AK4、CSK、PAG1、SIT1、FOXP3、PRDM1、BATF、VISTA、GUCY1A2、GUCY1A3、GUCY1B2、GUCY1B3、MT1、MT2、CD40、OX40、CD137、GITR、CD27、SHP-1或TIM-3。在較佳實施例中，靶向PD-1或CTLA-4基因之表現中所涉及之基因座。在其他較佳實施例中，靶向基因組合，例如但不限於PD-1及TIGIT。

在其他實施例中，編輯至少兩種基因。基因對可包括但不限於PD1及TCRα、PD1及TCRβ、CTLA-4及TCRα、CTLA-4及TCRβ、LAG3及TCRα、LAG3及TCRβ、Tim3及TCRα、Tim3及TCRβ、BTLA及TCRα、BTLA及TCRβ、BY55及TCRα、BY55及TCRβ、TIGIT及TCRα、TIGIT及TCRβ、B7H5及TCRα、B7H5及TCRβ、LAIR1及TCRα、LAIR1及TCRβ、SIGLEC10及TCRα、SIGLEC10及TCRβ、2B4及TCRα、2B4及TCRβ。

不論在T細胞之遺傳修飾之前抑或之後，T細胞通常可使用如例如以下案件中所述之方法活化並擴增：美國專利6,352,694；6,534,055；6,905,680；5,858,358；6,887,466；6,905,681；7,144,575；7,232,566；7,175,843；5,883,223；6,905,874；6,797,514；6,867,041；及7,572,631。T細胞在活體外或活體內擴增。

選擇最有可能受益於療法之患者群體

在另一態樣中，本發明提供選擇最有可能受益於本發明療法之有需要之患者。儘管本發明之組合物及方法通常適用於大部分患有癌症之個體，但該方法仍可包含一或多個自可能受益之患者群體選擇患者之步驟。例如，該方法可包含選擇其腫瘤含有一或多種在組合物中

之新抗原肽中代表之突變之個體。在另一實施例中，該方法可包含選擇具有至少一個結合至組合物中之新抗原肽中代表之一或多個新表位之HLA等位基因之個體。

疫苗或免疫原性組合物套組及共包裝

在一態樣中，本發明提供含有本文所論述元件中之任何一或多者之套組以容許投與療法。元件可個別或組合提供，且可於任何適宜容器中提供，例如小瓶、瓶子或管。在一些實施例中，套組包括使用一或多種語言之說明書，例如使用一種以上語言。在一些實施例中，套組包含一或多種試劑用於利用一或多種本文所述元件之方法中。試劑可於任何適宜容器中提供。舉例而言，套組可提供一或多種遞送或儲存緩衝液。所提供試劑可呈可用於具體方法中之形式，或呈需要在使用前添加一或多種其他組份之形式(例如呈濃縮或凍乾形式)。緩衝液可為任何緩衝液，包括(但不限於)碳酸鈉緩衝液、碳酸氫鈉緩衝液、硼酸鹽緩衝液、Tris緩衝液、MOPS緩衝液、HEPES緩衝液及其組合。在一些實施例中，緩衝液係鹼性。在一些實施例中，緩衝液之pH為約7至約10。在一些實施例中，套組包含本文所述載體、蛋白質及/或一或多種多核苷酸中之一或多者。套組可有利地容許提供本發明系統中之所有元件。套組可包括欲投與動物、哺乳動物、靈長類動物、齧齒類動物等之含有或編碼1-50個或更多新抗原突變之RNA之載體及/或顆粒及/或奈米顆粒，且此一套組包括用於投與此一真核生物之說明書；且此一套組可視情況包括本文所述抗癌劑中之任一者。套組可包括上文組份(例如含有或編碼1-50個或更多新抗原突變之RNA、新抗原蛋白質或肽之載體及/或顆粒及/或奈米顆粒)中之任一者以及與本發明之任一方法一起使用之說明書。

在一個實施例中，套組含有至少一個具有免疫原性組合物或疫

苗之小瓶。在一個實施例中，套組含有至少一個具有免疫原性組合物或疫苗之小瓶及至少一個具有抗癌劑之小瓶。在一個實施例中，套組可包含經混合且即可投與之即用型組份。在一個態樣中，套組含有即用型免疫原性或疫苗組合物及即用型抗癌劑。即用型免疫原性或疫苗組合物可包含含有免疫原性組合物之不同組合之各別小瓶。免疫原性組合物可包含一個含有病毒載體或DNA質體之小瓶及另一個可包含免疫原性蛋白質之小瓶。即用型抗癌劑可包含抗癌劑混合物或單一抗癌劑。各別小瓶可含有不同抗癌劑。在另一實施例中，套組可含有即用型抗癌劑及呈準備復原形式之免疫原性組合物或疫苗。免疫原性或疫苗組合物可經冷凍乾燥或凍乾。套組可包含具有復原緩衝液之各別小瓶，該復原緩衝液可添加至凍乾組合物中使其即可投與。緩衝液可有利地包含本發明之佐劑或乳液。在另一實施例中，套組可包含準備復原之抗癌劑及準備復原之免疫原性組合物或疫苗。在此態樣中，二者皆可經凍乾。在此態樣中，各別復原緩衝液可包括於套組中。緩衝液可有利地包含本發明之佐劑或乳液。在另一實施例中，套組可包含單一小瓶，其含有一劑量之一起投與之免疫原性組合物及抗癌劑。在另一態樣中，包括多個小瓶，根據治療時間線投與一個小瓶。一個小瓶可僅含有用於一個治療劑量之抗癌劑，另一小瓶可含有用於另一治療劑量之抗癌劑及免疫原性組合物二者，及一個小瓶可僅含有用於另一劑量之免疫原性組合物。在另一態樣中，小瓶經標記以將其適當投與有需要之患者。任一實施例之免疫原或抗癌劑可如本文所述呈凍乾形式、經乾燥形式或呈水溶液。免疫原可為如本文所述之減毒活病毒、蛋白質或核酸。

在一個實施例中，抗癌劑係增強免疫系統以增強免疫原性組合物或疫苗之有效性之藥劑。在較佳實施例中，抗癌劑係檢查點抑制

劑。在另一實施例中，套組含有多個小瓶之欲按治療計劃以不同時間間隔投與之免疫原性組合物及抗癌劑。在另一實施例中，套組可包含單獨小瓶之用於啟動免疫反應之免疫原性組合物及欲用於加強之另一免疫原性組合物。在一個態樣中，啟動免疫原性組合物可為DNA或病毒載體且加強免疫原性組合物可為蛋白質。任一組合物可經凍乾或準備好投與。在另一實施例中，含有至少一種抗癌劑之不同抗癌劑混合劑包括於不同小瓶中以供按治療計劃投與。

儘管已詳細描述了本發明及其優點，但應理解，可在不背離如隨附申請專利範圍中所定義之本發明之精神及範圍之情況下在本文中做出各種變化、替代及改變。

將在以下實例中進一步闡釋本發明，該等實例僅出於說明性目的而給出且不欲以任何方式限制本發明。

實例

實例1

sPDL1生成跨越多個HLA等位基因之免疫原性表位. PDL1(CD274)係與T細胞上之PD1 (CD279；*PDCD1*)相互作用之跨膜蛋白且可參與多種形式之天然免疫抑制(例如在妊娠期間)。PDL1之表現亦被腫瘤細胞用作逃避宿主免疫反應之途徑。sPDL1係PDL1基因之選擇式剪接形式。此選擇式剪接形式係因在外顯子4之末端處缺少剪接，讀入第4內含子所致。轉錄終止於內含子4內。轉譯產物在遇到終止密碼子之前之18個胺基酸之框中。

轉譯產物缺少通常在PDL1中發現之跨膜結構域且因此經分泌。其亦含有自內含子轉譯之neoORF內之半胱胺酸且似乎在介質中二聚化。經分泌形式似乎阻斷PDL1與PD1之間之結合。

申請人分析含有內含子編碼之neoORF區之9聚體及10聚體肽之預測結合可能性。顯示分析之預測9聚體肽表1。以黃色突出顯示之值係

以>5%之頻率存於所指示群體中之等位基因。值得注意的是，預測高加索人群體中之常見HLA等位基因A0210具有相當緊密之結合肽。類似分析顯示，亦預測10聚體肽可具有潛在免疫原性，包括對於A0201等位基因(85 nM)。表現PDL1訊息之替代形式之腫瘤細胞將由此用作免疫系統之靶。

該等肽可在多個患者中(HLA受限或更概括言之若預期患者具有一定機率含有相關HLA等位基因)用作「共有之新抗原」。注意，慮及sPDL1之neoORF區之相對短尺寸，可使用2種或3種長重疊肽作為混合物，從而容許靶向任何HLA等位基因(甚至罕見等位基因)，且降低為每一患者基於其HLA類型製備不同產物之需要。

此neoORF亦可含有CD4表位，但CD4表位之預測算法並非非常精確。可在活體外用天然T細胞或在患者樣品中評價CD4表位之存在。

表1

HLA	肽9聚體	親和性(nM)	高加索人	黑人	亞洲人	西班牙裔	ENHTAELVIPGNILNVSIKICLTLSPST
A0201	VIPGNILNV	182	28.3%	11.4%	9.7%	19.7%	
B4001	AELVIPGNI	144	4.0%	1.0%	12.0%	1.3%	
A3201	NILNVSIKI	491	3.2%	1.6%	0.3%	2.6%	
A3201	VSIKICLTL	224	3.2%	1.6%	0.3%	2.6%	
A2301	VSIKICLTL	468	2.3%	11.6%	0.2%	3.5%	
B4002	AELVIPGNI	53	1.6%	0.3%	7.6%	5.0%	
B4901	AELVIPGNI	108	1.4%	3.1%	0.0%	2.3%	
B4102	AELVIPGNI	192	1.0%	0.6%	0.0%	0.5%	
A0205	VIPGNILNV	170	0.8%	2.3%	0.1%	1.4%	
B5801	VSIKICLTL	373	0.8%	4.3%	4.5%	1.3%	
A6802	HTAELVIPG	170	0.7%	6.4%	0.0%	2.4%	
B4405	AELVIPGNI	219	0.6%	0.0%	0.0%	0.2%	

B4101	AELVIPGNI	92	0.5%	0.6%	0.0%	1.1%	
B4501	AELVIPGNI	302	0.4%	5.3%	0.0%	1.5%	
B1517	VSIKICLTL	23	0.3%	0.5%	0.1%	0.6%	
A0206	VIPGNILNV	85	0.2%	0.0%	4.7%	4.1%	
A0202	VIPGNILNV	90	0.1%	4.4%	0.0%	0.7%	
A6901	HTAELVIPG	283	0.1%	0.1%	0.0%	0.5%	
A6901	NILNVSIKI	162	0.1%	0.1%	0.0%	0.5%	
B1503	IKICLTLSP	408	0.1%	6.5%	0.1%	1.5%	
B1503	VSIKICLTL	138	0.1%	6.5%	0.1%	1.5%	
A0203	VIPGNILNV	98	0.0%	0.0%	5.2%	0.0%	

實例2

雄激素受體生成跨越多個HLA等位基因之免疫原性表位. 將雄激素受體鑑別為產生可在腫瘤細胞中特異性表現之neoORF之訊息之另一選擇式剪接形式。選擇式剪接產生至少兩種產生係neoORF之隱含外顯子之同種型。

在該等選擇式轉錄物中，AR-V1及AR-V7在激素抗性前列腺癌樣品中始終可見。

該等neoORF之免疫原性潛力未知且因此申請人在多種常見HLA等位基因之間實施預測結合分析。顯示HLA A等位基因之該等分析(表2)。

表2

高加索人		28.30%			13.70%			6.00%			1.60%				
亞洲人		9.70%			0.90%			22.40%			1.40%				
西班牙裔		19.65%			7.59%			4.88%			2.20%				
黑人		11.40%			7.10%			1.00%			6.50%				
	RVFGVSEWL	SEQ2	233					SEQ1							
	GMTLGAVVV	SEQ2	282				VVVSERILR	SEQ2	359						
	MELGEKFRV	SEQ1	400							KFRVGNCKHL	SEQ1	190			
													A	B	
	2.40%			3.20%			0.70%			3.40%			30.30%	6.80%	高加索人

	3.40%			0.30%			0.60%			0.30%			28.70%	19.70%	亞洲人
	4.72%			2.62%			1.97%			4.46%			26.46%	7.86%	西班牙裔
	1.00%			1.60%			1.70%			3.20%			20.40%	2.10%	黑人
[redacted]						NCKHLKM	SEQ1	385	[redacted]	SEQ2	[redacted]				
[redacted]			ILRVFGVS	SEQ2	255	TLGAVVV	SEQ2	417	[redacted]	SEQ2	[redacted]				
[redacted]									EAGMTLG	SEQ1	230				
GMTLGEK	SEQ1	199							LGAVVVS	SEQ2	268				
AVVVSER	SEQ2	230							AVVVSER	SEQ2	339				
AGMTLGE	SEQ1	284													
GNCKHLK	SEQ1	466													
LGAVVVS	SEQ2	488													

同樣，對於sPDL1，預測多種肽係免疫原性黏合劑且該等肽可應用於較大患者亞組中。該等免疫原性肽可用於多個患者中。

實例3

抗藥性突變. 使用各種化學治療劑、尤其使用諸如酪胺酸激酶抑制劑等靶向療法之治療通常導致靶分子中抵抗治療劑活性之新突變。正在評估多種用於克服此抗性之策略，包括研發不受該等突變影響之第二代療法及用多種藥劑(包括在抗性突變下游作用之彼等)治療。

申請人已評估藉由該等抗性突變產生之突變肽之免疫原性潛力且已發現，對於一些突變，產生可結合至多個HLA等位基因之預測之免疫原性肽。下文提供兩個特定實例以及多種抗性變體之資料。

BTK/C481S

靶向布魯頓酪胺酸激酶(BTK)且用於CLL及某些淋巴瘤之分子依魯替尼之極常見突變係在位置481處半胱胺酸變為絲胺酸。此變化產生多種結合至多種HLA分子之結合肽。

顯示9聚體肽之結合預測結果。可發現10聚體肽之類似結合肽(表3)。僅包括突變體預測親和性低於150 nM之肽。將肽範圍擴增至最多500 nM亦會顯著增加HLA範圍之數目。

表3

HLA	肽	親和性(nM) MUT	親和性(nM) NAT	高加索人	黑人	亞洲人	西班牙裔
A0201	SLLNYLREM	97	278	28.3%	11.4%	9.7%	19.7%
A2402	EYMANGSLL	95	120	9.3%	2.0%	23.1%	12.4%
B1801	TEYMANGSL	80	252	6.1%	3.5%	0.4%	4.1%
B1501	MANGSLLNY	91	158	5.8%	0.8%	12.1%	2.6%
B3501	MANGSLLNY	17	17	5.6%	6.1%	2.4%	6.0%
B4001	TEYMANGSL	10	24	4.0%	1.0%	12.0%	1.3%
A3101	LLNYLREMR	43	206	2.4%	1.0%	3.4%	4.7%
A2301	EYMANGSLL	122	133	2.3%	11.6%	0.2%	3.5%
A2902	MANGSLLNY	17	10	2.0%	4.4%	0.0%	4.1%
B4002	TEYMANGSL	45	110	1.6%	0.3%	7.6%	5.0%
B4102	TEYMANGSL	133	341	1.0%	0.6%	0.0%	0.5%
B5801	MANGSLLNY	40	35	0.8%	4.3%	4.5%	1.3%
A3301	LLNYLREMR	91	188	0.7%	1.7%	0.6%	2.0%
A3002	MANGSLLNY	16	15	0.5%	6.6%	0.0%	2.8%
A6804	EYMANGSLL	47	448	0.0%	0.0%	0.0%	0.0%
B1801	TEYMANGSL	44	252	6.1%	3.5%	0.4%	4.1%
B1501	MANGSLLNY	42	158	5.8%	0.8%	12.1%	2.6%
B3501	MANGSLLNY	40	17	5.6%	6.1%	2.4%	6.0%
B4001	TEYMANGSL	38	24	4.0%	1.0%	12.0%	1.3%
A3101	LLNYLREMR	36	206	2.4%	1.0%	3.4%	4.7%
A2301	EYMANGSLL	34	133	2.3%	11.6%	0.2%	3.5%
A2902	MANGSLLNY	32	10	2.0%	4.4%	0.0%	4.1%
B4002	TEYMANGSL	30	110	1.6%	0.3%	7.6%	5.0%

該等肽免疫原較佳預防性使用(在檢測抗性疾病之前)以誘導免疫原性反應，該反應能殺傷任何預先存在之或新近突變之細胞或亦可在

治療後或在治療期間在檢測疾病復發時使用。該等肽可用於多個患者中(HLA受限或更概括言之若預期患者具有一定機率含有相關HLA等位基因)。

EGFR/T790M

靶向表皮生長因子受體(EGFR)之酪胺酸激酶結構域之厄洛替尼一般用於治療肺癌及始終在治療後發生之抗性腫瘤。抗性純系中發現之常見突變係在位置790處蘇胺酸突變為甲硫胺酸。此變化產生多種結合至多種HLA分子之結合肽(表4)。

表4

													和
高加索人	2.3%		3.9%		4.0%		3.2%		3.2%				17%
黑人	11.6%		0.3%		1.5%		1.6%		1.6%				17%
亞洲人	0.2%		0.0%		3.9%		0.3%		0.3%				5%
西班牙裔	3.5%		0.9%		2.8%		2.6%		2.6%				12%
	A2301		A2501		A2601		A3201		A3201				
	VQLIMQLMPF	366	STVQLIMQLM	125	STVQLIMQLM	67	QLIMQLMPF	155	QLIMQLMPF	155			
							VQLIMQLMPF	426	VQLIMQLMPF	426			
高加索人	4.2%		5.8%		2.9%		1.4%		0.4%		1.6%		16%
黑人	1.2%		0.8%		0.1%		0.3%		0.1%		0.3%		3%
亞洲人	1.2%		12.1%		0.2%		2.4%		0.0%		7.6%		24%
西班牙裔	1.2%		2.6%		1.8%		1.0%		2.2%		5.0%		14%
	B1302		B1501		B3801		B3901		B3906		B4002		
	MQLMPFGCLL	125	MQLMPFGCLL	488	MQLMPFGCLL	400	MQLMPFGCLL	213	MQLMPFGCLL	400	MQLMPFGCL	221	
			QLIMQLMPF	23							MQLMPFGCLL	103	
			VQLIMQLMPF	73							VQLIMQLMPF	365	

如本文所述，該等肽免疫原理想地預防性使用(在檢測抗性疾病之前)以誘導免疫原性反應，該反應能殺傷任何預先存在的或新近突變的細胞或亦在治療後或在治療期間在檢測疾病復發時使用。該等肽可用於多個患者中(HLA受限或更概括言之若預期患者具有一定機率含有相關HLA等位基因)。

注意，作為免疫原，僅含有突變胺基酸及在突變胺基酸任一側上之至少10個胺基酸之單一長肽將足以含有所有所列示表位。因此，將涵蓋所顯示之所有HLA等位基因以及任何其他在此分析中尚未顯示之等位基因。對於高加索人群體，所顯示HLA A等位基因佔等位基因之群體分佈之17%且HLA B等位基因佔等位基因之群體分佈之16%。

由於每一個體具有兩個HLA A等位基因及兩個HLA B等位基因，將預期約50%之高加索人患者具有至少一個所顯示等位基因且因此受益於使用靶向此分子之疫苗之免疫療法。此原理亦適用於本文所論述之任何其他單一胺基酸突變。

其他抗性變體

除了本文所論述之特定抗性情形外，已觀察到多種針對靶向療法之其他抗性突變。該等突變亦各自用於界定免疫原性表位，該等表位可用作靶向彼等含有抗性突變之細胞之免疫療法之疫苗(表5)。

表5

藥物	基因	抗性突變	敏感性	參考文獻
伊馬替尼	BCR-Abl	T315I		http://www.mycancergenome.org/content/disease/chronic-myeloid-leukemia/
伊馬替尼	BCR-Abl	Y253H		http://www.mycancergenome.org/content/disease/chronic-myeloid-leukemia/
伊馬替尼	BCR-Abl	E255K		http://www.mycancergenome.org/content/disease/chronic-myeloid-leukemia/
伊馬替尼	BCR-Abl	E255V		http://www.mycancergenome.org/content/disease/chronic-myeloid-leukemia/
伊馬替尼	c-kit	T670I		http://www.mycancergenome.org/content/disease/gist/kit/50/
厄洛替尼 吉非替尼	PIK3CA	E545K		PMC1570180; PMC3132801
厄洛替尼 吉非替尼	HER2	G776(YVMA)		PMID 16843263; 15753357
厄洛替尼 吉非替尼	EML4-ALK	G1269A		http://www.ncbi.nlm.nih.gov/pubmed/22235099?dopt=Abstract
克唑替尼	KRAS	G12V/D		http://www.ncbi.nlm.nih.gov/pubmed/22235099?dopt=Abstract
克唑替尼	ALK	L1196M		http://stm.sciencemag.org/content/4/120/120ra17
克唑替尼	ALK	G1202R		http://stm.sciencemag.org/content/4/120/120ra17
克唑替尼	ALK	S1206Y		http://stm.sciencemag.org/content/4/120/120ra17
克唑替尼	ALK	1151T(ins)		http://stm.sciencemag.org/content/4/120/120ra17
克唑替尼	ALK	F1174C		http://cancerdiscovery.aacrjournals.org/content/4/6/662
克唑替尼	ROS1	G2032R		http://www.nejm.org/doi/full/10.1056/NEJMoa1215530
克唑替尼	PIK3CA	E542K		http://www.mycancergenome.org/content/disease/breast-cancer/
曲妥珠單抗	Her2	E545K		http://www.mycancergenome.org/content/disease/breast-cancer/
曲妥珠單抗	Hwe2	H1047R		http://www.mycancergenome.org/content/disease/breast-cancer/
曲妥珠單抗	AKT1	E17K		http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2834432/
曲妥珠單抗	BRAF		V600E	
威羅菲尼	MEK1	Q56P		http://www.ncbi.nlm.nih.gov/pubmed/23569304
威羅菲尼	MEK1	E203K		http://www.ncbi.nlm.nih.gov/pubmed/23569304
威羅菲尼	MEK1	C121S		http://cancerdiscovery.aacrjournals.org/content/4/1/94.long
威羅菲尼	NRAS	Q61K/L		http://www.ncbi.nlm.nih.gov/pubmed/23569304
威羅菲尼	NRAS	Q61R		http://cancerdiscovery.aacrjournals.org/content/4/1/94.long
威羅菲尼	NRAS	T58I		http://cancerdiscovery.aacrjournals.org/content/4/1/94.long
威羅菲尼	MEK2	C125S		http://cancerdiscovery.aacrjournals.org/content/4/1/94.long
威羅菲尼	MEK1	V60E		http://cancerdiscovery.aacrjournals.org/content/4/1/94.long
RAF/MEK	MEK1	G128V		http://cancerdiscovery.aacrjournals.org/content/4/1/94.long
RAF/MEK	MEK1	V154I		http://cancerdiscovery.aacrjournals.org/content/4/1/94.long
RAF/MEK	MEK1	P124S		http://cancerdiscovery.aacrjournals.org/content/4/1/94.long
RAF/MEK	MEK1	P124L		http://cancerdiscovery.aacrjournals.org/content/4/1/94.long
RAF/MEK	RAC1	P29S		http://cancerdiscovery.aacrjournals.org/content/4/1/94.long
RAF/MEK	ESR1	S463P		http://www.mycancergenome.org/content/disease/breast-cancer/er/314/
抗雌激素療法	AR	V534E		http://www.mycancergenome.org/content/disease/breast-cancer/er/314/
抗雌激素療法	AR	P535H		http://www.mycancergenome.org/content/disease/breast-cancer/er/314/
抗雌激素療法	AR	L536Q		http://www.mycancergenome.org/content/disease/breast-cancer/er/314/
抗雌激素療法	AR	L536R		http://www.mycancergenome.org/content/disease/breast-cancer/er/314/
抗雌激素療法	AR	Y537C		http://www.mycancergenome.org/content/disease/breast-cancer/er/314/
抗雌激素療法	AR	Y537S		http://www.mycancergenome.org/content/disease/breast-cancer/er/314/
抗雌激素療法	AR	Y537N		http://www.mycancergenome.org/content/disease/breast-cancer/er/314/
抗雌激素療法	AR	D538G		http://www.mycancergenome.org/content/disease/breast-cancer/er/314/
抗雌激素療法	AR	F876L		http://cancerdiscovery.aacrjournals.org/content/early/2013/06/18/2159-8290.CD-13-0226

多個該等實例已用於預測免疫原性表位。該等結果歸納於表6

中，其中對於每一抗性突變，顯示多個人類HLA等位基因之每一突變之潛在結合肽(預測親和性< 500 nM)數目。

表6

RES 500				ABL1:p.T315I	ALK:p.F1174C	ALK:p.F1174L	ALK:p.G1202R	ALK:p.G1269A	ALK:p.L1196M	ALK:p.S1206Y	AR:p.F876L
				80	80	80	80	80	80	80	80
hla_a_01_01	0.143	0.047	0.012							1	
hla_a_02_01	0.283	0.114	0.097			1			2		
hla_a_02_03	0	0	0.052		1	2			2		
hla_a_02_07	0	0	0.08						1		
hla_a_03_01	0.137	0.071	0.009			1		1			
hla_a_11_01	0.06	0.01	0.224				1	1			2
hla_a_23_01	0.023	0.116	0.002	2							
hla_a_24_02	0.093	0.02	0.231	1							
hla_a_30_01	0.016	0.065	0.014		1	1	2		1	1	1
hla_a_30_02	0.005	0.066	0	2						2	
hla_a_33_03	0.004	0.041	0.072				3	1		3	
hla_a_68_02	0.007	0.064	0								
hla_a_74_01	0	0.051	0.001			1	1	1			
hla_b_07_02	0.118	0.062	0.015						2		1
hla_b_08_01	0.098	0.039	0.002						1		
hla_b_15_01	0.058	0.008	0.121	1			1			3	1
hla_b_15_02	0	0	0.066	1			2			3	1
hla_b_15_03	0.001	0.065	0.001	5		3	3	2	4	4	4
hla_b_18_01	0.061	0.035	0.004	2		1	1		1		
hla_b_35_01	0.056	0.061	0.024	3			1		1	2	2
hla_b_40_01	0.04	0.01	0.12	3		1	1		1		1
hla_b_40_02	0.016	0.003	0.076	3	1	1	1	1	1		2
hla_b_42_01	0	0.057	0						2		
hla_b_44_02	0.071	0.014	0.002			1					1
hla_b_45_01	0.004	0.053	0			1					1
hla_b_46_01	0	0	0.082								1
hla_b_51_01	0.051	0.021	0.04						2		
hla_b_53_01	0.003	0.11	0	1						1	

RES 500				BTK:p.C481S	EGFR:p.T790M	KRAS:p.G12D	MAP2K1:p.C121S	MAP2K1:p.F203K	MAP2K1:p.G128V	MAP2K1:p.P124L	MAP2K1:p.P124S
				80	80	80	80	80	80	80	80
hla_a_01_01	0.143	0.047	0.012	2	1					1	2
hla_a_02_01	0.283	0.114	0.097	1	2	1	1	3		2	1
hla_a_02_03	0	0	0.052	2	1	2	1	3		2	1
hla_a_02_07	0	0	0.08								
hla_a_03_01	0.137	0.071	0.009	1						1	
hla_a_11_01	0.06	0.01	0.224	2		2			1		
hla_a_23_01	0.023	0.116	0.002	1	2				1	1	2
hla_a_24_02	0.093	0.02	0.231	1					1	1	1
hla_a_30_01	0.016	0.065	0.014					1			1
hla_a_30_02	0.005	0.066	0	2			3	2	3	4	5
hla_a_33_03	0.004	0.041	0.072	2				1			
hla_a_68_02	0.007	0.064	0	1	2	1		1			1
hla_a_74_01	0	0.051	0.001	1							
hla_b_07_02	0.118	0.062	0.015					2			
hla_b_08_01	0.098	0.039	0.002								
hla_b_15_01	0.058	0.008	0.121	3	2		2	1	3	1	2
hla_b_15_02	0	0	0.066	3	2		2	1	3	3	3
hla_b_15_03	0.001	0.065	0.001	8	7		7	2	6	8	8
hla_b_18_01	0.061	0.035	0.004	2					1	1	1
hla_b_35_01	0.056	0.061	0.024	3	1		2	1	3		3
hla_b_40_01	0.04	0.01	0.12	2	1		2		1	1	1
hla_b_40_02	0.016	0.003	0.076	2	3		3		1	1	1
hla_b_42_01	0	0.057	0								
hla_b_44_02	0.071	0.014	0.002								
hla_b_45_01	0.004	0.053	0				2		1	1	1
hla_b_46_01	0	0	0.082	3	1		1	1	1		
hla_b_51_01	0.051	0.021	0.04					1	1		
hla_b_53_01	0.003	0.11	0	2				2			

RES 500	高加索人	黑人	亞洲人	MAP2K1:p.Q56P	MAP2K1:p.V154I	MAP2K1:p.V60E	MAP2K2:p.C125S	MAP2K2:p.L46F	MAP2K2:p.N126D	MAP2K2:p.V35M	NRAS:p.Q61R
				80	80	80	80	80	80	80	80
hla_a_01_01	0.143	0.047	0.012								1
hla_a_02_01	0.283	0.114	0.097		1		1		1	1	
hla_a_02_03	0	0	0.052		1		1		1	1	
hla_a_02_07	0	0	0.08								
hla_a_03_01	0.137	0.071	0.009	1							
hla_a_11_01	0.06	0.01	0.224	1	1						
hla_a_23_01	0.023	0.116	0.002								
hla_a_24_02	0.093	0.02	0.231								
hla_a_30_01	0.016	0.065	0.014	2		1					1
hla_a_30_02	0.005	0.066	0				3		4		1
hla_a_33_03	0.004	0.041	0.072		1						
hla_a_68_02	0.007	0.064	0	1							1
hla_a_74_01	0	0.051	0.001								
hla_b_07_02	0.118	0.062	0.015	1							
hla_b_08_01	0.098	0.039	0.002	1							
hla_b_15_01	0.058	0.008	0.121				2	1	1		
hla_b_15_02	0	0	0.066				2		2		
hla_b_15_03	0.001	0.065	0.001		1		7	2	5	1	3
hla_b_18_01	0.061	0.035	0.004						1		
hla_b_35_01	0.056	0.061	0.024				2		2		
hla_b_40_01	0.04	0.01	0.12				2		1	1	
hla_b_40_02	0.016	0.003	0.076				3		1	1	
hla_b_42_01	0	0.057	0								
hla_b_44_02	0.071	0.014	0.002								
hla_b_45_01	0.004	0.053	0				2		1		
hla_b_46_01	0	0	0.082				1				
hla_b_51_01	0.051	0.021	0.04								
hla_b_53_01	0.003	0.11	0								

RES 500	高加索人	黑人	亞洲人	NRAS:p.T58I	PIK3CA:p.E545K	PLCG2:p.R665W	ROS1:p.G2032A
				80	80	80	80
hla_a_01_01	0.143	0.047	0.012	1			1
hla_a_02_01	0.283	0.114	0.097	1		2	3
hla_a_02_03	0	0	0.052	1		3	3
hla_a_02_07	0	0	0.08				
hla_a_03_01	0.137	0.071	0.009				
hla_a_11_01	0.06	0.01	0.224				2
hla_a_23_01	0.023	0.116	0.002				
hla_a_24_02	0.093	0.02	0.231				
hla_a_30_01	0.016	0.065	0.014			1	
hla_a_30_02	0.005	0.066	0	1		1	2
hla_a_33_03	0.004	0.041	0.072				1
hla_a_68_02	0.007	0.064	0			1	2
hla_a_74_01	0	0.051	0.001				
hla_b_07_02	0.118	0.062	0.015				
hla_b_08_01	0.098	0.039	0.002				
hla_b_15_01	0.058	0.008	0.121			1	2
hla_b_15_02	0	0	0.066			1	2
hla_b_15_03	0.001	0.065	0.001	3	2	4	5
hla_b_18_01	0.061	0.035	0.004			1	2
hla_b_35_01	0.056	0.061	0.024			1	1
hla_b_40_01	0.04	0.01	0.12				3
hla_b_40_02	0.016	0.003	0.076			1	3
hla_b_42_01	0	0.057	0				
hla_b_44_02	0.071	0.014	0.002		1	2	2
hla_b_45_01	0.004	0.053	0				
hla_b_46_01	0	0	0.082			1	
hla_b_51_01	0.051	0.021	0.04			1	
hla_b_53_01	0.003	0.11	0			1	

在上文所有實例中，僅顯示HLA等位基因亞組之預測。該等通常

並非排他性地係每一族群中之最豐富等位基因。其他等位基因易於預測。

此外，對於經設計以攻擊給定抗性突變之抗性變體之給定免疫，利用多種各自靶向可產生之單獨可能抗性變體之肽來使最廣泛患者組受益。

實例4

癌症亞型特異性免疫原性組合物. 表7顯示在樣品群體內發現之對癌症亞型具有特異性之突變數之資料匯總。在每種疾病之資料集內發現之每一突變導致至少一種與33個HLA等位基因中之任一者之預測黏合劑，該等HLA等位基因係基於在三個族群(高加索人、黑人、亞洲人)中之任一者之至少5%中發現來選擇。源自自該等突變獲得之多肽之新抗原肽之組合可用於免疫原性組合物中。基於來自所選突變之肽數，大部分患者可受益於疫苗。表7顯示在每一癌症特異性資料集中頻發之突變數。以顯示每一資料集中在選擇頻發突變時將具有至少單一突變之個體之百分比。舉例而言，用於SKCM之本文所述包括源自64個頻發突變之新抗原肽之免疫原性組合物覆蓋此群體中之90.91%患者，其中每一個體將含有該等新抗原性突變中之至少一者。

表7

實例性疾病	頻發性 (在>= 給定數目樣品中發生之突變)	集中之獨特突變數	具有集中之至少一個突變之樣品數	樣品總數	百分比
SKCM	5	64	230	253	90.91
SKCM	4	200	241	253	95.26
SKCM	3	707	247	253	97.63
SKCM	2	4437	250	253	98.81
SKCM	1	103732	253	253	100
ACC	5	161	90	90	100
ACC	4	219	90	90	100
ACC	3	299	90	90	100
ACC	2	546	90	90	100
ACC	1	10310	90	90	100
BLCA	5	6	35	130	26.92
BLCA	4	9	47	130	36.15
BLCA	3	26	77	130	59.23
BLCA	2	181	121	130	93.08
BLCA	1	25605	130	130	100
BRCA	5	18	320	888	36.04
BRCA	4	25	337	888	37.95
BRCA	3	35	357	888	40.2
BRCA	2	148	475	888	53.49
BRCA	1	31457	886	888	99.77
CESC	5	4	46	194	23.71

實例性疾病	頻發性 (在>= 給定數目樣品中發生之突變)	集中之獨特突變數	具有集中之至少一個突變之樣品數	樣品總數	百分比
CESC	4	7	55	194	28.35
CESC	3	12	65	194	33.51
CESC	2	145	133	194	68.56
CESC	1	25585	194	194	100
CRC	5	15	132	233	56.65
CRC	4	22	142	233	60.94
CRC	3	53	160	233	68.67
CRC	2	711	209	233	89.7
CRC	1	55287	233	233	100
DLBCL	5	0	0	58	0
DLBCL	4	2	8	58	13.79
DLBCL	3	4	13	58	22.41
DLBCL	2	30	38	58	65.52
DLBCL	1	7435	57	58	98.28
HNSC	5	10	83	384	21.61
HNSC	4	15	97	384	25.26
HNSC	3	27	123	384	32.03
HNSC	2	154	227	384	59.11
HNSC	1	43143	384	384	100
KICH	5	0	0	66	0
KICH	4	0	0	66	0
KICH	3	0	0	66	0
KICH	2	24	33	66	50
KICH	1	2576	66	66	100
KIRP	5	9	68	161	42.24
KIRP	4	18	86	161	53.42
KIRP	3	35	104	161	64.6
KIRP	2	117	139	161	86.34
KIRP	1	10482	161	161	100
LIHC	5	2	13	198	6.57
LIHC	4	5	25	198	12.63

實例性疾病	頻發性 (在>= 給定數目樣品中發生之突變)	集中之獨特突變數	具有集中之至少一個突變之樣品數	樣品總數	百分比
LIHC	3	10	38	198	19.19
LIHC	2	33	73	198	36.87
LIHC	1	18574	198	198	100
LUAD	5	11	134	401	33.42
LUAD	4	17	152	401	37.91
LUAD	3	35	185	401	46.13
LUAD	2	611	330	401	82.29
LUAD	1	101222	399	401	99.5
MM	5	6	49	205	23.9
MM	4	8	55	205	26.83
MM	3	16	71	205	34.63
MM	2	51	101	205	49.27
MM	1	7116	204	205	99.51
PRAD	5	24	104	261	39.85
PRAD	4	38	133	261	50.96
PRAD	3	83	174	261	66.67
PRAD	2	205	213	261	81.61
PRAD	1	10174	261	261	100
STAD	5	150	141	289	48.79
STAD	4	245	156	289	53.98
STAD	3	613	201	289	69.55
STAD	2	2729	269	289	93.08
STAD	1	97578	289	289	100
TGCT	5	14	80	155	51.61
TGCT	4	25	99	155	63.87
TGCT	3	64	124	155	80
TGCT	2	338	149	155	96.13
TGCT	1	7632	155	155	100
THCA	5	5	283	405	69.88
THCA	4	5	283	405	69.88
THCA	3	7	287	405	70.86

實例性疾病	頻發性 (在>= 給定數目樣品中發生之突變)	集中之獨特突變數	具有集中之至少一個突變之樣品數	樣品總數	百分比
THCA	2	31	300	405	74.07
THCA	1	4439	405	405	100
UCS	5	2	9	56	16.07
UCS	4	10	31	56	55.36
UCS	3	19	41	56	73.21
UCS	2	55	53	56	94.64
UCS	1	3805	56	56	100
CLL	5	6	46	263	17.49
CLL	4	19	74	263	28.14
CLL	3	38	100	263	38.02
CLL	2	157	167	263	63.5
CLL	1	7870	263	263	100
GBM	5	14	100	291	34.36
GBM	4	24	125	291	42.96
GBM	3	45	153	291	52.58
GBM	2	221	252	291	86.6
GBM	1	14142	291	291	100
KIRC	5	4	25	417	6
KIRC	4	8	41	417	9.83
KIRC	3	23	78	417	18.71
KIRC	2	291	292	417	70.02
KIRC	1	17725	417	417	100
LAML	5	11	93	196	47.45
LAML	4	12	95	196	48.47
LAML	3	16	101	196	51.53
LAML	2	27	114	196	58.16
LAML	1	1458	195	196	99.49
LUSC	5	2	14	178	7.87
LUSC	4	4	22	178	12.36
LUSC	3	15	50	178	28.09
LUSC	2	130	138	178	77.53

實例性疾病	頻發性 (在>= 給定數目樣品中發生之突變)	集中之獨特突變數	具有集中之至少一個突變之樣品數	樣品總數	百分比
LUSC	1	42062	178	178	100
OV	5	10	72	316	22.78
OV	4	12	80	316	25.32
OV	3	14	86	316	27.22
OV	2	56	151	316	47.78
OV	1	12840	316	316	100
PAAD	5	53	146	146	100
PAAD	4	69	146	146	100
PAAD	3	123	146	146	100
PAAD	2	398	146	146	100
PAAD	1	23715	146	146	100
UCEC	5	30	168	248	67.74
UCEC	4	81	196	248	79.03
UCEC	3	302	217	248	87.5
UCEC	2	2797	237	248	95.56
UCEC	1	112636	248	248	100
COAD	5	3	19	70	27.14%
COAD	4	7	20	70	28.57%
COAD	3	11	25	70	35.71%
COAD	2	84	44	70	62.86%
COAD	1	16670	70	70	100.00%
READ	5	0	0	39	0.00%
READ	4	2	8	39	20.51%
READ	3	5	16	39	41.03%
READ	2	33	29	39	74.36%
READ	1	12132	39	39	100.00%

表8顯示每一癌症亞型之特異性頻發突變，以及每一突變生成之肽及包括該等肽之側翼肽(「ACC」、「BLCA」、「BRCA」、「CESC」、「COAD」、「CLL」、「CRC」、「DLBCL」、「GBM」、「HNSC」、「KICH」、「KIRC」、「KIRP」、「LAML」、「LIHC」、「LUAD」、「LUSC」、「MM」、「OV」、「PAAD」、「PRAD」、「READ」、「SKCM」、

「STAD」、「TGCT」、「THCA」、「UCEC」及「UCS」)。用「fs」表示框移突變。「Del」及「Ins」指示缺失及插入物。顯示自每一突變生成之結合至特異性HLA等位基因之肽數。頻發突變包括框移突變且產生在多個等位基因之間之HLA黏合劑。

表8

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
A2M	c.2195G>A	p.R732Q	FYESDVMGRGHARLVHVEEPHTETV[p.R732Q]QKYFPETWIWDLVVVNSAGVAEVGVT	VQKYFPETW,QKYFPETWI,ETVQKYFPET,VQKYFPETWI,QKYFPETWIW,EPHTETVQKY	CRC
A2ML1	c.1960_1961insC	p.S654fs	YDQCPVSGPWDFPQPLIDPMPQGHS[p.S654fs]EPAFHYLEALVL*	HSEPAFHYL,MPQGHSEPA,PQGHSEPAF,GHSEPAFHY,FHYLEALVL,EPAFHYLEA,QGHSEPAFHY,EPAFHYLEAL,MPQGHSEPAF,SEPAFHYLEA	LUAD
AADACL4	c.796G>A	p.A266T	VPLLSRKFMVTSLCNYLAIDLSWRD[p.A266T]TILNGTCVPPDVWRKYEKWLSPDNIP	IDLSWRDTI,SWRDTILNG,DTILNGTCV,IDLSWRDTIL	CRC
AASS	c.2634_2635insC	p.T878fs	KTIDLVAYGDINGFSAMAKTVGLPT[p.T878fs]RHGSQNVA*	MAKTVGLPTR,LPTRHGSQNV	GBM
ABCA11P	c.1154G>T	p.R385I	TGEKPYTCGECGKTFRQSANLYVHR[p.R385I]IIHTGEKPYKCEDCGKAFGRYTALNQ	VHRIIHTGEK,QSANLYVHRI	UCEC
ABCA3	c.285G>C	p.E95D	TFPPPGDTWELAYIPSHSDAAKTVT[p.E95D]DTVRRALVINMRVRGFPSEKDFEDYI	KTVTDTVRR,VTDTVRRALV,AAKTVTDTVR,DAAKTVTDTV,TVTDTVRRAL	KIRC
ABCA5	c.4427G>A	p.R1476Q	PQITLLDEPSTGMDPKAKQHMWRAI[p.R1476Q]QTAFKNRKRAAILTTHYMEEAEAVCD	HMWRAIQTA,IQTAFKNRK,MWRAIQTAF,AIQTAFKNR,QTAFKNRKR,MWRAIQTAFK,AIQTAFKNRK,HMWRAIQTAF,KQHMWRAIQT,RAIQTAFKNR,QHMWRAIQTA	UCEC
ABCA6	c.917delT	p.L306fs	FVTIIITFTQIIVMTGFMVIFILFF[p.L306fs]YMAYLW*	MVIFILFFY,VIFILFFYM,ILFFYMAYL,LFFYMAYLW,FILFFYMAY,MVIFILFFYM,VIFILFFYMA,FILFFYMAYL,ILFFYMAYLW,FMVIFILFFY,IFILFFYMAY	STAD
ABCA8	c.2086G>A	p.A696T	STQFMDEADILADRKVFLSQGKLKC[p.A696T]TGSSLFLKKKWGIGYHLSLQLNEICV	KLKCTGSSL,CTGSSLFLK,TGSSLFLKK,LKCTGSSLF,FLSQGKLKCT,CTGSSLFLKK,KCTGSSLFLK,KLKCTGSSLF,GKLKCTGSSL,LKCTGSSLFL	CRC
ABCA8	c.2525G>A	p.R842Q	RLVEMEQVLSSLNKMRKTIGGVALW[p.R842Q]QQQICAIARVRLLKLKHERKALLALL	ALWQQQICA,WQQQICAIA,ALWQQQICAI	CRC
ABCA8	c.3472G>A	p.E1158K	NSGIWSFCFYVVTVFSVAGFAFSIF[p.E1158K]KSDIPFIFTFLIPPATMIGCLFLSSH	AGFAFSIFK,IFKSDIPFI,SIFKSDIPF,FKSDIPFIF,SIFKSDIPFI,VAGFAFSIFK,IFKSDIPFIF,KSDIPFIFTF,FAFSIFKSDI,FSIFKSDIPF	CRC
ABCB1	c.1400G>T	p.R467L	RLYDPTEGMVSVDGQDIRTINVRFL[p.R467L]LEIIGVVSQEPVLFATTIAENIRYGR	RTINVRFLL,FLLEIIGVV,RFLLEIIGV,INVRFLLEI,FLLEIIGVVS,TINVRFLLEI,RFLLEIIGVV,RTINVRFLLE	LUAD
ABCB1	c.1581_1582delAG	p.R527fs	VKEANAYDFIMKLPHKFDTLVGERG[p.R527fs]PVEWWAEAEDRHCTCPGSQPQDPPAG*	TLVGERGPV,GERGPVEWW,AEAEDRHCT,DTLVGERGPV,GERGPVEWWA	STAD
ABCB6	c.953delG	p.G318fs	LTEKAPWNSLAWTVTSYVFLKFLQG[p.G318fs]VALAVQAS*	FLQGVALAV,FLKFLQGVA,LKFLQGVAL,YVFLKFLQGV,FLKFLQGVAL,KFLQGVALAV,LKFLQGVALA	STAD
ABCB8	c.1034G>A	p.R345H	SRQCQEQIARAMGVADEALGNVRTV[p.R345H]HAFAMEQREEERYGAELEACRCRAEE	NVRTVHAFA,GNVRTVHAF,VRTVHAFAM,ALGNVRTVHA,TVHAFAMEQR,NVRTVHAFAM,LGNVRTVHAF	CRC
ABCC10	c.1708C>T	p.R570W	RMLILPLNNFPWVINGLLEAKVSLD[p.R570W]WIQLFLDLPNHNPQAYYSPDPPAEPS	SLDWIQLFL,VSLDWIQLF,DWIQLFLDL,LEAKVSLDW,KVSLDWIQLF,AKVSLDWIQL,LEAKVSLDWI,LDWIQLFLDL	GBM
ABCC4	c.2648delT	p.L883fs	VAVIPWIAIPLVPLGIIFIFLRRYF[p.L883fs]WKRQEM*	IFLRRYFWK,FIFLRRYFW,RYFWKRQEM,FLRRYFWKR,FIFLRRYFWK,IFIFLRRYFW,IFLRRYFWKR,RRYFWKRQEM	STAD
ABCC5	c.3269delT	p.L1090fs	HAYNKGQEFLHRYQELLDDNQAPFF[p.L1090fs]CLRVRCGGWLCGWTSSASPSSPPRG*	WLCGWTSSA,SASPSSPPR,RVRCGGWLC,NQAPFFCLR,QAPFFCLRV,NQAPFFCLRV,SSASPSSPPR,RVRCGGWLCG,DNQAPFFCLR,CLRVRCGGWL	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ABCC8	c.1535A>G	p.Y512C	STLEYSNERLKQTNEMLRGIKLLKL[p.Y512C]CAWENIFRTRVETTRRKEMTSLRAFA	IKLLKLCAW,LKLCAWENI,KLCAWENIF,LLKLCAWENI,KLCAWENIFR,CAWENIFRTR,LKLCAWENIF	TGCT
ABCC9	c.1397T>C	p.L466P	IIMGVILLYNLLGSSALVGAAVIVL[p.L466P]PAPIQYFIATKLAEAQKSTLDYSTER	AVIVLPAPI,IVLPAPIQY,VLPAPIQYF,LPAPIQYFI,VLPAPIQYFI,IVLPAPIQYF,AAVIVLPAPI,VIVLPAPIQY,LPAPIQYFIA	TGCT
ABCD1	c.1816T>C	p.S606P	DVVHLHHILQREGGWEAMCDWKDVL[p.S606P]PGGEKQRIGMARMFYHRPKYALLDEC	LPGGEKQRI,DVLPGGEKQR	CESC
ABCD1	c.507C>A	p.H169Q	ATFVNSAIRYLEGQLALSFRSRLVA[p.H169Q]QAYRLYFSQQTYYRVSNMDGRLRNPD	RLVAQAYRL,VAQAYRLYF,RSRLVAQAY,LVAQAYRLY,RLVAQAYRLY,RSRLVAQAYR,LVAQAYRLYF,SFRSRLVAQA,FRSRLVAQAY,SRLVAQAYRL	TGCT
ABI1	c.1335G>T	p.K445N	DYEDEEAAVVQYNDPYADGDPAWAP[p.K445N]NNYIEKVVAIYDYTKDKDDELSFMEG	DPAWAPNNY,AWAPNNYIEK,WAPNNYIEKV,DPAWAPNNYI	UCEC
ABL2	c.55C>A	p.P19T	MGQQVGRVGEAPGLQQPQ[p.P19T]TRGIRGSSAARPSGRRRDPAGRTTET	LQQPQTRGI,QTRGIRGSSA	TGCT
ABTB1	c.747_748insC	p.L249fs	TIEPPPADPRLREDMALLADCALPP[p.L249fs]RAPR*	CALPPRAPR,LLADCALPPR,DCALPPRAPR	LAML
ACACA	c.5191C>T	p.R1731C	ARAEGIPRIYVSANSGARIGLAEEI[p.R1731C]CHMFHVAWVDPEDPYKGYRYLYLTPQ	GLAEEICHM,EICHMFHVA,LAEEICHMF,ICHMFHVAW,EEICHMFHV,GLAEEICHMF,IGLAEEICHM,EEICHMFHVA,AEEICHMFHV	CRC
ACACB	c.6952G>C	p.E2318Q	VAVQFADFHDTPGRMLEKGVISDIL[p.E2318Q]QWKTARTFLYWRLRRLLLEDQVKQEI	ILQWKTART,VISDILQWK,QWKTARTFL,DILQWKTAR,LQWKTARTF,GVISDILQWK,ILQWKTARTF,QWKTARTFLY,LQWKTARTFL	BLCA
ACACB	c.763delG	p.G255fs	EHKKLDLHRDFTVASPAEFVTRFGG[p.G255fs]IGSSRRCLLPTTGLPP*	SSRRCLLPT,RFGGIGSSR,RCLLPTTGL,SSRRCLLPTT,AEFVTRFGGI,RRCLLPTTGL	STAD
ACADM	c.143T>G	p.F48C	QHTKANRQREPGLGFSFEFTEQQKE[p.F48C]CQATARKFAREEIIPVAAEYDKTGEY	QQKECQATA,QQKECQATAR,CQATARKFAR,KECQATARKF,TEQQKECQAT	CRC
ACADS	c.989G>A	p.R330H	TKLQVIQFKLADMALALESARLLTW[p.R330H]HAAMLKDNKKPFIKEAAMAKLAASEA	RLLTWHAAM,LLTWHAAML,LTWHAAMLK,HAAMLKDNK,SARLLTWHA,ARLLTWHAA,RLLTWHAAML,LLTWHAAMLK,SARLLTWHAA,HAAMLKDNKK,ESARLLTWHA,LESARLLTWH,ARLLTWHAAM	KIRC,PRAD
ACBD3	c.671G>T	p.R224L	REEEERERLQKEEEKRRREEEERLR[p.R224L]LEEEERRRIEEERLRLEQQKQQIMAA	REEEERLRL	LUAD
ACOT9	c.149G>A	p.R50Q	GPQNPKKQGIFHIHEACSSIHVNHV[p.R50Q]QDKLREIVGASTNWRDHVKAMEERKL	VQDKLREIV,SIHVNHVQDK,HVNHVQDKLR	CRC
ACP1	c.368delA	p.Q123fs	DLNRKSNQVKTCKAKIELLGSYDPQ[p.Q123fs]NNLLLKIPIMGMTLTLRRCTSSVSGAAERSWRRPTEAGSCPAAASLTRPHPEVLHFSVGV*	SLTRPHPEV,LLKIPIMGM,TLRRCTSSV,IMGMTLTLR,MGMTLTLRR,SSVSGAAER,RSWRRPTEA,LTRPHPEVL,GAAERSWRR,CTSSVSGAA,EVLHFSVGV,RPHPEVLHF,HPEVLHFSV,NLLLKIPIM,GSYDPQNNL,TEAGSCPAA,GSCPAAASL,AAASLTRPH,AERSWRRPT,LLLKIPIMGM,LTLRRCTSSV,SLTRPHPEVL,IMGMTLTLRR,SYDPQNNLLL,ASLTRPHPEV,LTRPHPEVLH,PIMGMTLTLR,SGAAERSWRR,IPIMGMTLTL,RPTEAGSCPA,GSYDPQNNLL,LKIPIMGMTL,TEAGSCPAAA,PEVLHFSVGV,DPQNNLLLKI	STAD
ACP6	c.86T>G	p.V29G	GVFSMRLWTPVGVLTSLAYCLHQRR[p.V29G]GALAELQEADGQCPVDRSLLKLKMVQ	CLHQRRGAL,HQRRGALAE,QRRGALAEL,CLHQRRGALA,HQRRGALAEL,YCLHQRRGAL	KIRP
ACPP	c.127C>T	p.R43W	FLFLLFFWLDRSVLAKELKFVTLVF[p.R43W]WHGDRSPIDTFPTDPIKESSWPQGFG	TLVFWHGDR,LKFVTLVFW,FWHGDRSPI,VTLVFWHGDR,VFWHGDRSPI	BRCA
ACPP	c.314G>A	p.R105Q	ELGEYIRKRYRKFLNESYKHEQVYI[p.R105Q]QSTDVDRTLMSAMTNLAALFPPEGVS	HEQVYIQST,IQSTDVDRTL	CRC
ACPP	c.961G>A	p.E321K	LQMALDVYNGLLPPYASCHLTELYF[p.E321K]KKGEYFVEMYYRNETQHEPYPLMLPG	HLTELYFKK,LYFKKGEYF,ELYFKKGEY,KKGEYFVEM,LYFKKGEYFV,SCHLTELYFK,ELYFKKGEYF,TELYFKKGEY,FKKGEYFVEM,KKGEYFVEMY	BLCA

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ACR	c.837G>T	p.W279C	YVVVGITSWGVGCARAKRPGIYTAT[p.W279C]CPYLNWIASKIGSNALRMIQSATPPP	GIYTATCPY,IYTATCPYL,CPYLNWIAS,TATCPYLNW,GIYTATCPYL,YTATCPYLNW,TATCPYLNWI	KICH
ACSBG2	c.750T>G	p.I250M	AVLIYTSGTTGIPKGVMLSHDNITW[p.I250M]MAGAVTKDFKLTDKHETVVSYLPLSH	NITWMAGAV,TWMAGAVTK,MAGAVTKDF,LSHDNITWM,MLSHDNITWM,ITWMAGAVTK,MAGAVTKDFK,DNITWMAGAV,WMAGAVTKDF	KIRP
ACSL3	c.562A>T	p.T188S	AIFCETRAEWMIAAQACFMYNFQLV[p.T188S]SLYATLGGPAIVHALNETEVTNIITS	FMYNFQLVS,FQLVSLYAT,QLVSLYATL,MYNFQLVSL,YNFQLVSLY,FMYNFQLVSL,FQLVSLYATL,SLYATLGGPA,MYNFQLVSLY,YNFQLVSLYA	CLL
ACSM2A	c.1206_1207insC	p.L402fs	PGYMGTAASCYDVQIIDDKGNVLPP[p.L402fs]RHRRRHWHQGQTHQAYRHLLWLCGQSRQDSSQHSRRLLAPWRPGNQR*	HQAYRHLLW,AYRHLLWLC,SSQHSRRLL,SQHSRRLLA,HSRRLLAPW,RLLAPWRPG,HQGQTHQAY,NVLPPRHRR,VLPPRHRRR,QGQTHQAYR,RHWHQGQTH,QAYRHLLWL,HQAYRHLLWL,THQAYRHLLW,QTHQAYRHLL,SSQHSRRLLA,HSRRLLAPWR,WHQGQTHQAY,NVLPPRHRRR,HQGQTHQAYR,HLLWLCGQSR,LAPWRPGNQR,GQTHQAYRHL,GQSRQDSSQH,SQHSRRLLAP,QHSRRLLAPW	KIRC
ACSM2B	c.585G>T	p.K195N	VASECPSLRIKLLVSEKSCDGWLNF[p.K195N]NKLLNEASTTHHCVETGSQEASAIYF	GWLNFNKLL	UCEC
ACTA1	c.823G>T	p.G275C	ITIGNERFRCPETLFQPSFIGMESA[p.G275C]CIHETTYNSIMKCDIDIRKDLYANNV	FIGMESACI,SACIHETTY,ESACIHETT,MESACIHET,ESACIHETTY,CIHETTYNSI,SFIGMESACI,MESACIHETT	LUAD
ACTG1	c.64G>C	p.A22P	MEEEIAALVIDNGSGMCKAGF[p.A22P]PGDDAPRAVFPSIVGRPRHQGVMVGM	FPGDDAPRA,FPGDDAPRAV	MM
ACTL6A	c.264delA	p.L88fs	GPTYYIDTNALRVPRENMEAISPLK[p.L88fs]MGWLKTGIVSKLFWIIPTKCMSNQKPVSILFSCQRHRGILEQRERN*	KMGWLKTGI,GIVSKLFWI,WLKTGIVSK,KLFWIIPTK,ILFSCQRHR,VSILFSCQR,IVSKLFWII,NQKPVSILF,PTKCMSNQK,MEAISPLKM,LKTGIVSKL,SKLFWIIPT,MSNQKPVSI,KMGWLKTGIV,WLKTGIVSKL,GIVSKLFWII,KLFWIIPTKC,AISPLKMGWL,CMSNQKPVSI,ISPLKMGWLK,GWLKTGIVSK,SILFSCQRHR,NMEAISPLKM,LKMGWLKTGI,LKTGIVSKLF,MSNQKPVSIL,SNQKPVSILF,FSCQRHRGIL,EAISPLKMGW	STAD
ACTL7B	c.1061G>A	p.R354H	TGFKEEMAANVLLCGGCTMLDGFPE[p.R354H]HFQRELSLLCPGDSPAVAAAPERKTS	HFQRELSLL,DGFPEHFQR,FPEHFQREL,TMLDGFPEH,MLDGFPEHF,EHFQRELSL,TMLDGFPEHF	CRC
ACTL7B	c.631G>A	p.E211K	IYSYGKTSGLVVESGHGVSHVVPIS[p.E211K]KGDVLPGLTSRADYAGGDLTNYLMQL	VSHVVPISK,VPISKGDVL,GVSHVVPISK,HVVPISKGDV	CESC
ACTL9	c.992G>A	p.R331H	EVPGLSPVGLSTMAKQSLRKLSLEM[p.R331H]HADLAQNVLLCGGSSLFTGFEGRFRA	LEMHADLAQ,HADLAQNVL,KLSLEMHADL,EMHADLAQNV,MHADLAQNVL	CRC
ACTN2	c.2677G>T	p.D893Y	AYSGPGSVPGALDYAAFSSALYGES[p.D893Y]YL*	SSALYGESY,SALYGESYL,FSSALYGESY,SSALYGESYL	LUAD
ACVR1	c.617G>A	p.R206H	ADLLDHSCTSGSGSGLPFLVQRTVA[p.R206H]HQITLLECVGKGRYGEVWRGSWQGEN	HQITLLECV,TVAHQITLL,RTVAHQITL,FLVQRTVAH,VQRTVAHQI,RTVAHQITLL,VQRTVAHQIT,QRTVAHQITL,HQITLLECVG	UCEC
ACVR1	c.869C>T	p.S290L	FIASDMTSRHSSTQLWLITHYHEMG[p.S290L]LLYDYLQLTTLDTVSCLRIVLSIASG	GLLYDYLQL,LLYDYLQLT,ITHYHEMGL,HYHEMGLLY,HEMGLLYDY,GLLYDYLQLT,LLYDYLQLTT,ITHYHEMGLL,THYHEMGLLY,YHEMGLLYDY,HEMGLLYDYL,MGLLYDYLQL	CRC
ADAD1	c.32C>T	p.S11L	MASNNHWFQS[p.S11L]LQVPSFAQMLKKNLPVQPATKTITTP	SNNHWFQSL,FQSLQVPSF,LQVPSFAQM,FQSLQVPSFA,SLQVPSFAQM,LQVPSFAQML,WFQSLQVPSF,ASNNHWFQSL	UCEC
ADAD2	c.131G>A	p.G44E	LAASLQISPQPRPWRPLPAQAQSAW[p.G44E]EPAPAPATYRAEGGWPQVSVLRDSGP	QSAWEPAPA,EPAPAPATY,AQAQSAWEP,AQSAWEPAP,WEPAPAPAT,AQSAWEPAPA,AQAQSAWEPA,SAWEPAPAPA,WEPAPAPATY	ACC
ADAM23	c.1139A>T	p.K380M	EKDQIDITTNPVQMLHEFSKYRQRI[p.K380M]MQHADAVHLISRVTFHYKRSSLSYFG	RIMQHADAV,MQHADAVHL,KYRQRIMQH,FSKYRQRIM,IMQHADAVH,IMQHADAVHL,MQHADAVHLI,KYRQRIMQHA,RQRIMQHADA,SKYRQRIMQH,RIMQHADAVH	KIRC
ADAM28	c.217_218insA	p.K73fs	QEQFETELKYKMTINGKIAVLYLKK[p.K73fs]KQEPPCTRLHGNIL*	CTRLHGNIL,KQEPPCTRL,KIAVLYLKKK,YLKKKQEPPC,KKQEPPCTRL,KQEPPCTRLH	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ADAM29	c.613G>A	p.V205I	IDNSTQKQSSYVGWWIHFRIVEIVV[p.V205I]IIDNYLYIRYERNDSKLLEDLYVIVN	RIVEIVVII,VIIDNYLYI,VVIIDNYLY,IVVIIDNYL,FRIVEIVVI,IIDNYLYIRY,VVIIDNYLYI,VIIDNYLYIR,HFRIVEIVVI,IVVIIDNYLY,EIVVIIDNYL,VEIVVIIDNY	GBM
ADAM30	c.2223G>T	p.Q741H	LKPKQEKMPLSKAKTEQEESKTKTV[p.Q741H]HEESKTKTGQEESEAKTGQEESKAKT	KTKTVHEES,KTKTVHEESK,KTVHEESKTK	LUAD
ADAM30	c.289_290GG>TT	p.G97L	KHVLHLWPKRLLLPRHLRVFSFTEH[p.G97L]LELLEDHPYIPKDCNYMGSVKESLDSK	RVFSFTEHL,SFTEHLELL,FSFTEHLEL,LELLEDHPY,HLELLEDHPY,VFSFTEHLEL,LRVFSFTEHL,FSFTEHLELL,LELLEDHPYI	SKCM
ADAM30	c.941C>A	p.S314Y	SSDWAHLYLQRKYNDALAWSFGKVC[p.S314Y]YLEYAGSVSTLLDTNILAPATWSAHE	WSFGKVCYL,CYLEYAGSV,AWSFGKVCY,FGKVCYLEY,SFGKVCYLEY,LAWSFGKVCY	CRC
ADAM32	c.1676G>A	p.R559Q	DRNNKYVFCGWRNLICGRLVCTYPT[p.R559Q]QKPFHQENGDVIYAFVRDSVCITVDY	LVCTYPTQK,CTYPTQKPF,RLVCTYPTQK,CTYPTQKPFH,VCTYPTQKPF	CRC
ADAM9	c.767G>A	p.R256Q	NQTAVREEMILLANYLDSMYIMLNI[p.R256Q]QIVLVGLEIWTNGNLINIVGGAGDVL	YIMLNIQIV,IMLNIQIVL,MLNIQIVLV,MYIMLNIQI,SMYIMLNIQI,YIMLNIQIVL,IMLNIQIVLV,MYIMLNIQIV,IQIVLVGLEI	UCEC
ADAMTS12	c.1075G>A	p.E359K	LNPVHHDVAVLLTRKDICAGFNRPC[p.E359K]KTLGLSHLSGMCQPHRSCNINEDSGL	CAGFNRPCK,CKTLGLSHL,KTLGLSHLSG,FNRPCKTLGL,AGFNRPCKTL	UCS
ADAMTS12	c.3157C>G	p.P1053A	RPRMLTTPTGPESMSTSTPAISSPS[p.P1053A]ATTASKEGDLGGKQWQDSSTQPELSS	TPAISSPSA,ISSPSATTA,AISSPSATTA,SSPSATTASK,STPAISSPSA,TPAISSPSAT	CESC
ADAMTS14	c.712G>T	p.G238C	QQEWAEPDGDLHNEAFGLGDLPNLL[p.G238C]CLVGDQLGDTERKRRHAKPGSYSIEV	DLPNLLCLV,NLLCLVGDQL	LUAD
ADAMTS16	c.2449G>A	p.D817N	LRRYYLNGHWTVDWPGRYKFSGTTF[p.D817N]NYRRSYNEPENLIATGPTNETLIVEL	FSGTTFNYR,KFSGTTFNY,TTFNYRRSY,SGTTFNYRR,FSGTTFNYRR,KFSGTTFNYR,YKFSGTTFNY,GTTFNYRRSY	CRC
ADAMTS17	c.1715A>C	p.N572T	SPWGAWSMCSRTCGTGARFRQRKCD[p.N572T]TPPPGPGGTHCPGASVEHAVCENLPC	RQRKCDTPP,RQRKCDTPPP	TGCT
ADAMTS2	c.2842G>A	p.D948N	WEPCSQTCGRTGMQVRSVRCIQPLH[p.D948N]NNTTRSVHAKHCNDARPESRRACSRE	LHNNTTRSV,SVRCIQPLHN,LHNNTTRSVH	CLL
ADAMTS20	c.1622G>T	p.R541L	KLHKGCFTQHVPPADGTDCGPGMHC[p.R541L]LHGLCVNKETETRPVNGEWGPWEPYS	CLHGLCVNK,GMHCLHGLCV,GPGMHCLHGL	LUAD
ADAMTS20	c.3751C>A	p.R1251S	GKTTRQVLCMNYHQPIDENYCDPEV[p.R1251S]SPLMEQECSLAACPPAHSHFPSSPVQ	SPLMEQECSL	LUAD
ADAMTS4	c.466C>T	p.R156W	TINGDPESVASLHWDGGALLGVLQY[p.R156W]WGAELHLQPLEGGTPNSAGGPGAHIL	VLQYWGAEL,ALLGVLQYW,QYWGAELHL,LQYWGAELH,LLGVLQYWGA,LQYWGAELHL,GALLGVLQYW,WGAELHLQPL	CRC
ADAMTS5	c.1645C>A	p.L549M	QGQMVCLTKKLPAVEGTPCGKGRIC[p.L549M]MQGKCVDKTKKKYYSTSSHGNWGSWG	KGRICMQGK,TPCGKGRICM	LUAD
ADAMTS8	c.1570G>A	p.V524M	TPCGPGHLCSEGSCLPEEEVERPKP[p.V524M]MADGGWAPWGPWGECSRTCGGGVQFS	KPMADGGWA,EEVERPKPM,MADGGWAPW,PMADGGWAPW,EEEVERPKPM	GBM
ADAMTS9	c.1975G>T	p.G659W	FKSCNTEPCLKQKRDFRDEQCAHFD[p.G659W]WKHFNINGLLPNVRWVPKYSGILMKD	HFDWKHFNI,CAHFDWKHF,WKHFNINGL,DEQCAHFDW,AHFDWKHFNI,WKHFNINGLL	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ADAMTSL4	c.2332_2333insG	p.G778fs	TSCSRSCGPGTQHRQLQCRQEFGGG[p.G778fs]WLLGAPGALWTSPPAQHHPVLPAAPLWPLGSWLSLEPVLRAVRPGPEKPAGSLCWEQW*	WLLGAPGAL,GSWLSLEPV,SLEPVLRAV,RAVRPGPEK,SWLSLEPVL,HPVLPAAPL,LPAAPLWPL,SPPAQHHPV,PPAQHHPVL,WPLGSWLSL,GPEKPAGSL,RQEFGGGWL,QEFGGGWLL,LLGAPGALW,AQHHPVLPA,QHHPVLPAA,APLWPLGSW,VLPAAPLWPL,AQHHPVLPAA,WLSLEPVLRA,LWPLGSWLSL,AVRPGPEKPA,SWLSLEPVLR,SLEPVLRAVR,TSPPAQHHPV,SPPAQHHPVL,APLWPLGSWL,RQEFGGGWLL,WLLGAPGALW,GSWLSLEPVL,QEFGGGWLLG,HPVLPAAPLW	STAD
ADCY2	c.260C>T	p.A87V	LAVFFALGLEVEDHVAFLITVPTAL[p.A87V]VIFFAIFILVCIESVFKKLLRLFSLV	LVIFFAIFI,VIFFAIFIL,LITVPTALV,TVPTALVIF,TALVIFFAI,PTALVIFFA,ALVIFFAIF,ITVPTALVI,VPTALVIFF,FLITVPTALV,ALVIFFAIFI,VIFFAIFILV,ITVPTALVIF,TVPTALVIFF,TALVIFFAIF,PTALVIFFAI,LVIFFAIFIL,VPTALVIFFA	DLBCL
ADCY2	c.2662G>A	p.V888I	HVAEHFLARSLKNEELYHQSYDCVC[p.V888I]IMFASIPDFKEFYTESDVNKEGLECL	SYDCVCIMF,IMFASIPDF,QSYDCVCIM,HQSYDCVCI,IMFASIPDFK,CIMFASIPDF,HQSYDCVCIM,QSYDCVCIMF	OV
ADCY2	c.3046C>A	p.P1016T	SFNDFKLRVGINHGPVIAGVIGAQK[p.P1016T]TQYDIWGNTVNVASRMDSTGVLDKIQ	AQKTQYDIW,TQYDIWGNTV,GVIGAQKTQY	LUAD
ADCY5	c.1982G>A	p.R661H	SIETFLILRCTQKRKEEKAMIAKMN[p.R661H]HQRTNSIGHNPPHWGAERPFYNHLGG	MIAKMNHQR,KAMIAKMNH,KMNHQRTNS,HQRTNSIGH,MNHQRTNSI,KMNHQRTNSI,AMIAKMNHQR	CRC
ADD3	c.1708G>A	p.E570K	HGPPAPPNPFSHLTEGELEEYKRTI[p.E570K]KRKQQGLEDAEQELLSDDASSVSQIQ	TIKRKQQGL,RTIKRKQQGL	UCEC
ADGB	c.3371C>T	p.S1124L	PCNSFAIKEIRDYYIPNDKKILFRY[p.S1124L]LVKVLTPQPATIQVRTSKPDAFIKLQ	ILFRYLVKV,KILFRYLVK,LFRYLVKVL,KKILFRYLV,KILFRYLVKV,ILFRYLVKVL,KKILFRYLVK,LVKVLTPQPA	UCEC
ADH1A	c.461A>T	p.D154V	SRFTCRRKPIHHFLGISTFSQYTVV[p.D154V]VENAVAKIDAASPLEKVCLIGCGFST	YTVVVENAV,VVVENAVAK,TFSQYTVVV,SQYTVVVEN,STFSQYTVVV,SQYTVVVENA,VVVENAVAKI,TVVVENAVAK,YTVVVENAVA,VENAVAKIDA	KIRC
ADNP2	c.965delC	p.S322fs	NSPSPAAGQPVTVAQGAPGSLTHSP[p.S322fs]LLLANPT*	SLTHSPLLL,GSLTHSPLL,LTHSPLLLA,SLTHSPLLLA,APGSLTHSPL	STAD
AFF2	c.1790G>A	p.R597H	VKTNASQVPAEPKERPLLSLIREKA[p.R597H]HPRPTQKIPETKALKHKLSTTSETVS	KAHPRPTQK,LIREKAHPR,REKAHPRPT,KAHPRPTQKI,SLIREKAHPR	PRAD
AFF3	c.2755G>A	p.E919K	INKNEKMLRSPISPLSDASKHKYTS[p.E919K]KDLTSSSRPNGNSLFTSASSSKKPKA	ASKHKYTSK,TSKDLTSSSR,SKHKYTSKDL	BLCA
AFP	c.545C>G	p.A182G	TFMNKFIYEIARRHPFLYAPTILLW[p.A182G]GARYDKIIPSCCKAENAVECFQTKAA	LLWGARYDK,LWGARYDKI,TILLWGARY,PTILLWGAR,PTILLWGARY,YAPTILLWGA,LLWGARYDKI,ILLWGARYDK,LYAPTILLWG	LUAD
AGAP1	c.381delC	p.G127fs	GGRFKKEIVVDGQSYLLLIRDEGGP[p.G127fs]RRRSLPCGWTLLYLSSAWRMK*	LPCGWTLLY,SLPCGWTLL,LLYLSSAWR,YLSSAWRMK,RSLPCGWTL,LYLSSAWRM,WTLLYLSSA,GPRRRSLPC,TLLYLSSAW,LLYLSSAWRM,RSLPCGWTLL,LIRDEGGPRR,LYLSSAWRMK,SLPCGWTLLY,TLLYLSSAWR,RRSLPCGWTL,WTLLYLSSAW,LPCGWTLLYL	STAD
AGAP3	c.2296C>T	p.R766W	VWEGALGGYSKPGPDACREEKERWI[p.R766W]WAKYEQKLFLAPLPSSDVPLGQQLLR	WIWAKYEQK,IWAKYEQKL,KERWIWAKY,WAKYEQKLF,EEKERWIWA,WIWAKYEQKL,IWAKYEQKLF,RWIWAKYEQK,REEKERWIWA	GBM
AGAP6	c.207delC	p.D69fs	MAAAVQPAEVTVEVGEDLHMHHVRD[p.D69fs]GRCLKLWSLTFLPIQSQAQYSRGTLKQKLWSLTLLPIQRQAQYSRGTLKQML*	TLKQKLWSL,HVRDGRCLK,CLKLWSLTF,LWSLTFLPI,YSRGTLKQK,KQKLWSLTL,HMHHVRDGR,LPIQSQAQY,LKLWSLTFL,SQAQYSRGT,QKLWSLTLL,KLWSLTFLPI,KLWSLTLLPI,CLKLWSLTFL,KQKLWSLTLL,RCLKLWSLTF,HVRDGRCLKL,FLPIQSQAQY,LTFLPIQSQA,DGRCLKLWSL,SQAQYSRGTL,LKQKLWSLTL,YSRGTLKQML	KIRC
AGAP6	c.380G>T	p.S127I	NPSANPEASTIFQRNSQTDVVEIRR[p.S127I]INCTNHVSAVRFSQQYSLCSTIFLDD	RRINCTNHV,RINCTNHVSA	CLL,PRAD
AGAP7	c.211delG	p.E71fs	AAAVQPAEVTVEVGEDLHMHHVRDR[p.E71fs]RCLKLWSLTLLPIQRQAQYSRGTLKQML*	HMHHVRDRR,HVRDRRCLK,CLKLWSLTL,RRCLKLWSL,LKLWSLTLL,KLWSLTLLPI,CLKLWSLTLL,HVRDRRCLKL,DRRCLKLWSL,RCLKLWSLTL,YSRGTLKQML	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
AGAP9	c.742A>G	p.M248V	STSQEDPQFSVPPTANTPTPVCKLS[p.M248V]VRWSNLFTSEKGSDPDKERKAPENHA	KLSVRWSNL,LSVRWSNLF,SVRWSNLFT,KLSVRWSNLF,SVRWSNLFTS,TPTPVCKLSV,CKLSVRWSNL,TPVCKLSVRW	SKCM
AGBL5	c.1260_1261insC	p.I420fs	KLNSVWIMPQQSAGLEESAPDTIPP[p.I420fs]QREWRCLLCGPAWTCFQKGLLHVRKQL*	CFQKGLLHV,TIPPQREWR,FQKGLLHVR,RCLLCGPAW,LCGPAWTCF,REWRCLLCG,CGPAWTCFQK,DTIPPQREWR,CFQKGLLHVR,LLCGPAWTCF,WRCLLCGPAW,REWRCLLCGP	STAD
AGMAT	c.937G>A	p.V313M	TGTPEIAGLTPSQALEIIRGCQGLN[p.V313M]MMGCDLVEVSPPYDLSGNTALLAANL	MMGCDLVEV,IRGCQGLNM,RGCQGLNMM,GLNMMGCDLV,NMMGCDLVEV,IIRGCQGLNM,IRGCQGLNMM	CRC
AGPAT4	c.634G>A	p.A212T	ISMQVARAKGLPRLKHHLLPRTKGF[p.A212T]TITVRSLRNVVSAVYDCTLNFRNNEN	RTKGFTITV,FTITVRSLR,LPRTKGFTI,LLPRTKGFTI,RTKGFTITVR,KGFTITVRSL,GFTITVRSLR,LPRTKGFTIT	CRC
AGRN	c.3851_3853delTGA	p.1284_1285VT>A	GATSGAIAAGATARATTASRLPSSA[p.1284_1285VT>A]APRAPHPSHTSQPVAKTTAAPTTRRPPT	ASRLPSSAA,RLPSSAAPR,SSAAPRAPH,APRAPHPSH,LPSSAAPRA,RLPSSAAPRA,APRAPHPSHT	KICH
AGXT2	c.1504C>T	p.R502C	FSQTFRIAPSMCITKPEVDFAVEVF[p.R502C]CSALTQHMERRAK*	FAVEVFCSA,FCSALTQHM,VEVFCSALT,FAVEVFCSAL,CSALTQHMER,VFCSALTQHM	UCEC
AHI1	c.909_910insA	p.K303fs	DDEISSMEQSTEDSMQDDTKPKPKK[p.K303fs]NKKED*	KPKPKKNKK	STAD
AHNAK	c.12449C>T	p.S4150F	KAPKISMPEVDLNLKGPKMKGDVDV[p.S4150F]FLPKVEGDLKGPEVDIKGPKVDIDVP	KMKGDVDVF,KMKGDVDVFL,KGDVDVFLPK,PKMKGDVDVF	BLCA
AHNAK	c.15_16insGAG	p.5_6insE	MEKEE[p.5_6insE]ETTRELLLPNWQGSGSHGLTIAQRDDGV	KEEETTREL,EEETTRELL,KEEETTRELL,EEETTRELLL	KIRC
AHNAK	c.3658G>A	p.V1220I	ISMPDVDLHLKGPKVKGDVDVSVPK[p.V1220I]IEGEMKVPDVEIKGPKMDIDAPDVEV	IEGEMKVPDV,VPKIEGEMKV	CLL
AHNAK	c.6341C>G	p.A2114G	PDVSLEGPEGKLKGPKLKMPEMHFK[p.A2114G]GPKISMPDVDLHLKGPKVKGDVDVSL	HFKGPKISM,MHFKGPKISM,PEMHFKGPKI	CLL
AHNAK	c.8665G>C	p.D2889H	LKGPEVDLKGPKVDIDVPDVNVQGP[p.D2889H]HWHLKMPKMKMPKFSMPGFKAEGPEV	VQGPHWHLK,NVQGPHWHL,NVQGPHWHLK,HWHLKMPKMK,VQGPHWHLKM	BLCA
AHNAK2	c.3643C>T	p.P1215S	APKVEADVSLPSMQGDLKTTDLSIQ[p.P1215S]SPSADLEVHAGQVDVKLLEGHVPEGA	SPSADLEVH	KIRP
AHNAK2	c.4918C>A	p.L1640M	PDVKMSLSSMEVDVQAPRAKLDGAQ[p.L1640M]MEGDLSLADKAVTAKDSKFKMPKFKM	AQMEGDLSL,QMEGDLSLA,RAKLDGAQM,AQMEGDLSLA	TGCT
AHNAK2	c.6497C>T	p.S2166F	LANKDLTTKDSKFKMPKFKMPSFGV[p.S2166F]FAPGKSIEASVDVSPPKVEADMSLPS	KMPSFGVFA,SFGVFAPGK,FKMPSFGVF,GVFAPGKSI,MPSFGVFAP,PSFGVFAPGK,KFKMPSFGVF,MPSFGVFAPG,FKMPSFGVFA	KIRP
AICDA	c.391C>G	p.R131G	LRIFTARLYFCEDRKAEPEGLRRLH[p.R131G]GAGVQIAIMTFKDYFYCWNTFVENHE	RLHGAGVQI,GLRRLHGAGV,RLHGAGVQIA,RRLHGAGVQI,LHGAGVQIAI,HGAGVQIAIM	LUSC
AICDA	c.431A>T	p.Y144F	RKAEPEGLRRLHRAGVQIAIMTFKD[p.Y144F]FFYCWNTFVENHERTFKAWEGLHENS	IMTFKDFFY,MTFKDFFYC,FFYCWNTFV,TFKDFFYCW,DFFYCWNTF,IAIMTFKDF,AIMTFKDFF,KDFFYCWNT,AIMTFKDFFY,IAIMTFKDFF,MTFKDFFYCW,KDFFYCWNTF,DFFYCWNTFV	GBM
AIDA	c.740A>T	p.K247M	VDIELQKHVEKLTKGAAIFFEFKHY[p.K247M]MPKKRFTSTKCFAFMEMDEIKPGPIV	IFFEFKHYM,EFKHYMPKK,MPKKRFTST,FEFKHYMPK,KHYMPKKRF,YMPKKRFTST,MPKKRFTSTK,FFEFKHYMPK,EFKHYMPKKR,AIFFEFKHYM,FKHYMPKKRF	KIRC
AK302879	c.572A>G	p.Q191R	AVSTQQQEEDRSSSCREAVLQWRLQ[p.Q191R]RTIKEQALLNAHVTQVTESLKQVQLE	AVLQWRLQR,QWRLQRTIK,RTIKEQALL,LQWRLQRTI,VLQWRLQRTI,EAVLQWRLQR,LQRTIKEQAL	PRAD
AK7	c.476C>T	p.A159V	SALSEEVSHFEKRKLFILLSTVMTW[p.A159V]VRSKALDPEDSEVPFTEEDYRRRKSH	LLSTVMTWV,VMTWVRSKA,TVMTWVRSK,MTWVRSKAL,LSTVMTWVR,ILLSTVMTWV,TVMTWVRSKA,VMTWVRSKAL,STVMTWVRSK,LLSTVMTWVR	GBM
AK8	c.728A>C	p.D243A	KLLEYHRNIVRVIPSYPKILKVISA[p.D243A]AQPCVDVFYQALTYVQSNHRTNAPFT	KILKVISAA,VISAAQPCV,AQPCVDVFY,AAQPCVDVF,KVISAAQPCV,AAQPCVDVFY,SAAQPCVDVF	GBM

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
AKAP12	c.3844G>A	p.E1282K	ILSKTEGTQEADQYADEKTKDVPFF[p.E1282K]KGLEGSIDTGITVSREKVTEVALKGE	KTKDVPFFK,KDVPFFKGL,KTKDVPFFKG	CRC
AKAP13	c.8353delA	p.K2785fs	QAPASTSASTRLFGLTKPKEKKEKK[p.K2785fs]RRTKPAALSPVMVPRQKYQQRVKRSSADPLPLC*	ALSPVMVPR,KRRTKPAAL,RTKPAALSP,RQKYQQRVK,QQRVKRSSA,RVKRSSADP,RSSADPLPL,KPAALSPVM,EKKRRTKPA,YQQRVKRSS,VKRSSADPL,RTKPAALSPV,AALSPVMVPR,RQKYQQRVKR,RVKRSSADPL,MVPRQKYQQR,KPAALSPVMV,VPRQKYQQRV,KKRRTKPAAL,TKPAALSPVM,YQQRVKRSSA,KRSSADPLPL,SPVMVPRQKY	STAD
AKAP9	c.10444C>A	p.L3482I	RRILYQNLNEPTTWSLTSDRTRNWV[p.L3482I]IQQKIEGETKESNYAKLIEMNGGGTG	RTRNWVIQQ,SDRTRNWVI,RNWVIQQKI,RTRNWVIQQK	CRC
AKAP9	c.11229delG	p.M3743fs	YLLLLLGGFQECEDATLALLARMGG[p.M3743fs]SQLSRI*	RMGGSQLSR,LARMGGSQL,RMGGSQLSRI,LLARMGGSQL	STAD
AKD1	c.3625delA	p.R1209fs	DMKAKIRVDTIAKRRAELILERDKK[p.R1209fs]GGRMLLEMMKRLVRKNLKKTMMILKTSLKMSFQKMRKR*	MLLEMMKRL,TMMILKTSL,NLKKTMMIL,RMLLEMMKR,EMMKRLVRK,RLVRKNLKK,MMILKTSLK,TSLKMSFQK,KMSFQKMRK,MSFQKMRKR,KRLVRKNLK,KNLKKTMMI,LKKTMMILK,KTMMILKTS,KTSLKMSFQ,SLKMSFQKM,MKRLVRKNL,MILKTSLKM,KGGRMLLEM,RKNLKKTMM,LKTSLKMSF,MLLEMMKRLV,MMILKTSLKM,NLKKTMMILK,TMMILKTSLK,KTSLKMSFQK,KMSFQKMRKR,GGRMLLEMMK,MMKRLVRKNL,MKRLVRKNLK,KRLVRKNLKK,KTMMILKTSL,SLKMSFQKMR,ILKTSLKMSF,LERDKKGGRM,KKGGRMLLEM,RMLLEMMKRL,RKNLKKTMMI,TSLKMSFQKM	STAD
AKNAD1	c.1859A>G	p.K620R	AEMTAPSPSCAFCRRLLEWKQNVEK[p.K620R]RGHGRINCGRFSIVLHEKAPHSDSTP	NVEKRGHGR,RGHGRINCGR	HNSC
AKT1	c.49G>A	p.E17K	MSDVAIVKEGWLHKRG[p.E17K]KYIKTWRPRYFLLKNDGTFIGYKERP	WLHKRGKYI,LHKRGKYIK,RGKYIKTWR,KYIKTWRPR,GWLHKRGKY,WLHKRGKYIK,KYIKTWRPRY,HKRGKYIKTW	BRCA,CESC,THCA
AKT2	c.867C>G	p.I289M	EYLHSRDVVYRDIKLENLMLDKDGH[p.I289M]MKITDFGLCKEGISDGATMKTFCGTP	LMLDKDGHM,HMKITDFGL,MLDKDGHMK,MLDKDGHMKI,LMLDKDGHMK	BRCA
ALAS1	c.904G>C	p.G302R	PRVCGAVMDTLKQHGAGAGGTRNIS[p.G302R]RTSKFHVDLERELADLHGKDAALLFS	GTRNISRTS,ISRTSKFHV,RTSKFHVDL,RNISRTSKF,NISRTSKFHV,GTRNISRTSK,TRNISRTSKF	KIRC
ALB	c.881C>T	p.S294L	CCHGDLLECADDRADLAKYICENQD[p.S294L]LISSKLKECCEKPLLEKSHCIAEVEN	YICENQDLI,KYICENQDL,NQDLISSKL,CENQDLISS,KYICENQDLI,AKYICENQDL	CRC
ALDH1A2	c.253C>T	p.R85C	PATGEQVCEVQEADKADIDKAVQAA[p.R85C]CLAFSLGSVWRRMDASERGRLLDKLA	CLAFSLGSV,QAACLAFSL,AVQAACLAF,VQAACLAFSL,KAVQAACLAF,CLAFSLGSVW	PRAD
ALDH1L1	c.2608G>A	p.A870T	KALYVSDKLQAGTVFVNTYNKTDVA[p.A870T]TPFGGFKQSGFGKDLGEAALNEYLRV	VATPFGGFK,DVATPFGGF,NKTDVATPF,DVATPFGGFK,YNKTDVATPF,TDVATPFGGF	CRC
ALDH2	c.858delG	p.L286fs	TEIGRVIQVAAGSSNLKRVTLELGG[p.L286fs]RAPTSSCQMPIWIGPWNRPTSPCSSTRASAAVPAPGPSCRRTSMMSLWSGALPGPSLGWSGTPLIARPSRGRRWMKLSLRRSSATSTRGSKRGRSCCVVGALLLTVVTSSSPLCLEMCRMA*	SMMSLWSGA,MMSLWSGAL,SLGWSGTPL,VVGALLLTV,KLSLRRSSA,ATSTRGSKR,QMPIWIGPW,STRASAAVP,RTSMMSLWS,IARPSRGRR,PSRGRRWMK,RGRRWMKLS,RWMKLSLRR,SLRRSSATS,SATSTRGSK,STRGSKRGR,RGRSCCVVG,SSSPLCLEM,PIWIGPWNR,SSTRASAAV,TVVTSSSPL,RPTSPCSST,GPSCRRTSM,RPSRGRRWM,LELGGRAPT,RAPTSSCQM,CRRTSMMSL,RRTSMMSLW,SLWSGALPG,SGALPGPSL,LGWSGTPLI,GRRWMKLSL,RSCCVVGAL,MPIWIGPWN,SMMSLWSGAL,SLGWSGTPLI,CVVGALLLTV,VVGALLLTVV,SSATSTRGSK,CQMPIWIGPW,STRASAAVPA,RASAAVPAPG,SCRRTSMMSL,RTSMMSLWSG,TSMMSLWSGA,RPSRGRRWMK,RGRRWMKLSL,GSKRGRSCCV,RGRSCCVVGA,RSCCVVGALL,MPIWIGPWNR,LIARPSRGRR,SATSTRGSKR,CSSTRASAAV,LTVVTSSSPL,APTSSCQMPI,GPWNRPTSPC,SPCSSTRASA,GPSCRRTSMM,GRAPTSSCQM,CRRTSMMSLW,MSLWSGALPG,WSGALPGPSL,GALPGPSLGW,IARPSRGRRW,MKLSLRRSSA,GRSCCVVGAL,TSSSPLCLEM,LELGGRAPTS,SPLCLEMCRM	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ALDH3A1	c.1685delC	p.P562fs	ETFSHRRSCLVRPLMNDEGLKVRYP[p.P562fs]RARPR*	GLKVRYPRA,KVRYPRARP,EGLKVRYPR,GLKVRYPRAR,KVRYPRARPR	STAD
ALG2	c.905C>A	p.S302Y	NVEHYQELKKMVQQSDLGQYVTFLR[p.S302Y]YFSDKQKISLLHSCTCVLYTPSNEHF	TFLRYFSDK,QYVTFLRYF,RYFSDKQKI,GQYVTFLRY,YVTFLRYFS,LGQYVTFLRY,VTFLRYFSDK,FLRYFSDKQK,GQYVTFLRYF	CRC
ALK8H1	c.409A>G	p.K137E	WHWVKQCLKLYSQKPNVCNLDKHMS[p.K137E]EEETQDLWEQSKEFLRYKEATKRRPR	SEEETQDLW,HMSEEETQDL,MSEEETQDLW	LUAD
ALPK2	c.1067delT	p.L356fs	ECSDVMTDYSNAVWQRNLLGTEHVF[p.L356fs]Y*	LLGTEHVFY,NLLGTEHVFY	STAD
ALPK2	c.1568delA	p.K523fs	LLSGESENSGMSQCWETAADKRVGG[p.K523fs]RTYGARGVQGNLPG*	RVGGRTYGA,RTYGARGVQ,RVGGRTYGAR,RTYGARGVQG,TAADKRVGGR,ADKRVGGRTY	UCEC
ALPK2	c.157G>A	p.D53N	DAVLRCIISGQPKPEVTWYKNGQAI[p.D53N]NGSGIISNYEFFENQYIHVLHLSCCT	NGSGIISNY,GQAINGSGI,INGSGIISNY,GQAINGSGII	LUSC
ALPPL2	c.92G>C	p.W31S	VLLLLGLRLQLSLGIIPVEEENPDF[p.W31S]SNRQAAEALGAAKKLQPAQTAAKNLi	SNRQAAEAL,FSNRQAAEAL	TGCT
ALX4	c.377G>A	p.R126Q	PPPQPQPQQQQPQPQPPAQPHLYLQ[p.R126Q]QGACKTPPDGSLKLQEGSSGHSAALQ	YLQQGACKT,HLYLQQGACK,LQQGACKTPP	BLCA
AM8N	c.674C>A	p.S225Y	QGPSLPGLDFADPQGSTIFQIARLI[p.S225Y]YHGPMPQNKQSPLYPGMLYVPFGANQ	IFQIARLIY,FQIARLIYH,ARLIYHGPM,TIFQIARLIY,IARLIYHGPM,IYHGPMPQNK,FQIARLIYHG	UCEC
AMDHD1	c.7A>G	p.S3G	MA[p.S3G]GGHSLLLENAQQVVLVCARGERFLAR	MAGGHSLLL	ACC
AMPH	c.874C>T	p.R292W	PSPLPSPTASPNHTLAPASPAPARP[p.R292W]WSPSQTRKGPPVPPLPKVTPTKELQQ	APARPWSPS,RPWSPSQTRK	CRC
ANAPC1	c.1609A>G	p.T537A	PGLPAPSLTMSNTMPRPSTPLDGVS[p.T537A]APKPLSKLLGSLDEVVLLSPVPELRD	VSAPKPLSK,APKPLSKLL,GVSAPKPLSK	PAAD,PRAD
ANK2	c.1358A>G	p.N453S	TESGLTPIHVAAFMGHLNIVLLLQ[p.N453S]SGASPDVTNIRGETALHMAARAGQVE	VLLLQSGA,LQSGASPDV,LLQSGASPDV,LQSGASPDVT	KIRC
ANK2	c.9227A>T	p.Q3076L	DDEAFEARVKEEEQKIFGLMVDRQS[p.Q3076L]LGTTPDTTPARTPTEEGTPTSEQNPF	GLMVDRQSL,RQSLGTTPD,LMVDRQSLGT,FGLMVDRQSL,RQSLGTTPDT	LUAD
ANK3	c.3966T>A	p.D1322E	LATQLYRELICVPYMAKFVVFAKMN[p.D1322E]EPVESSLRCFCMTDDKVDKTLEQQEN	KMNEPVESS,VVFAKMNEPV,KMNEPVESSL,EPVESSLRCF	TGCT
ANKDD1A	c.71G>A	p.R24H	MQEELAWETDGLLPLERQLHEAA[p.R24H]HQNNVGRMQELIGRRVNTRARNHVGR	HEAAHQNNV,AHQNNVGRM,EAAHQNNVGR,LERQLHEAAH,RQLHEAAHQN,AAHQNNVGRM	UCEC
ANKFN1	c.840G>T	p.M280I	YRLYRRMKTGFEHARAPEMPTNVCL[p.M280I]IVTSSTSLTVSFQEPLSVNAAVVTRY	EMPTNVCLI,LIVTSSTSL,MPTNVCLIV,CLIVTSSTSL,EMPTNVCLIV,IVTSSTSLTV,MPTNVCLIVT,PEMPTNVCLI	LUSC
ANKLE1	c.1930_1933delTGTT	p.C644fs	TAAPISGFRRGVCVCVCVCVCVCVC[p.C644fs]VCVCVCREHPGRSPPG*	CVCREHPGR,REHPGRSPP,CVCVCVCVCR,REHPGRSPPG	TGCT
ANKLE1	c.1932_1933delTT	p.C644fs	TAAPISGFRRGVCVCVCVCVCVCVC[p.C644fs]VCVCVCVGSTQADLPQAERGLCYRWYCWRGSK*	RWYCWRGSK,CYRWYCWRG,QAERGLCYR,LCYRWYCWR,PQAERGLCY,AERGLCYRW,RGLCYRWYCW,GLCYRWYCWR,LPQAERGLCY,AERGLCYRWY	TGCT
ANKMY1	c.905A>T	p.N302I	KELDARIFLNEIPPFVEDGEPWFII[p.N302I]IETPLLVKIQKQTYKFRNKPAHTSWN	FIIIETPLL,IIIETPLLV,IIETPLLVK,IETPLLVKI,FIIIETPLLV,IIIETPLLVK,WFIIIETPLL,GEPWFIIIET	THCA
ANKRD11	c.1106A>G	p.K369R	KDEYEFDEDDEQDRVPPVDDKHLLK[p.K369R]RDYRKETKSNSFISIPKMEVKSYTKN	HLLKRDYRK,KHLLKRDYR,KHLLKRDYRK	TGCT
ANKRD11	c.6044A>C	p.Y2015S	SPKRFCPADPLHSAAPGPFSASEAP[p.Y2015S]SPAPPASPAPYALPVAEPGLEDVKDG	SASEAPSPA,EAPSPAPPA,SPAPPASPA,FSASEAPSPA,SPAPPASPAP,SEAPSPAPPA	TGCT

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ANKRD12	c.1879G>A	p.E627K	HKEKSKHQKDFHLEFGEKSNAKIKD[p.E627K]KDHSPTFENSDCTLKKMDKEGKTLKK	KSNAKIKDK,KDKDHSPTF,IKDKDHSPTF	BLCA
ANKRD12	c.2161G>C	p.E721Q	WKENFFKSDETEDLFLNMEHESLTL[p.E721Q]QKKSKLEKNIKDDKSTKEKHVSKERN	LQKKSKLEK,TLQKKSKLEK	CESC
ANKRD32	c.2996C>A	p.T999N	SEFILASKGLTHLNELLMACKSHKE[p.T999N]NTSVHTDWLLDLYAGNIKTLQKLPHI	KSHKENTSV,NTSVHTDWL,NTSVHTDWLL,KSHKENTSVH,KENTSVHTDW	BLCA
ANKRD36	c.1010C>G	p.P337R	TSDKDDSVSNTATEIKDEQKSGTVL[p.P337R]RAVEQCLNRSLYRPDAVAQPVTENEF	KSGTVLRAV,EQKSGTVLR,QKSGTVLRAV	CLL
ANKRD36	c.1133A>G	p.K378R	VAQPVTENEFSLESEIISKLYIPKR[p.K378R]RIISPRSIKDVLPPVEEAVDRCLYLL	RIISPRSIK,LYIPKRRII,KLYIPKRRI,KRRIISPRS,IPKRRIISP,RRIISPRSI,ISKLYIPKRR,KLYIPKRRII,KRRIISPRSI,IPKRRIISPR	KIRC
ANKRD36	c.3040G>T	p.D1014Y	SEKPPGLKATSDEKDSVLNIARGKK[p.D1014Y]YGEKTRTVSSQKPPTLKATSDEEDSV	RGKKYGEKTR,KKYGEKTRTV	CLL
ANKRD36	c.3431T>C	p.M1144T	KSRTVSSPKQPALKAICDKEDSVPN[p.M1144T]TATEKKDEQISGTVSCQKQPALKATS	SVPNTATEK,KEDSVPNTA,SVPNTATEKK,KEDSVPNTAT	CESC
ANKRD36C	c.1313A>G	p.H438R	LEKDTIKNQNLEKKYLKDFEIVKRK[p.H438R]REDLQKA	IVKRKREDL	PAAD,PRAD
ANKRD50	c.1909G>A	p.V637M	WTALRSAAWGGHTEVVSALLYAGVK[p.V637M]MDCADADSRTALRAAAWGGHEDIVLN	ALLYAGVKM,SALLYAGVKM	TGCT
ANKRD6	c.1435C>T	p.R479C	TQHQMRVLDKLMVERLSAERTECLN[p.R479C]CLQQHSDTEKHEGEKRQISLVDELKT	CLQQHSDTEK,AERTECLNCL	CRC
ANO2	c.1000C>T	p.R334C	PLHDGEYDSPEDDMNDRKLLYQEWA[p.R334C]CYGVFYKFQPIDLIRKYFGEKIGLYF	YQEWACYGV,WACYGVFYK,ACYGVFYKF,LLYQEWACY,EWACYGVFY,QEWACYGVF,LYQEWACYGV,YQEWACYGVF,WACYGVFYKF,KLLYQEWACY,EWACYGVFYK,QEWACYGVFY	GBM
ANO3	c.121G>T	p.A41S	GMNISKSEITKETSLKPSRRSLPCL[p.A41S]SQSYAYSKSLSQSTSLFQSTESESQA	LSQSYAYSK,SLPCLSQSY,SLPCLSQSYA,CLSQSYAYSK,RSLPCLSQSY,SQSYAYSKSL,LPCLSQSYAY	LUAD
ANO3	c.2868G>T	p.M956I	IAYLIPDVPKGLHDRIRREKYLVQE[p.M956I]IMYEAELEHLQQQRRKSGQPVHHEWP	LVQEIMYEA,KYLVQEIMY,IMYEAELEH,REKYLVQEI,EKYLVQEIM,QEIMYEAEL,YLVQEIMYEA,IMYEAELEHL,RREKYLVQEI,REKYLVQEIM,EKYLVQEIMY,VQEIMYEAEL	CESC
ANXA6	c.692G>A	p.R231Q	RSKQHLRLVFDEYLKTTGKPIEASI[p.R231Q]QGELSGDFEKLMLAVVKCIRSTPEYF	IQGELSGDF,IEASIQGEL	HNSC
AOC3	c.237_238insG	p.L79fs	QSQLFADLSREELTAVMRFLTQRLG[p.L79fs]ARAGGCSPGPALGQLCLLSGVAAASQGCSPGSLGQGEPPTCPGGTGHRLLWQATPAQRE*	GQLCLLSGV,CLLSGVAAA,RLLWQATPA,RFLTQRLGA,FLTQRLGAR,LWQATPAQR,SPGPALGQL,GPALGQLCL,CPGGTGHRL,TQRLGARAG,SQGCSPGSL,FLTQRLGARA,RFLTQRLGAR,LLWQATPAQR,GPALGQLCLL,CPGGTGHRLL,MRFLTQRLGA,GQLCLLSGVA,HRLLWQATPA	STAD
AOX1	c.1520C>T	p.A507V	GRHWNEQMLDIACRLILNEVSLLGS[p.A507V]VPGGKVEFKRTLIISFLFKFYLEVSQ	LLGSVPGGK,NEVSLLGSV,LLGSVPGGKV,SLLGSVPGGK,SVPGGKVEFK,GSVPGGKVEF	GBM
AP1G1	c.2168G>T	p.R723L	NDIAAGIPSITAYSKNGLKIEFTFE[p.R723L]LSNTNPSVTVITIQASNSTELDMTDF	ELSNTNPSV,LKIEFTFEL,FELSNTNPS,IEFTFELSN,GLKIEFTFEL,IEFTFELSNT,FELSNTNPSV	LUAD
AP1G2	c.727G>A	p.D243N	PQLVHILRTLVTMGYSTEHSISGVS[p.D243N]NPFLQVQILRLLRILGRNHEESSETM	GVSNPFLQV,NPFLQVQIL,SISGVSNPF,SISGVSNPFL,HSISGVSNPF,NPFLQVQILR,VSNPFLQVQI	HNSC
AP3S1	c.121_124delAAGA	p.K41fs	LSKFYQPYSEDTQQQIIRETFHLVS[p.K41fs]EMKMFVIS*	LVSEMKMFV,TFHLVSEMK,ETFHLVSEM,FHLVSEMKM,HLVSEMKMF,SEMKMFVIS,RETFHLVSE,HLVSEMKMFV,LVSEMKMFVI,ETFHLVSEMK,RETFHLVSEM,FHLVSEMKMF	PAAD
AP4B1	c.826C>T	p.R276W	VVMGATKLFLILAKMFPHVQTDVLV[p.R276W]WVKGPLLAACSSESRELCFVALCHVR	VQTDVLVWV,VLVWVKGPL,QTDVLVWVK,HVQTDVLVW,VLVWVKGPLL,HVQTDVLVWV,VQTDVLVWVK,DVLVWVKGPL	PRAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
APBA1	c.1870G>A	p.E624K	LIAQSIGQAFSVAYQEFLRANGINP[p.E624K]KDLSQKEYSDLLNTQDMYNDDLIHFS	FLRANGINPK,GINPKDLSQK,NPKDLSQKEY	CRC
APBA1	c.2190G>T	p.K730N	QIMSINGTSLVGLPLSTCQSIIKGL[p.K730N]NNQSRVKLNIVRCPPVTTVLIRRPDL	GLNNQSRVK,KGLNNQSRVK,IIKGLNNQSR	CRC
APBB2	c.729_730insC	p.T243fs	EDGQVATVSSSPETKKDHPKTGAKT[p.T243fs]RLCTAPDPEPGTER*	GAKTRLCTA,KTRLCTAPD,KTRLCTAPDP,HPKTGAKTRL	LUAD
APC	c.2540delA	p.E847fs	PYLNTTVLPSSSSSRGSLDSSRSEK[p.E847fs]IEVWRENAELV*	SSRSEKIEV,EVWRENAEL,EVWRENAELV,SSRSEKIEVW,IEVWRENAEL	CRC
APC	c.4060delT	p.F1354fs	PRTKSSRLQGSSLSSESARHKAVEF[p.F1354fs]LQERNLPPKVVLRHPKVHLNTMFRRPHSCLADVLLSVHLIVLRVVRLPAPFRVNHAVEW*	CLADVLLSV,VLLSVHLIV,LLSVHLIVL,TMFRRPHSC,SVHLIVLRV,KVHLNTMFR,LSVHLIVLR,VVRLPAPFR,RVVRLPAPF,KVVLRHPKV,VLRHPKVHL,MFRRPHSCL,VLRVVRLPA,KAVEFLQER,NLPPKVVLR,HLIVLRVVR,DVLLSVHLI,HPKVHLNTM,RPHSCLADV,APFRVNHAV,ARHKAVEFL,RNLPPKVVL,FRVNHAVEW,LPAPFRVNH,VEFLQERNL,QERNLPPKV,ADVLLSVHL,TMFRRPHSCL,VLLSVHLIVL,SVHLIVLRVV,HLIVLRVVRL,FLQERNLPPK,KVHLNTMFRR,RVVRLPAPFR,SARHKAVEFL,RNLPPKVVLR,MFRRPHSCLA,VVRLPAPFRV,LLSVHLIVLR,DVLLSVHLIV,LSVHLIVLRV,HPKVHLNTMF,RPHSCLADVL,LPAPFRVNHA,NTMFRRPHSC,LQERNLPPKV,RHPKVHLNTM,HLNTMFRRPH,CLADVLLSVH,LRVVRLPAPF,ADVLLSVHLI	CRC
APOB	c.128C>T	p.A43V	LLLLLAGARAEEEMLENVSLVCPKD[p.A43V]VTRFKHLRKYTYNYEAESSSGVPGTA	VTRFKHLRK,LVCPKDVTR,DVTRFKHLR,VTRFKHLRKY,SLVCPKDVTR,DVTRFKHLRK,LVCPKDVTRF	CRC
APOB	c.2917C>A	p.L973M	TKTEVIPPLIENRQSWSVCKQVFPG[p.L973M]MNYCTSGAYSNASSTDSASYYPLTGD	GMNYCTSGA,KQVFPGMNY,MNYCTSGAY,GMNYCTSGAY,SVCKQVFPGM,CKQVFPGMNY,KQVFPGMNYC	LUAD
APOB	c.9306C>A	p.F3102L	FLSPSAQQASWQVSARFNQYKYNQN[p.F3102L]LSAGNNENIMEAHVGINGEANLDFLN	NQYKYNQNL,YKYNQNLSA,NLSAGNNENI,QYKYNQNLSA,FNQYKYNQNL,NQYKYNQNLS,YKYNQNLSAG,LSAGNNENIM	UCEC
APOB	c.9406C>T	p.R3136C	MEAHVGINGEANLDFLNIPLTIPEM[p.R3136C]CLPYTIITTPPLKDFSLWEKTGLKEF	TIPEMCLPY,PEMCLPYTI,LTIPEMCLPY,PEMCLPYTII,IPLTIPEMCL,IPEMCLPYTI	CRC
APOBR	c.2519G>T	p.R840L	SQVEAFESREGGPWGGRVEAEESAG[p.R840L]VEDSCGLDPAGSQTARAEGMGAMVEA	VEAEESAGV,VEDSCGLDPA	LUAD
APOD	c.344C>T	p.S115L	IEGEATPVNLTEPAKLEVKFSWFMP[p.S115L]LAPYWILATDYENYALVYSCTCIIQL	FMPLAPYWI,WFMPLAPYW,KFSWFMPLA,SWFMPLAPY,MPLAPYWIL,VKFSWFMPL,FSWFMPLAPY,FMPLAPYWIL,SWFMPLAPYW,WFMPLAPYWI,EVKFSWFMPL,VKFSWFMPLA,MPLAPYWILA	CESC
APOE	c.388T>C	p.C130R	EETRARLSKELQAAQARLGADMEDV[p.C130R]RGRLVQYRGEVQAMLGQSTEELRVRL	RGRLVQYRG,MEDVRGRLV,DVRGRLVQYR	ACC
APOOL	c.412A>C	p.I138L	PKMGVITVSGLAGLVSARKGSKFKK[p.I138L]LTYPLGLATLGATVCYPVQSVIIAKV	KLTYPLGLA,KFKKLTYPL,GSKFKKLTY,KKLTYPLGL,LTYPLGLATL,KFKKLTYPLG,KGSKFKKLTY,SKFKKLTYPL,FKKLTYPLGL	CLL
APPL1	c.2002C>T	p.R668W	ERVKEKQQKELNKQKQIEKDLEEQS[p.R668W]WLIAASSRPNQASSEGQFVVLSSSQS	SWLIAASSR,LEEQSWLIA,EEQSWLIAA,QSWLIAASSR,IEKDLEEQSW,LEEQSWLIAA,EEQSWLIAAS,KDLEEQSWLI	CRC
AQP10	c.782A>T	p.Q261L	SAGNGWWWVPVVAPLVGATVGTATY[p.Q261L]LLLVALHHPEGPEPAQDLVSAQHKAS	GTATYLLLV,ATYLLLVAL,ATVGTATYL,TVGTATYLL,GTATYLLLVA,ATYLLLVALH,ATVGTATYLL	LUAD
AQP2	c.203A>C	p.N68T	QIAMAFGLGIGTLVQALGHISGAHI[p.N68T]TPAVTVACLVGCHVSVLRAAFYVAAQ	HITPAVTVA,SGAHITPAV,TPAVTVACL,AHITPAVTV,HISGAHITPA,ITPAVTVACL,TPAVTVACLV,AHITPAVTVA	KIRP
AQPEP	c.925G>A	p.A309T	KEDVNGSKWTVTTFSTTPHMPTYLV[p.A309T]TFVICDYDHVNRTERGKEIRIWARKD	HMPTYLVTF,PTYLVTFVI,TYLVTFVIC,LVTFVICDY,MPTYLVTFV,HMPTYLVTFV,PHMPTYLVTF,YLVTFVICDY,MPTYLVTFVI	CRC

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
ARAP3	c.3677G>T	p.R1226L	ASLLLKKVPLAQAGCLFTGIRRESP[p.R1226L]LVGLLRCREEPPRLLGSRFQERFFLL	GIRRESPLV,TGIRRESPL,RRESPLVGL,RESPLVGLL,FTGIRRESPL,IRRESPLVGL	LUAD
ARF4	c.446G>A	p.R149H	FANKQDLPNAMAISEMTDKLGLQSL[p.R149H]HNRTWYVQATCATQGTGLYEGLDWLS	SLHNRTWYV,HNRTWYVQA,QSLHNRTWY,LQSLHNRTW,QSLHNRTWYV,LQSLHNRTWY,KLGLQSLHNR,GLQSLHNRTW	CRC
ARFGAP2	c.113G>A	p.S38N	LFKRLRAVPTNKACFDCGAKNPSWA[p.S38N]NITYGVFLCIDCSGVHRSLGVHLSFI	SWANITYGV,NPSWANITY,WANITYGVF,AKNPSWANI,ANITYGVFL,SWANITYGVF,GAKNPSWANI,KNPSWANITY,NITYGVFLCI,WANITYGVFL	PRAD
ARFGAP3	c.896delA	p.N299fs	SLRLAYKDLEIQMKKDEKMNISGKK[p.N299fs]MLTQTDSAWDLEIAEVLFHIQ*	KMLTQTDSA,EIAEVLFHI,KMNISGKKM,DSAWDLEIA,MLTQTDSAW,TQTDSAWDL,LEIAEVLFH,WDLEIAEVL,QTDSAWDLEI,SAWDLEIAEV,KMNISGKKML,EKMNISGKKM,KKMLTQTDSA,KMLTQTDSAW,LEIAEVLFHI,WDLEIAEVLF	PRAD
ARFGEF1	c.4654_4655insC	p.P1552fs	LDIFKTTIPHALLTWRPNSGETAPP[p.P1552fs]TSISCK*	ETAPPTSIS,GETAPPTSI,ETAPPTSISC	STAD
ARFGEF1	c.4894G>A	p.D1632N	KFPEQKLFAALLIKCVVQLELIQTI[p.D1632N]NNIVFFPATSKKEDAENLAAAQRDAV	ELIQTINNI,LIQTINNIV,QTINNIVFF,IQTINNIVF,TINNIVFFPA,ELIQTINNIV,IQTINNIVF,LIQTINNIVF,LELIQTINNI	CRC
ARFIP2	c.257G>T	p.R86L	GLIPTGSGRHPSHSTTPSGPGDEVA[p.R86L]LGIAGEKFDIVKKWGINTYKCTKQLL	VALGIAGEK,ALGIAGEKF,DEVALGIAG,VALGIAGEKF,DEVALGIAGE	LUAD
ARHGAP24	c.103A>G	p.T35A	NPQQGQGRQNAIKCGWLRKQGGFVK[p.T35A]AWHTRWFVLKGDQLYYFKDEDETKPL	KAWHTRWFV,AWHTRWFVL,GFVKAWHTR,RKQGGFVKA,KQGGFVKAW,FVKAWHTRW,VKAWHTRWF,AWHTRWFVLK,GFVKAWHTRW,KAWHTRWFVL,FVKAWHTRWF,RKQGGFVKAW	TGCT
ARHGAP32	c.3757G>A	p.E1253K	LEFADKSPTPPNLPSDKIYPPSGSP[p.E1253K]KENTSTATMTYMTTTPATAQMSTKEA	SPKENTSTA,KENTSTATM,KIYPPSGSPK,SPKENTSTAT,KENTSTATMT	CRC
ARHGAP36	c.382C>T	p.R128C	GQQRAVSHKTFGISLEEVLVNEFTR[p.R128C]CKHLELTATMQVEEATGQAAGRRRGN	LVNEFTRCK,FTRCKHLEL,CKHLELTAT,NEFTRCKHL,VLVNEFTRCK,CKHLELTATM	CRC
ARHGAP36	c.440C>T	p.A147V	VNEFTRRKHLELTATMQVEEATGQA[p.A147V]VGRRRGNVVRRVFGRIRRFFSRRRNE	VGRRRGNVV,VEEATGQAV,VGRRRGNVVR	CRC
ARHGAP36	c.47C>A	p.P16H	MGGCIPFLKAARALC[p.P16H]HRIMPPLLLLSAFIFLVSVLGGAPGH	KAARALCHR,AARALCHRI,RALCHRIMP,LKAARALCH,ARALCHRIM,HRIMPPLLL,ALCHRIMPPL,KAARALCHRI,AARALCHRIM,RALCHRIMPP,HRIMPPLLLL	LUAD
ARHGAP5	c.2071A>T	p.M691L	ESLSFIGEFIGKIRTEASQIRKDKY[p.M691L]LANLPFTLILANQRDSISKNLPILRH	YLANLPFTL,KYLANLPFT,QIRKDKYLA,LANLPFTLI,DKYLANLPF,SQIRKDKYL,RKDKYLANL,YLANLPFTLI,KYLANLPFTL,KDKYLANLPF,LANLPFTLIL	GBM
ARHGAP5	c.2670delT	p.D890fs	RAFLSEVQDTIPVQLVAVTDSQADF[p.D890fs]LKMRLSKS*	VTDSQADFL,FLKMRLSKS,DFLKMRLSK,VTDSQADFLK,SQADFLKMRL,DSQADFLKMR	CRC,STAD
ARHGAP9	c.409C>T	p.R137C	QQVSLAEGDRFLLLRKTNSDWWLAR[p.R137C]CLEAPSTSRPIFVPAAYMIEESIPSQ	SDWWLARCL,WLARCLEAPS	BRCA
ARHGEF17	c.1844delC	p.A615fs	VQEARQVFEKIQRMGAQQDDGSDAP[p.A615fs]LEALTGQGM*	LEALTGQGM,QQDDGSDAPL	STAD
ARHGEF5	c.1460A>G	p.E487G	PISLLGSFLTEESPDKEIDQNSQQE[p.E487G]GSRLRKGTVSSQGTEVVFASASVTPP	GSRLRKGTV,SQQEGSRLRK	KIRC
ARHGEF5	c.4535delC	p.S1512fs	EKLRWISALAMPREELDLLECYNSP[p.S1512fs]RYSAFEPTSPERMMNWHWRKPTW*	RMMNWHWRK,NWHWRKPTW,CYNSPRYSA,LLECYNSPR,YNSPRYSAF,LECYNSPRY,LLECYNSPRY,MMNWHWRKPT,SAFEPTSPER,CYNSPRYSAF,RMMNWHWRKP,DLLECYNSPR,SPRYSAFEPT,MNWHWRKPTW,FEPTSPERMM,SPERMMNWHW	STAD
ARID1A	c.1841C>T	p.S614L	QTAYSQQRFPPPQELSQDSFGSQAS[p.S614L]LAPSMTSSKGGQEDMNLSLQSRPSSL	SLAPSMTSS,LAPSMTSSK,DSFGSQASL,SQASLAPSM,SLAPSMTSSK,DSFGSQASLA,GSQASLAPSM,SQASLAPSMT	BLCA
ARID1A	c.3211delA	p.K1071fs	KFLDLYRLYVSVKEIGGLTQVNKNK[p.K1071fs]NGGNLQPTSMWAHQAVLPAP*	SMWAHQAVL,NLQPTSMWA,TSMWAHQAV,WAHQAVLPA,LQPTSMWAH,TSMWAHQAVL,SMWAHQAVLP,MWAHQAVLPA	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ARID1A	c.3972delC	p.Y1324fs	STGAPQPNLMPSNPDSGMYSPSRYP[p.Y1324fs]RSSSSSSSNDMIPMAISSPPKAPLLAAPSPASRLQCINSNSRITSGQWMAHMALLPSGTKGRCTACHTALGRGSLSSSSCPQPSPSLPASNKLPSLPLSKMYTTSMAMPILPLPQLLLSADQQAAPRTNFHSSLAETVSLHPLAPMPSKTCHHK*	GQWMAHMAL,KMYTTSMAM,YTTSMAMPI,SMAMPILPL,HMALLPSGT,LLSADQQAA,MALLPSGTK,KLPSLPLSK,PMAISSPPK,QWMAHMALL,MYSPSRYPR,KGRCTACHT,LSKMYTTSM,RTNFHSSLA,HPLAPMPSK,LAAPSPASR,TACHTALGR,HTALGRGSL,TTSMAMPIL,ETVSLHPLA,YPRSSSSSS,IPMAISSPP,SPASRLQCI,LPASNKLPS,LPSLPLSKM,MPILPLPQL,APRTNFHSS,QQAAPRTNF,SSSNDMIPM,VSLHPLAPM,SSSSSSNDM,ISSPPKAPL,SRITSGQWM,MAHMALLPS,AHMALLPSG,RCTACHTAL,SNKLPSLPL,SKMYTTSMA,FHSSLAETV,SSLAETVSL,AETVSLHPL,LPLPQLLLS,GQWMAHMALL,AMPILPLPQL,LLLSADQQAA,WMAHMALLPS,KLPSLPLSKM,GMYSPSRYPR,HMALLPSGTK,CTACHTALGR,MYTTSMAMPI,IPMAISSPPK,RLQCINSNSR,KGRCTACHTA,ASNKLPSLPL,LSKMYTTSMA,TSMAMPILPL,RTNFHSSLAE,ITSGQWMAHM,LLAAPSPASR,LSADQQAAPR,SSNDMIPMAI,YTTSMAMPIL,TVSLHPLAPM,YPRSSSSSSS,SPPKAPLLAA,APLLAAPSPA,CPQPSPSLPA,SPSLPASNKL,LPASNKLPSL,MPILPLPQLL,APRTNFHSSL,SKMYTTSMAM,LPSLPLSKMY,SSSSSSSNDM,SSSSNDMIPM,ISSPPKAPLL,LAAPSPASRL,LQCINSNSRI,SGQWMAHMAL,GRCTACHTAL,SSCPQPSPSL,KMYTTSMAMP,DQQAAPRTNF,QQAAPRTNFH,HSSLAETVSL,LAETVSLHPL,LPLPQLLLSA,AETVSLHPLA	STAD
ARID1A	c.5542delG	p.G1848fs	VDCSDKLGRVQEFDSGLLHWRIGGG[p.G1848fs]TPLSISRPTSRARQSCCLPGLTHPAHQPLGSM*	RQSCCLPGL,CLPGLTHPA,LSISRPTSR,ISRPTSRAR,RARQSCCLP,LTHPAHQPL,RPTSRARQS,WRIGGGTPL,LPGLTHPAH,GLTHPAHQPL,LLHWRIGGGT,SISRPTSRAR,HWRIGGGTPL,TSRARQSCCL,RARQSCCLPG,RPTSRARQSC,HPAHQPLGSM,RIGGGTPLSI,ARQSCCLPGL,RQSCCLPGLT	STAD
ARID1A	c.6415delC	p.P2139fs	RLVLETLSKLSIQDNNVDLILATPP[p.P2139fs]SAAWRSCIALWCASSVTERTRCAGRWLWYCWPTWLRGTAWQLVPLQCRRAVSATSWAS*	IALWCASSV,ALWCASSVT,WLRGTAWQL,GTAWQLVPL,ILATPPSAA,AWRSCIALW,RWLWYCWPT,WLWYCWPTW,LWYCWPTWL,RTRCAGRWL,RAVSATSWA,RCAGRWLWY,WYCWPTWLR,QLVPLQCRR,WPTWLRGTA,VPLQCRRAV,SAAWRSCIA,LATPPSAAW,AAWRSCIAL,LQCRRAVSA,RRAVSATSW,CIALWCASSV,WLWYCWPTWL,WLRGTAWQLV,CAGRWLWYCW,RWLWYCWPTW,TWLRGTAWQL,RTRCAGRWLW,LATPPSAAWR,LWCASSVTER,VTERTRCAGR,LWYCWPTWLR,SAAWRSCIAL,WPTWLRGTAW,ILATPPSAAW,AAWRSCIALW,TERTRCAGRW,RGTAWQLVPL,LQCRRAVSAT,CRRAVSATSW,RAVSATSWAS	STAD
ARID3A	c.1649_1650delGA	p.G550fs	NGIMYTGVLFAQPPAPTPTSAPNKG[p.G550fs]RRRRRQQQQRRRPGRKHRNQRRPGWASGAVHTLHIYLK*	QQRRRPGRK,AVHTLHIYL,GAVHTLHIY,WASGAVHTL,RPGWASGAV,NQRRPGWAS,AVHTLHIYLK,GWASGAVHTL,QQQRRRPGRK,SGAVHTLHIY,RQQQQRRRPG	CLL
ARID4A	c.3462T>A	p.D1154E	LNVSKPQKLARSPARISPHIKDGEK[p.D1154E]EKHREKHPNSSPRTYKWSFQLNELDN	HIKDGEKEK	CLL
ARL13B	c.1073G>T	p.R358L	ETDRPSLESANGKKKTKKLRMKRNH[p.R358L]LVEPLNIDDCAPESPTPPPPPPPVGW	KLRMKRNHL,RMKRNHLVE,LRMKRNHLV,KRNHLVEPL,KLRMKRNHLV,RMKRNHLVEP,MKRNHLVEPL,KKLRMKRNHL	LUAD
ARL16	c.16G>A	p.G6R	MRVAG[p.G6R]RRALSRGAELRVPGGAKHGMCLLLGA	RVAGRRALS,MRVAGRRAL,RVAGRRALSR,AGRRALSRGA,RRALSRGAEL	SKCM
ARL6IP1	c.223A>T	p.M75L	GVVSLVFLIIYYLDPSVLSGVSCFV[p.M75L]LFLCLADYLVPILAPRIFGSNKWTTE	GVSCFVLFL,SGVSCFVLF,VLFLCLADY,LSGVSCFVL,VLSGVSCFVL,VLFLCLADYL,LSGVSCFVLF,FVLFLCLADY	MM
ARMC3	c.1540G>A	p.A514T	LRSKNDEVRKHASWAVMVCAGDELT[p.A514T]TNELCRLGALDILEEVNVSGTRKNKF	TTNELCRLGA	TGCT
ARMC4	c.64G>A	p.E22K	MGVALRKLTQWTAAGHGTGIL[p.E22K]KITPLNEAILKEIIVFVESFIYKHPQ	KITPLNEAI,AGHGTGILK,TGILKITPL,LKITPLNEA,ILKITPLNEA,AAGHGTGILK,LKITPLNEAI	SKCM
ARNTL	c.1184C>T	p.T395M	GTSCYEYFHQDDIGHLAECHRQVLQ[p.T395M]MREKITTNCYKFKIKDGSFITLRSRW	RQVLQMREK,LQMREKITT,AECHRQVLQM,RQVLQMREKI,LQMREKITTN,MREKITTNCY	CRC
ARPC1A	c.636C>A	p.F212L	SKMPFGQLMSEFGGSGTGGWVHGVSL[p.F212L]LSASGSRLAWVSHDSTVSVADASKSV	WVHGVSLSA,SLSASGSRL,GGWVHGVSL,SLSASGSRLA,GVSLSASGSR,VSLSASGSRL,LSASGSRLAW	LUSC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ARPP21	c.1013G>A	p.R338H	SSSENELKWSDHQRAWSSTDSDSSN[p.R338H]HNLKPAMTKTASFGGITVLTRGDSTS	HNLKPAMTK,SNHNLKPAM,SSNHNLKPAM	CRC
ARPP21	c.388delA	p.I130fs	HNVEKQDIATYYCALWEVHSKLGKK[p.I130fs]SRYLVPEQSLSLQINNLMQMFPPSPLFFFLQLLKQSSRRLEHTFVFLRNFSLMLLRYIGKKRRATRFWDPRRGTP*	SLSLQINNL,MQMFPPSPL,RLEHTFVFL,FVFLRNFSL,FLRNFSLML,LQINNLMQM,LFFFLQLLK,LMLLRYIGK,MLLRYIGKK,RNFSLMLLR,RATRFWDPR,RYLVPEQSL,QMFPPSPLF,MFPPSPLFF,RRLEHTFVF,VFLRNFSLM,HSKLGKKSR,KLGKKSRYL,LGKKSRYLV,KSRYLVPEQ,KQSSRRLEH,SSRRLEHTF,RYIGKKRRA,IGKKRRATR,ATRFWDPRR,NFSLMLLRY,LLRYIGKKR,SPLFFFLQL,LLKQSSRRL,YIGKKRRAT,QINNLMQMF,HTFVFLRNF,SKLGKKSRY,LSLQINNLM,LRNFSLMLL,GKKRRATRF,KKRRATRFW,FPPSPLFFF,PPSPLFFFL,KLGKKSRYLV,YLVPEQSLSL,LMQMFPPSPL,FVFLRNFSLM,FLRNFSLMLL,SLSLQINNLM,PLFFFLQLLK,RLEHTFVFLR,SLMLLRYIGK,LMLLRYIGKK,LQINNLMQMF,MQMFPPSPLF,QMFPPSPLFF,MFPPSPLFFF,RRLEHTFVFL,TFVFLRNFSL,VFLRNFSLML,KSRYLVPEQS,SSRRLEHTFV,HTFVFLRNFS,RATRFWDPRR,ATRFWDPRRG,HSKLGKKSRY,RNFSLMLLRY,FLQLLKQSSR,MLLRYIGKKR,LLRYIGKKRR,YIGKKRRATR,FPPSPLFFFL,SPLFFFLQLL,SRYLVPEQSL,SLQINNLMQM,LKQSSRRLEH,KQSSRRLEHT,QSSRRLEHTF,SRRLEHTFVF,VPEQSLSLQI	STAD
ARRB2	c.295A>C	p.T99P	LSFRKDLFIATYQAFPPVPNPPRPP[p.T99P]PRLQDRLLRKLGQHAHPFFFTVRMPL	RPPPRLQDRL	TGCT
ARRDC4	c.235A>G	p.T79A	ALRLEAQGRATAAWGPSTCPRASAS[p.T79A]AAALAVFSEVEYLNVRLSLREPPAGE	RASASAAAL,ASASAAALA,SASAAALAV,CPRASASAA,ASAAALAVF,AAALAVFSEV,STCPRASASA,RASASAAALA,ASASAAALAV,CPRASASAAA,SASAAALAVF	ACC
ARSD	c.701C>G	p.A234G	LGILTLAAGQTCGFFSVSARAVTGM[p.A234G]GGVGCLFFISWYSSFGFVRRWNCILM	MGGVGCLFF,SARAVTGMG,GMGGVGCLF,GMGGVGCLFF,SARAVTGMGG,TGMGGVGCLF	KIRC
ARSD	c.701_709delCCGGCGTGG	p.AGV234del	LGILTLAAGQTCGFFSVSARAVTGM[p.AGV234del]GCLFFISWYSSFGFVRRWNCILMRNHDVTEQPMV	TGMGCLFFI,VTGMGCLFF,SARAVTGMG,AVTGMGCLF,GMGCLFFISW,MGCLFFISWY,RAVTGMGCLF,AVTGMGCLFF	KIRC
ARSG	c.391G>A	p.V131I	FAVTSVGGLPLNETTLAEVLQQAGY[p.V131I]ITGIIGKWHLGHHGSYHPNFRGFDYY	QQAGYITGI,EVLQQAGYI,LQQAGYITG,LQQAGYITGI,QQAGYITGII,AGYITGIIGK,GYITGIIGKW,AEVLQQAGYI	CRC
ART1	c.729delC	p.I243fs	IWTCLGAPIKGYSFFPGEEEVLIPP[p.I243fs]LRPSK*	LIPPLRPSK,EEEVLIPPL,VLIPPLRPSK,GEEEVLIPPL	STAD
ASB16	c.745A>G	p.T249A	QHVALYLEHGADVGLRTSQGETALN[p.T249A]AACAGAEGPGSCRRHQAAARRLLEAG	ALNAACAGA,ETALNAACA,SQGETALNA,GETALNAAC,SQGETALNAA,GETALNAACA	ACC
ASCC1	c.619C>T	p.H207Y	QEEVLAKCSMDHGVDSSIFQNPKKL[p.H207Y]YLTIGMLVLLSEEEIQQTCEMLQQCK	YLTIGMLVL,FQNPKKLYL,KLYLTIGML,LYLTIGMLV,IFQNPKKLY,NPKKLYLTI,KKLYLTIGM,KLYLTIGMLV,YLTIGMLVLL,IFQNPKKLYL,LYLTIGMLVL,SIFQNPKKLY,KKLYLTIGML	CESC
ASCC2	c.1094G>T	p.R365L	CDNIQGFIEEFLQIFSSLLQEKRFL[p.R365L]LDYDALFPVAEDISLLQQASSVLDET	LLQEKRFLL,FLLDYDALF,RFLLDYDAL,QEKRFLLDY,LDYDALFPV,SLLQEKRFLL,FLLDYDALFP,LLDYDALFPV,RFLLDYDALF,LQEKRFLLDY,KRFLLDYDAL,LDYDALFPVA	LUAD
ASCC3	c.3590G>A	p.R1197Q	VKQCVHQIPSVMMEASIQPITRTVL[p.R1197Q]QVTLSIYADFTWNDQVHGTVGEPWWI	TVLQVTLSI,VLQVTLSIY,LQVTLSIYA,VLQVTLSIYA,ITRTVLQVTL,RTVLQVTLSI,TVLQVTLSIY,QPITRTVLQV	CRC
ASCC3	c.407G>A	p.R136Q	ETKAIKQMFGPFPSSSATAACNATN[p.R136Q]QIISHFSQDDLTALVQMTEKEHGDRV	ATNQIISHF,TAACNATNQI,NATNQIISHF	UCEC
ASCL4	c.105delC	p.D35fs	ALPYSLRTAPLGVPGTLPGLPRRDP[p.D35fs]SGSPCVWTPRAGSGRAAAAHGDGSTCPCRWTAPSSPPSSASATSASGSGCAA*	RAGSGRAAA,STCPCRWTA,WTAPSSPPS,TPRAGSGRA,APSSPPSSA,DPSGSPCVW,RAGSGRAAAA,RWTAPSSPPS,SGSPCVWTPR,TPRAGSGRAA	STAD
ASIC2	c.137G>T	p.R46L	RMAREEPAPAALAAAGQPGGGRGGE[p.R46L]LALQGPGVARRGRPSLSRAKLHGLRH	ELALQGPGV,GELALQGPG,QPGGGRGGEL,GELALQGPGV	KIRP

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
ASPDH	c.797A>G	p.Q266R	AVHTRRENPAEPGAVTGSATVTAFW[p.Q266R]RSLLACCQLPSRPGIHLC*	SATVTAFWR,TAFWRSLLA,RSLLACCQL,TVTAFWRSL,VTAFWRSLL,GSATVTAFWR,ATVTAFWRSL,TVTAFWRSLL,VTAFWRSLLA,WRSLLACCQL	ACC
ASPM	c.719C>T	p.S240F	EENKIPISPISPAFNECHGATCLPL[p.S240F]FVRRSTTYSSLHASENRELLNVHSAN	ATCLPLFVR,HGATCLPLF,FVRRSTTYS,LFVRRSTTY,TCLPLFVRR,LPLFVRRST,ATCLPLFVRR,LPLFVRRSTT,PLFVRRSTTY,CHGATCLPLF	LUAD
ASPN	c.201delT	p.F67fs	DDDDDDDDDEDNSLFPTREPRSHFF[p.F67fs]HLICFQCVHLDVSAIHELYIAQI*	DVSAIHELY,SHFFHLICF,CFQCVHLDV,RSHFFHLIC,EPRSHFFHL,HLICFQCVH,LDVSAIHEL,HLICFQCVHL,HLDVSAIHEL,AIHELYIAQI,RSHFFHLICF,DVSAIHELYI,EPRSHFFHLI,REPRSHFFHL,FQCVHLDVSA,LDVSAIHELY	STAD
ASTN2	c.661_663delCTG	p.L221del	EIVEEQMHILHISVMGGLIALLLLL[p.L221del]VFTVALYAQRRWQKRRRIPQKSASTEAT	LIALLLLLV,ALLLLLVFT,IALLLLLVF,GLIALLLLLV,ALLLLLVFTV,LIALLLLLVF	PRAD
ASXL2	c.3242C>T	p.S1081L	EGLSKATQDQILQTLIQRVRRQNLL[p.S1081L]LVVPPSQFNFAHSGFQLEDISTSQRF	RVRRQNLLL,LLVVPPSQF,RRQNLLLVV,RQNLLLVVP,RVRRQNLLLV,LLLVVPPSQF,LVVPPSQFNF,RQNLLLVVPP	LUSC
ASXL3	c.2618delA	p.E873fs	SIPELASTEMIKVKNHSVLQRTEKK[p.E873fs]CYLHHWNYLSFLKGQIIREMSFHLLNYRTSNISHQWIRLHFQKALEIKHISKGVHRVG*	EMSFHLLNY,YLHHWNYLS,IIREMSFHL,YLSFLKGQI,LLNYRTSNI,HISKGVHRV,MSFHLLNYR,ALEIKHISK,HWNYLSFLK,QWIRLHFQK,CYLHHWNYL,LHHWNYLSF,SHQWIRLHF,WIRLHFQKA,KCYLHHWNY,RTSNISHQW,SFLKGQIIR,SNISHQWIR,EIKHISKGV,GQIIREMSF,LQRTEKKCY,HHWNYLSFL,LSFLKGQII,LKGQIIREM,REMSFHLLN,IRLHFQKAL,LHFQKALEI,FQKALEIKH,YLHHWNYLSF,HLLNYRTSNI,YLSFLKGQII,FLKGQIIREM,QIIREMSFHL,IIREMSFHLL,RLHFQKALEI,HQWIRLHFQK,KALEIKHISK,HHWNYLSFLK,LSFLKGQIIR,CYLHHWNYLS,NYLSFLKGQI,ISHQWIRLHF,KCYLHHWNYL,RTSNISHQWI,KKCYLHHWNY,REMSFHLLNY,EMSFHLLNYR,TSNISHQWIR,MSFHLLNYRT,WIRLHFQKAL,LQRTEKKCYL,LHHWNYLSFL,KGQIIREMSF,LNYRTSNISH,YRTSNISHQW,FQKALEIKHI,LEIKHISKGV,KHISKGVHRV,TEKKCYLHHW	STAD
ASXL3	c.4409C>A	p.P1470Q	NRADNSGKPQQPPGGFAPAAINRSI[p.P1470Q]QCKVIVDHSTTLTSSLSLTVSVESSE	AINRSIQCK,RSIQCKVIV,AINRSIQCKV,AAINRSIQCK	LUAD
ATADS	c.913A>G	p.I305V	EIPDSTMSICVPSETVDEIVKSGYI[p.I305V]GESENSEISQQVRFKTVTVLAQVHPI	YIGESENSEI	TGCT
ATM	c.2399C>T	p.S800F	SLRNMMQLCTRCLSNCTKKSPNKIA[p.S800F]FGFFLRLLTSKLMNDIADICKSLASF	KIAFGFFLR,AFGFFLRLL,SPNKIAFGF,KKSPNKIAF,NKIAFGFFL,IAFGFFLRL,KIAFGFFLRL,KSPNKIAFGF,NKIAFGFFLR,SPNKIAFGFF,TKKSPNKIAF,IAFGFFLRLL	CESC
ATP10B	c.3910C>A	p.L1304I	CNSPTNPYWVMEGQLSNPTFYLVCF[p.L1304I]ITPVVALLPRYFFLSLQGTCGKSLIS	YLVCFITPV,LVCFITPVV,FITPVVALL,CFITPVVAL,YLVCFITPVV,FYLVCFITPV,CFITPVVALL,ITPVVALLPR,NPTFYLVCFI	UCEC
ATP10D	c.932G>A	p.R311H	AVVGIVVYAGHETKAMLNNSGPRYK[p.R311H]HSKLERRANTDVLWCVMLLVIMCLTG	SGPRYKHSK,RYKHSKLER,GPRYKHSKL,NSGPRYKHSK	CRC
ATP12A	c.2572C>T	p.R858C	LGTDIIPSIALAYEKAESDIMNRKP[p.R858C]CHKNKDRLVNQPLAVYSYLHIGLMQA	IMNRKPCHK,MNRKPCHKNK,DIMNRKPCHK	BLCA
ATP2A1	c.2110G>T	p.G704C	VEPSHKSKIVEYLQSYDEITAMTGD[p.G704C]CVNDAPALKKAEIGIAMGSGTAVAKT	CVNDAPALK,ITAMTGDCV,AMTGDCVNDA,CVNDAPALKK,EITAMTGDCV	KIRC
ATP2A1	c.2457_2458insC	p.R819fs	LVTDGLPATALGFNPPDLDIMDRPP[p.R819fs]PEPQGAPHQWLALLPLHGNRGLCGCSHRGSSCLVVPVR*	HQWLALLPL,GSSCLVVPV,RGLCGCSHR,ALLPLHGNR,SSCLVVPVR,APHQWLALL,LPLHGNRGL,CSHRGSSCL,EPQGAPHQW,LLPLHGNRGL,GSSCLVVPVR,CSHRGSSCLV,LALLPLHGNR,HQWLALLPLH,SHRGSSCLVV,RGSSCLVVPV	STAD
ATP2B4	c.548G>A	p.R183H	SVIVVLVTAFNDWSKEKQFRGLQC[p.R183H]HIEQEQKFSIIRNGQLIQLPVAEIVV	KQFRGLQCH,CHIEQEQKF,KQFRGLQCHI	CLL
ATP2C1	c.2170G>A	p.E724K	GTDVCKEAADMILVDDDFQTIMSAI[p.E724K]KEGKGIYNNIKNFVRFQLSTSIAALT	IMSAIKEGK,AIKEGKGIY,TIMSAIKEGK,SAIKEGKGIY,DFQTIMSAIK,KEGKGIYNNI	UCEC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ATP6AP2	c.355G>C	p.E119Q	ISYPLENAVPFSLDSVANSIHSLFS[p.E119Q]QETPVVLQLAPSEERVYMVGKANSVF	SLFSQETPV,FSQETPVVL,QETPVVLQL,SLFSQETPVV,HSLFSQETPV,LFSQETPVVL,SQETPVVLQL,QETPVVLQLA	HNSC
ATP6V0A4	c.572G>A	p.R191Q	MTGKLGFIAGVINRERMASFERLLW[p.R191Q]QICRGNVYLKFSEMDAPLEDPVTKEE	SFERLLWQI,WQICRGNVY,FERLLWQIC,LLWQICRGNV,WQICRGNVYL,QICRGNVYLK,LWQICRGNVY,ASFERLLWQI	CRC
ATP6V1A	c.710T>C	p.L237P	RQVRPVTEKLPANHPLLTGQRVLDA[p.L237P]PFPCVQGGTTAIPGAFGCGKTVISQS	VLDAPFPCV,GQRVLDAPF,RVLDAPFPCV,TGQRVLDAPF	THCA
ATP6V1B1	c.1149delC	p.Y383fs	DLTGFITEGQIYVDRQLHNRQIYPP[p.Y383fs]STCSLPCRG*	IYPPSTCSL,RQIYPPSTC,QIYPPSTCSL,RQIYPPSTCS	STAD
ATP6V1C2	c.934_935insAG	p.R312fs	STFPDHKVKVTPLGNPDRPAAGQTD[p.R312fs]KERERVRARVRAPCCAGSR*	KERERVRAR,RERVRARVR,RVRARVRAP,RARVRAPCC,RVRAPCCAG,RAPCCAGSR,RVRARVRAPC,RARVRAPCCA,RVRAPCCAGS,KERERVRARV,RERVRARVRA	STAD
ATP7A	c.2968_2969insA	p.Q990fs	IVETYFPGYNRSISRTETIIRFAFQ[p.Q990fs]SLYHSSVYCMSLFTGTGHSNCCDGGYRSRCSKWHTNKRWRAIGDGS*	HSNCCDGGY,FQSLYHSSV,SLYHSSVYC,LYHSSVYCM,IIRFAFQSL,RFAFQSLYH,GGYRSRCSK,RSRCSKWHT,RCSKWHTNK,CSKWHTNKR,KWHTNKRWR,HTNKRWRAI,RWRAIGDGS,IRFAFQSLY,QSLYHSSVY,SSVYCMSLF,FAFQSLYHS,HSSVYCMSL,MSLFTGTGH,SKWHTNKRW,SLYHSSVYCM,TIIRFAFQSL,HSNCCDGGYR,IIRFAFQSLY,RSRCSKWHTN,KWHTNKRWRA,HTNKRWRAIG,FQSLYHSSVY,HSSVYCMSLF,GHSNCCDGGY,ETIIRFAFQS,FAFQSLYHSS,YHSSVYCMSL,GGYRSRCSKW	KIRC
ATP9A	c.1556G>A	p.R519Q	VYQASSPDEVALVQWTESVGLTLVG[p.R519Q]QDQSSMQLRTPGDQILNFTILQIFPF	LVGQDQSSM,GQDQSSMQL,TLVGQDQSSM	BLCA
ATP9A	c.869G>A	p.R290Q	ASGTVVGVVLYTGRELRSVMNTSNP[p.R290Q]QSKIGLFDLEVNCLTKILFGALVVVS	NTSNPQSKI,NPQSKIGLF,VMNTSNPQSK	UCEC
ATP9B	c.115A>G	p.S39G	AAAAANRKRAAYYSAAGPRPGADRH[p.S39G]GRYQLEDESAHLDEMPLMMSEEGFEN	RPGADRHGRY	ACC
ATR	c.5440delA	p.R1814fs	NYLAADGKSTTWSVRLGQLLLSAKK[p.R1814fs]EISQLFMTH*	AKKEISQLF,KKEISQLFM,KEISQLFMT,SAKKEISQLF,AKKEISQLFM,KEISQLFMTH	UCEC
ATRN	c.590C>A	p.P197Q	LRFNHFATECSWDHLYVYDGDSIYA[p.P197Q]QLVAAFSGLIVPERDGNETVPEVVAT	SIYAQLVAA,QLVAAFSGL,IYAQLVAAF,AQLVAAFSG,AQLVAAFSGL,QLVAAFSGLI,SIYAQLVAAF,DSIYAQLVAA	LUAD
ATRNL1	c.3732A>T	p.L1244F	IAFSQHNTIMDLVQFFVTFFSCFLS[p.L1244F]FLLVAAVVWKIKQTCWASRRREQLLR	FSCFLSFLL,FLSFLLVAA,FFSCFLSFL,LSFLLVAAV,TFFSCFLSF,FLLVAAVVW,FSCFLSFLLV,FFSCFLSFLL,FLSFLLVAAV,VTFFSCFLSF,TFFSCFLSFL,SFLLVAAVVW,LSFLLVAAVV	CLL
ATRX	c.5807A>G	p.K1936R	IASDSDETSMSLSSDDYTKKKKKGK[p.K1936R]RGKKDSSSSGSGSDNDVEVIKVWNSR	YTKKKKKGKR	TGCT
ATXN1	c.651G>T	p.Q217H	GHKAEQQQQQQQQQQQQHQHQQQQQ[p.Q217H]HQQQQQQQQHLSRAPGLITPGSPPPA	HQHQQQQQH,HQQQQQQQQH	LIHC
AURKA	c.1160C>T	p.S387L	RLLKHNPSQRPMLREVLEHPWITAN[p.S387L]LSKPSNCQNKESASKQS*	HPWITANLS,LSKPSNCQNK,LEHPWITANL	CESC
AVIL	c.190G>T	p.G64W	EGDCYVILSTRRVASLLSQDIHFWI[p.G64W]WKDSSQDEQSCAAIYTTQLDDYLGGS	SQDIHFWIW,SQDIHFWIWK,LSQDIHFWIW	LUAD
AVIL	c.896_897insG	p.G299fs	DLLNHDDCYILDQSGTKIYVWKGKG[p.G299fs]SHKG*	VWKGKGSHK,YVWKGKGSHK	KIRC
AVL9	c.102C>A	p.F34L	DGVPRGPVLHIVVVGFHHKKGCQVE[p.F34L]LSYPPLIPGDGHDSHTLPEEWKYLPF	KGCQVELSY,HKKGCQVEL,CQVELSYPP,VELSYPPLI,CQVELSYPPL,KKGCQVELSY	UCEC
AVL9	c.21_22insG	p.G7fs	MEKARRGG[p.G7fs]GWRPPGARTAHRGGRISPQEGLPG*	KARRGGGWR,RTAHRGGRI,RPPGARTAH,GRISPQEGL,KARRGGGWRP,GWRPPGARTA,GARTAHRGGR,MEKARRGGGW	ACC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
AVPR1A	c.1053delT	p.F351fs	ENPTITITALLGSLNSCCNPWIYMF[p.F351fs]LVAISFKTVFKASHAAKT*	WIYMFLVAI,YMFLVAISF,FLVAISFKT,LVAISFKTV,TVFKASHAA,MFLVAISFK,AISFKTVFK,IYMFLVAIS,KTVFKASHA,VFKASHAAK,VAISFKTVF,ISFKTVFKA,FKTVFKASH,NPWIYMFLV,FLVAISFKTV,AISFKTVFKA,YMFLVAISFK,VAISFKTVFK,TVFKASHAAK,PWIYMFLVAI,IYMFLVAISF,SFKTVFKASH,KTVFKASHAA,LVAISFKTVF,NPWIYMFLVA	STAD
AVPR1B	c.115G>A	p.G39R	RGTLSAPNATTPWLGRDEELAKVEI[p.G39R]RVLATVLVLATGGNLAVLLTLGQLGR	RVLATVLVL,ELAKVEIRV,EIRVLATVL,VEIRVLATV,RVLATVLVLA,KVEIRVLATV,EIRVLATVLV,AKVEIRVLAT,VEIRVLATVL,IRVLATVLVL,EELAKVEIRV	TGCT
AXDND1	c.2790G>T	p.E930D	WRESAKQGTLAQKYLEAMAVIEHMQ[p.E930D]DKLLEVENRARQAEEKFEDAYEKLHH	HMQDKLLEV,AVIEHMQDK,IEHMQDKLL,AVIEHMQDKL	CRC
AXDND1	c.301T>C	p.W101R	CPENLLPPKKIKTPKGTLPRLVDHV[p.W101R]RHHPVRRNKFKYLIDHPVSLTGAGRD	HVRHHPVRR,RHHPVRRNK,RLVDHVRHH,LVDHVRHHPV,HVRHHPVRRN,RHHPVRRNKF	LUAD
AXIN2	c.1988_1994delGGGGGGG	p.W663fs	QSTKKAYPLESARSSPGERASRHHL[p.W663fs]STAGTPAPPPVPTCSPRTLRCLP*	HLSTAGTPA,RASRHHLST,ASRHHLSTA,PTCSPRTLR,TPAPPPVPT,VPTCSPRTL,RASRHHLSTA,ASRHHLSTAG,HHLSTAGTPA	CRC
AXIN2	c.1993_1994insG	p.G665fs	KKAYPLESARSSPGERASRHHLWGG[p.G665fs]QQRAPPHHPPCPPVHPGPCDASPDPTQHAGSAGGGLSQAS*	HLWGGQQRA,GQQRAPPHH	CRC
AXIN2	c.1994delG	p.G665fs	TKKAYPLESARSSPGERASRHHLWG[p.G665fs]ATAGTPAPPPVPTCSPRTLRCLP*	HLWGATAGT,ASRHHLWGA,PTCSPRTLR,TPAPPPVPT,VPTCSPRTL,RHHLWGATA,WGATAGTPA,RASRHHLWGA,ASRHHLWGAT,RHHLWGATAG	STAD
B2M	c.1A>G	p.M1V	[p.M1V]VSRSVALAVLALLSLSGLEAIQRTPK	VSRSVALAV,VSRSVALAVL	OV
B2M	c.37_38delCT	p.L13fs	MSRSVALAVLALLS[p.L13fs]FWPGGYPAYSKDSGLLTSSSREWKVKFPELLCVWVSSIRH*	LLSFWPGGY,LLCVWVSSI,LTSSSREWK,SSSREWKVK,KFPELLCVW,KVKFPELLC,FWPGGYPAY,TSSSREWKV,EWKVKFPEL,LAVLALLSF,SFWPGGYPA,LLTSSSREW,SSREWKVKF,WKVKFPELL,VKFPELLCV,REWKVKFPE,FPELLCVWV,ELLCVWVSSI,ALLSFWPGGY,LLTSSSREWK,TSSSREWKVK,SFWPGGYPAY,KFPELLCVWV,KVKFPELLCV,DSGLLTSSSR,LLCVWVSSIR,LSFWPGGYPA,LTSSSREWKV,YPAYSKDSGL,ALAVLALLSF,LAVLALLSFW,GLLTSSSREW,SSSREWKVKF,REWKVKFPEL,VKFPELLCVW	CRC,STAD
B2M	c.3G>A	p.M1I	[p.M1I]ISRSVALAVLALLSLSGLEAIQRTPK	ISRSVALAV,ISRSVALAVL	HNSC
B3GALNT1	c.434G>A	p.R145Q	QEAEKEDKMLALSLEDEHLLYGDII[p.R145Q]QQDFLDTYNNLTLKTIMAFRWVTEFC	IQQDFLDTY,LYGDIIQQDF,IIQQDFLDTY	CRC
B3GAT1	c.374G>T	p.R125L	AELTRMANTLLHVPNLHWLVVEDAP[p.R125L]LRTPLTARLLRDTGLNYTHLHVETPR	WLVVEDAPL,VEDAPLRTPL	LUAD
B3GNT5	c.88delT	p.F30fs	GRRVKKWQLIIQLFATCFLASLMFF[p.F30fs]GNQSIITL*	FLASLMFFG,LMFFGNQSI,MFFGNQSII,FGNQSIITL,FLASLMFFGN,SLMFFGNQSI,LMFFGNQSII,FFGNQSIITL	STAD
B4GALNT1	c.263_264insG	p.G88fs	PVRIKEQVVGLLAWNNCSCESSGGG[p.G88fs]PPPPLPETSPSY*	PLPETSPSY,PPLPETSPSY	PRAD
BACH1	c.1613G>A	p.R538Q	ESCSAREQECEVKLPFNAQRIISLS[p.R538Q]QNDFQSLLKMHKLTPEQLDCIHDIRR	SQNDFQSLL,AQRIISLSQ,IISLSQNDF,LSQNDFQSL,SLSQNDFQSL,SQNDFQSLLK,RIISLSQNDF,LSQNDFQSLL	CRC
BAG1	c.133G>C	p.G45R	RLRALRPGREPRQSEPPAQRGPPPS[p.G45R]RRPPARSTASGHDRPTRGAAAGARRP	AQRGPPPSR,AQRGPPPSRR,GPPPSRRPPA	ACC
BAI2	c.692C>G	p.A231G	EECGRAAGRACGFAQPGCSCPGEAG[p.A231G]GGSTTTTSPGPPAAHTLSNALVPGGP	GEAGGGSTT,GEAGGGSTTT	TGCT
BAIAP2L2	c.1186G>A	p.V396M	SSASGWFPEAYVKALEEGPVNPMTP[p.V396M]MTPMTSMTSMSPMTPMNPGNELPSRS	NPMTPMTPM,GPVNPMTPM,TPMTPMTSM,MTPMTPMTSM,MTPMTSMTSM,TPMTPMTSMT	KIRP

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
BAP1	c.233A>G	p.N78S	IEERRSRRKVSTLVDDTSVIDDDIV[p.N78S]SNMFFAHQLIPNSCATHALLSVLLNC	IVSNMFFAH,DIVSNMFFA,SNMFFAHQL,SNMFFAHQLI,VSNMFFAHQL	KIRC
BAP1	c.679C>T	p.R227C	WTDKARRVIMERIGLATAGEPYHDI[p.R227C]CFNLMAVVPDRRIKYEARLHVLKVNR	PYHDICFNL,DICFNLMAV,YHDICFNLM,GEPYHDICF,HDICFNLMA,PYHDICFNLM,DICFNLMAVV,EPYHDICFNL,HDICFNLMAV	OV
BARX2	c.203G>C	p.R68P	SLYSVCPSLVVRPKPLHSCTGSPSL[p.R68P]PAYPLLSVITRQPTVISHLVPATPGI	TGSPSLPAY,LPAYPLLSV,SPSLPAYPL,CTGSPSLPAY,SLPAYPLLSV,SPSLPAYPLL,LPAYPLLSVI	LUAD
BAX	c.114_115insG	p.M38fs	SEQIMKTGALLLQGFIQDRAGRMGG[p.M38fs]GGTRAGPGPGASGCVHQEAERVSQAHRGRTGQ*	RMGGGGTRA,GTRAGPGPG,RVSQAHRGR,QEAERVSQA,AGRMGGGGTR,GTRAGPGPGA,RMGGGGTRAG,HQEAERVSQA,QEAERVSQAH	STAD
BBOX1	c.526T>G	p.F176V	RLTGASDKPGEVSKLGKRMGFLYLT[p.F176V]VYGHTWQVQDKIDANNVAYTTGKLSF	RMGFLYLTV,TVYGHTWQV,YLTVYGHTW,MGFLYLTVY,FLYLTVYGHT,LTVYGHTWQV,RMGFLYLTVY,LYLTVYGHTW,KRMGFLYLTV	CRC
BBS9	c.802delT	p.F268fs	ALDICIVSFNQSASSVFVLGERNFF[p.F268fs]ALRIMDKFDS*	VLGERNFFA,FALRIMDKF,RNFFALRIM,FVLGERNFFA,VLGERNFFAL,NFFALRIMDK,FFALRIMDKF,GERNFFALRI,ERNFFALRIM	PRAD
BC139719	c.398T>G	p.L133R	SSKSRNAPRSSCGNCGARAPEHPPV[p.L133R]RRVESLNLPLLNGLREEGPGVFSRSV	PPVRRVESL,HPPVRRVESL,RRVESLNLPL	PRAD
BCAS3	c.641C>T	p.T214M	DLHCNKRILVVVLQEKIAAFDSCTF[p.T214M]MKKFFVTSCYPCPGPNMNPIALGSRW	CTFMKKFFV,AFDSCTFMK,TFMKKFFVT,AAFDSCTFM,FMKKFFVTS,MKKFFVTSC,FMKKFFVTSC,AAFDSCTFMK,AFDSCTFMKK,MKKFFVTSCY,IAAFDSCTFM,FDSCTFMKKF	BLCA
BCKDHA	c.111delC	p.H37fs	RGLSQAALLLLRQPGARGLARSHPP[p.H37fs]GSSSSFHLWMTSPSSQGPRRSL*	SSSSFHLWM,RSHPPGSSS,HPPGSSSSF,SSQGPRRSL,GSSSSFHLW,FHLWMTSPS,WMTSPSSQG,MTSPSSQGPR,RGLARSHPPG,RSHPPGSSSS,SHPPGSSSSF,GSSSSFHLWM,FHLWMTSPSS	STAD
BCKDHA	c.385_395del GGGGACTGGGC	p.G129fs	LCCFWPVGIAAFCLAQKVSLCVGLG[p.G129fs]IKEKNAPQKQRAIYLRREGGR*	SLCVGLGIK,CVGLGIKEK,KQRAIYLRR,IYLRREGGR,APQKQRAIY,KVSLCVGLGI,VSLCVGLGIK,GIKEKNAPQK,KQRAIYLRRE,AIYLRREGGR,APQKQRAIYL	PAAD
BCL11A	c.1735G>A	p.E579K	SMQHFSEAFHQVLGEKHKRGHLAEA[p.E579K]KGHRDTCDEDSVAGESDRIDDGTVNG	HLAEAKGHR,AEAKGHRDT	HNSC
BCL2	c.515A>G	p.N172S	IVAFFEFGGVMCVESVNREMSPLVD[p.N172S]SIALWMTEYLNRHLHTWIQDNGGWDA	LVDSIALWM,SIALWMTEY,EMSPLVDSI,MSPLVDSIA,SPLVDSIAL,REMSPLVDS,DSIALWMTEY,SIALWMTEYL,MSPLVDSIAL,REMSPLVDSI,SPLVDSIALW	DLBCL
BCL2	c.60T>G	p.H20Q	MAHAGRTGYDNREIVMKYI[p.H20Q]QYKLSQRGYEWDAGDVGAAPPGAAPA	VMKYIQYKL,IVMKYIQYK,YIQYKLSQR,IQYKLSQRG,REIVMKYIQ,IVMKYIQYKL,EIVMKYIQYK,IQYKLSQRGY,KYIQYKLSQR,REIVMKYIQY	DLBCL
BCL2	c.97G>A	p.G33R	GYDNREIVMKYIHYKLSQRGYEWDA[p.G33R]RDVGAAPPGAAPAPGIFSSQPGHTPH	YEWDARDVG,SQRGYEWDAR,YEWDARDVGA	DLBCL
BCL2L11	c.272G>A	p.R91Q	PPASPGPFATRSPLFIFMRRSSLLS[p.R91Q]QSSSGYFSFDTDRSPAPMSCDKSTQT	QSSSGYFSF,LLSQSSSGY,LSQSSSGYF,SQSSSGYFS,SQSSSGYFSF,SLLSQSSSGY,LLSQSSSGYF,FMRRSSLLSQ	CRC
BCL2L11	c.560_561insA	p.L187fs	YARRVFLNNYQAAEDHPRMVILRLL[p.L187fs]TLHCPPGVENALTGSLRSRDTMQTFCLFKPTRPSTAVSWCHYYAASGSLVEGAGDVSEDTELDGTTFLFITTQQNF*	STAVSWCHY,TAVSWCHYY,ELDGTTFLF,LTLHCPPGV,AVSWCHYYA,SLVEGAGDV,MVILRLLTL,TMQTFCLFK,DTMQTFCLF,HYYAASGSL,YYAASGSLV,LFITTQQNF,RSRDTMQTF,LFKPTRPST,VSWCHYYAA,TFCLFKPTR,CPPGVENAL,KPTRPSTAV,RMVILRLLT,VENALTGSL,GSLRSRDTM,TELDGTTFL,STAVSWCHYY,ELDGTTFLFI,RMVILRLLTL,LLTLHCPPGV,AVSWCHYYAA,FLFITTQQNF,DTMQTFCLFK,QTFCLFKPTR,HYYAASGSLV,TELDGTTFLF,RSRDTMQTFC,LFKPTRPSTA,PSTAVSWCHY,NALTGSLRSR,TAVSWCHYYA,LRSRDTMQTF,RDTMQTFCLF,MQTFCLFKPT,CHYYAASGSL	UCS
BCL7A	c.155C>T	p.T52M	KVRKWEKKWVTVGDTSLRIYKWVPV[p.T52M]MEPKVDDKNKNKKKGKDEKCGSEVTT	RIYKWVPVM,KWVPVMEPK,LRIYKWVPVM	CRC
BCL9L	c.2938G>T	p.G980C	PQTPSQMVPLPSANPPGPLKSPQVL[p.G980C]CSSLSVRSPTGSPSRLKSPSMAVPSP	QVLCSSLSV,SPQVLCSSL,QVLCSSLSVR	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
BCL9L	c.3379_3380insC	p.P1127fs	YHNAIKTIATSDDELLPDRPLLPPP[p.P1127fs]TTTAGLRARDQQQPAQPDAPELSRCPEPYGHEPARPAAPVP*	LLPPPTTTA,RARDQQQPA,LSRCPEPYG,ELSRCPEPY,TTTAGLRAR,EPARPAAPV,RPLLPPPTTT,LPPPTTTAGL,QPAQPDAPEL,YGHEPARPAA,HEPARPAAPV	STAD
BCLAF1	c.109_110insCA	p.R37fs	RSKSRSQSSSRSRSRSHSRKKRYSS[p.R37fs]TGLVPEHIQGLVVEIVCILEIIVAITEIIEE*	LVVEIVCIL,CILEIIVAI,IIVAITEII,LVPEHIQGL,HIQGLVVEI,GLVVEIVCI,EIVCILEII,EIIVAITEI,SRKKRYSST,KKRYSSTGL,KRYSSTGLV,VEIVCILEI,VPEHIQGLV,GLVPEHIQGL,LVPEHIQGLV,HIQGLVVEIV,GLVVEIVCIL,HSRKKRYSST,KKRYSSTGLV,EIVCILEIIV,EIIVAITEII,VPEHIQGLVV,RKKRYSSTGL,LEIIVAITEI,VEIVCILEII	CRC
BCOR	c.4376A>G	p.N1459S	LPCSSSPQETTQSRPMPPEARRLIV[p.N1459S]SKNAGETLLQRAARLGYEEVVLYCLE	EARRLIVSK,VSKNAGETL,SKNAGETLL	LUAD
BEND2	c.1607C>A	p.P536Q	RILFSKEILISSSVDIHLKDSQSLD[p.P536Q]QNKMAALREYLATTFPTCDLHEHGKD	DQNKMAALR,SQSLDQNKM,SLDQNKMAAL	LUAD
BEND2	c.1888G>A	p.E630K	NDQRGRDGGEGCSWMFQPMNNSKMR[p.E630K]KKRNLQPNSNAIPEGMREPSTDNPEE	PMNNSKMRK,MNNSKMRKK,KMRKKRNLQ,SKMRKKRNL,KMRKKRNLQP,MNNSKMRKKR,NSKMRKKRNL	MM
BEND3	c.793delG	p.D265fs	FQPPPEYQLTAAELKQIVDQSLSGG[p.D265fs]TWPAACWCSSSPSSSATWTSPGAAVPVALRPSASWSRCTCSSSATMWRSTTPR*	SLSGGTWPA,TMWRSTTPR,GAAVPVALR,CSSSATMWR,TSPGAAVPV,VPVALRPSA,RPSASWSRC,CTCSSSATM,DQSLSGGTW,VALRPSASW,WPAACWCSS,SLSGGTWPAA,ATWTSPGAAV,WTSPGAAVPV,ALRPSASWSR,ATMWRSTTPR,WSRCTCSSSA,SSATWTSPGA,SPGAAVPVAL,RPSASWSRCT,SSSPSSSATW,RCTCSSSATM,WPAACWCSSS	STAD
BEND5	c.592C>T	p.R198C	LEDAVVPRALYEELLRNYQQQQEEM[p.R198C]CHLQQELERTRRQLVQQAKKLKEYGA	QQQEEMCHL,YQQQQEEMCH,QQQQEEMCHL,EEMCHLQQEL	CRC
BEST3	c.1148C>T	p.P383L	SFLGSTVQMGKQMPKNEWKMEDIKI[p.P383L]LLPQPQFQCAKSDPGG*	KMEDIKILL,WKMEDIKIL,KILLPQPQF,LLPQPQFQCA,WKMEDIKILL,IKILLPQPQF	TGCT
BEST3	c.1331_1332insC	p.P444fs	SSMFLPRDDLSPARDLLDVPSRNPP[p.P444fs]QGLTHLEEILLPRRKPHAALQHGRAVHHQGDQPDKHFTEPDPTVQCENFPHQNATGT*	HLEEILLPR,LPRRKPHAA,AALQHGRAV,FPHQNATGT,LQHGRAVHH,CENFPHQNA,LLPRRKPHAA,HLEEILLPRR,HAALQHGRAV,VPSRNPPQGL,LPRRKPHAAL,AALQHGRAVH,LQHGRAVHHQ,HQGDQPDKHF,KHFTEPDPTV,CENFPHQNAT	STAD
BHLHE22	c.185T>A	p.L62Q	STPPGMDLSLAPPPRERPASSSSSP[p.L62Q]QGCFEPADPEGAGLLLPPPGGGGGGS	SPQGCFEPA,SSSSPQGCF,RPASSSSSPQ,SSSSSPQGCF	ACC
BICD2	c.485G>A	p.R162H	SENERLASVAQELKEINQNVEIQRG[p.R162H]HLRDDIKEYKFREARLLQDYSELEEE	RGHLRDDIK,HLRDDIKEY,HLRDDIKEYK,NVEIQRGHLR,IQRGHLRDDI,GHLRDDIKEY	CRC
BIRC6	c.1240G>C	p.V414L	SCFGSGSCPHFLAAATKRGKICIWDf[p.V414L]LSKLMKVHLKFEINAYDPAIVQQLIL	KICIWDLSK,CIWDLSKLMK,LSKLMKVHLK,ICIWDLSKLM	TGCT
BIRC8	c.673_674GC>AT	p.A225M	VFIPCGHLVTCKQCAEAVDRCPMCS[p.A225M]MVIDFKQRVFMS*	MVIDFKQRV,MCSMVIDFK,VDRCPMCSM,PMCSMVIDF,SMVIDFKQRV,PMCSMVIDFK,CSMVIDFKQR,CPMCSMVIDF,MVIDFKQRVF	TGCT
BLM	c.1980T>A	p.H660Q	ASRNLKHERFQSLSFPHTKEMMKIF[p.H660Q]QKKFGLHNFRTNQLEAINAALLGEDC	KIFQKKFGL,EMMKIFQKK,KEMMKIFQK,MMKIFQKKF,FQKKFGLHN,QKKFGLHNF,KIFQKKFGLH,EMMKIFQKKF,FQKKFGLHNF,KEMMKIFQKK,MMKIFQKKFG,MKIFQKKFGL	KIRC
BLVRA	c.131C>T	p.S44L	AGSVRMRDLRNPHPSSAFLNLIGFV[p.S44L]LRRELGSIDGVQQISLEDALSSQEVE	FLNLIGFVL,VLRRELGSI,NLIGFVLRR,IGFVLRREL,FVLRRELGSI,AFLNLIGFVL,FLNLIGFVLR	CRC
BMP2K	c.1461C>G	p.H487Q	QQQQQQQQQQQQQQQQQQQQQQQQQQQ[p.H487Q]QHHHHHHHLLQDAYMQQYQHATQQQQ	QQHHHHHHHL,QHHHHHHHLL	TGCT
BMP3	c.1030C>T	p.R344W	KPYKTLQAQAPEKSKNKKKQRKGPH[p.R344W]WKSQTLQFDEQTLKKARRKQWIEPRN	HWKSQTLQF,KQRKGPHWK,GPHWKSQTL,KKQRKGPHW,KKQRKGPHWK,KQRKGPHWKS,KKKQRKGPHW,PHWKSQTLQF	CRC
BMP6	c.353A>T	p.Q118L	PRPLHGLQQPQPPALRQQEEQQQQQ[p.Q118L]LLPRGEPPPGRLKSAPLFMLDLYNAL	QEEQQQQQL,QQEEQQQQQL,QEEQQQQQLL	KIRP

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
BMPER	c.1329_1340delGCGCATCGCGCT	p.RiAL444del	KSVELVLGESRVSLQQHLTVRWNGS[p.RIAL444del]PCRAPHFHIDLDGYLLKVTTKAGLEISWDGDSFVEVM	RWNGSPCRA,TVRWNGSPCR,NGSPCRAPHF,SPCRAPHFHI	KIRC
BMPER	c.722G>A	p.R241Q	PPGQCCPKCLGQRKVFDLPFGSCLF[p.R241Q]QSDVYDNGSSFLYDNCTACTCRDSTV	SCLFQSDVY,GSCLFQSDVY,LPFGSCLFQS	UCEC
BMS1	c.1364G>T	p.G455V	KAIFGDEDESGDSDDEEDDEMSEDD[p.G455V]VLENGSSDEEAEEEENAEMTDQYMAV	DEMSEDDVL	LUAD
BMS1	c.2634G>T	p.E878D	GEMQKQAQLNRAEFEDQDDEARVQY[p.E878D]DGFRPGMYVRIEIENVPCEFVQNFDP	YDGFRPGMY,DGFRPGMYV,VQYDGFRPG,QYDGFRPGMY,EARVQYDGFR,DGFRPGMYVR,VQYDGFRPGM,DEARVQYDGF	KIRP
BNC1	c.2809T>A	p.Y937N	MEKADQSLASLPSGLPITCHLCQKT[p.Y937N]NSNKGTFRAHYKTVHLRQLHKCKVPG	KTNSNKGTF,TNSNKGTFR,HLCQKTNSNK,KTNSNKGTFR,QKTNSNKGTF	CLL
BNC2	c.1534C>T	p.R512W	NRHSANPNPRLHMPMLRNNRDKDLI[p.R512W]WATSGAATPVIASTKSNLALTSPGRP	LIWATSGAA,DLIWATSGA,DLIWATSGAA,WATSGAATPV	CRC
BNC2	c.1723A>C	p.S575R	LQNPLPSQLVFSGLKTVQPVPPFYR[p.S575R]RLLTPGEMVSPPTSLPTSPIIPTSGT	RLLTPGEMV,QPVPPFYRR,VPPFYRRLL,RRLLTPGEM,QPVPPFYRRL,YRRLLTPGEM	STAD
BPI	c.765G>T	p.M255i	IDSVAGINYGLVAPPATTAETLDVQ[p.M255I]IKGEFYSENHHNPPPFAPPVMEFPAA	LDVQIKGEF,TTAETLDVQ!,LDVQIKGEFY	BLCA
BRAF	c.1208delC	p.P403fs	NIDDLIRDQGFRGDGGSTTGLSATP[p.P403fs]LPHYLAH*	LSATPLPHY,SATPLPHYL,GLSATPLPH,TPLPHYLAH,GLSATPLPHY,STTGLSATPL,LSATPLPHYL	STAD
BRAF	c.1397G>T	p.G466V	LGRRDSSDDWEIPDGQITVGQRIGSGSF[p.G466V]VSFGTVYKGKWHGDVAVKMLNVTAPT	SVSFGTVYK,GSVSFGTVY,GQRIGSVSF,RIGSVSFGTV,GSVSFGTVYK,VSFGTVYKGK,IGSVSFGTVY,ITVGQRIGSV,VGQRIGSVSF	LUAD
BRAF	c.1406G>C	p.G469A	RDSSDDWEIPDGQITVGQRIGSGSF[p.G469A]ATVYKGKWHGDVAVKMLNVTAPTPQQ	GSGSFATVY,SGSFATVYK,SFATVYKGK,FATVYKGKW,RIGSGSFATV,GSGSFATVYK,GSFATVYKGK,SFATVYKGKW,GQRIGSGSFA,IGSGSFATVY	MM,PRAD
BRAF	c.1406G>T	p.G469V	RDSSDDWEIPDGQITVGQRIGSGSF[p.G469V]VTVYKGKWHGDVAVKMLNVTAPTPQQ	SGSFVTVYK,SFVTVYKGK,GSGSFVTVY,RIGSGSFVTV,GSGSFVTVYK,GSFVTVYKGK,SFVTVYKGKW,GQRIGSGSFV,IGSGSFVTVY	LUAD
BRAF	c.1798_1799GT>AA	p.V600K	RDLKSNNIFLHEDLTVKIGDFGLAT[p.V600K]KKSRWSGSHQFEQLSGSILWMAPEVIR	ATKKSRWSG,KKSRWSGSH,ATKKSRWSGS,DFGLATKKSR,FGLATKKSRW	SKCM
BRAF	c.1799T>A	p.V600E	RDLKSNNIFLHEDLTVKIGDFGLAT[p.V600E]EKSRWSGSHQFEQLSGSILWMAPEVI	DFGLATEKSR,FGLATEKSRW	CRC,GBM,LUAD,MM,SKCM,THCA
BRAF	c.1801A>G	p.K601E	DLKSNNIFLHEDLTVKIGDFGLATV[p.K601E]ESRWSGSHQFEQLSGSILWMAPEVIR	VESRWSGSH,DFGLATVESR,ESRWSGSHQF,FGLATVESRW	DLBCL,SKCM
BRAF	c.1803A>T	p.K601N	DLKSNNIFLHEDLTVKIGDFGLATV[p.K601N]NSRWSGSHQFEQLSGSILWMAPEVIR	GLATVNSRW,DFGLATVNSR,NSRWSGSHQF,FGLATVNSRW	CLL
BRD3	c.70_71insC	p.P24fs	MSTATTVAPAGIPATPGPVNPPPP[p.P24fs]GGLQPQQARPQDQPAAVHAECGGEDALETPVRLALLPARGRNQIEPAGLS*	RGRNQIEPA,ETPVRLALL,RPQDQPAAV,LPARGRNQI,AECGGEDAL,LETPVRLAL,GEDALETPV,LLPARGRNQI,PVRLALLPAR,RLALLPARGR,TPVRLALLPA,QQARPQDQPA,ALETPVRLAL,LETPVRLALL	STAD
BRD9	c.988G>T	p.G330W	HAADEARDRINRFLPGGKMGYLKRN[p.G330W]WDGSLLYSVVNTAEPDADEEETHPVD	RNWDGSLLY,KMGYLKRNW,LKRNWDGSL,KRNWDGSLL,WDGSLLYSV,YLKRNWDGSL,KRNWDGSLLY,GKMGYLKRNW,LKRNWDGSLL,WDGSLLYSVV	LUAD
BRF1	c.1405G>T	p.V469L	DGELDLSGIDDLEIDRYILNESEAR[p.V469L]LKAELWMRENAEYLREQREKEARIAK	ILNESEARL,RLKAELWMR,SEARLKAEL,ARLKAELWM,NESEARLKA,YILNESEARL,ILNESEARLK,SEARLKAELW	LUAD
BRK1	c.208A>C	p.K70Q	SRLATLNEKLTALERRIEYIEARVT[p.K70Q]QGETLT*	ARVTQGETL,IEARVTQGET	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
BRMS1	c.321delG	p.G107fs	LSQLRLRLEEVGAERAPEYTEPLGG[p.G107fs]CSGASRFAFRWQGSTRASVWM*	WQGSTRASV,SGASRFAFR,ASRFAFRWQ,AFRWQGSTR,GGCSGASRF,CSGASRFAF,FAFRWQGST,FRWQGSTRA,GASRFAFRW,CSGASRFAFR,FAFRWQGSTR,ASRFAFRWQG,RFAFRWQGST,AFRWQGSTRA,RWQGSTRASV,LGGCSGASRF,GCSGASRFAF,SGASRFAFRW,FRWQGSTRAS,WQGSTRASVW	STAD
BRPF1	c.196C>T	p.R66C	HLYHYDHDNPPPPQQTPLRKHKKKG[p.R66C]CQSRPANKQSPSPSEVSQSPGREVMS	GCQSRPANK,KHKKKGCQSR,KGCQSRPANK	CRC
BRWD1	c.3956A>G	p.K1319R	TSSGRRRVHDGKKSIRATNYVESNW[p.K1319R]RKQCKELVNLIFQCEDSEPFRQPVDL	NYVESNWRK,ATNYVESNWR,RKQCKELVNL	TGCT
BRWD3	c.2359C>T	p.R787C	TVEKKKKPSYTTQRNDYEPSCGRSL[p.R787C]CRTQRKRQHTYQTRSNIEHNSQASCQ	RSLCRTQRK,CGRSLCRTQR,RSLCRTQRKR	CRC
BRWD3	c.478C>A	p.H160N	VNYVKPPNVVNITSARQLTGCSRFG[p.H160N]NIFPSSAYQHIKMHKRILGHLSSVYC	CSRFGNIFP,RFGNIFPSS,GNIFPSSAY,GCSRFGNIF,SRFGNIFPS,CSRFGNIFPS,RFGNIFPSSA,FGNIFPSSAY,TGCSRFGNIF	LUAD
BST1	c.107G>C	p.G36A	LLQLLLQLLLLLLLLAAGGARARWR[p.G36A]AEGTSAHLRDIFLGRCAEYRALLSPE	RARWRAEGT,RWRAEGTSA,WRAEGTSAH,RAEGTSAHL,GARARWRAEG,RARWRAEGTS,RWRAEGTSAH,ARWRAEGTSA,WRAEGTSAHL	KIRP
BTBD11	c.1352delC	p.T451fs	LSDLVSRAMHHLQPLNAKHHGNGTP[p.T451fs]CTTSRGHCTGSPRPCTPFAISCTAHKWNGKTPTWSLPKSTSRWKGPSSCCRR*	CTAHKWNGK,KTPTWSLPK,FAISCTAHK,KWNGKTPTW,RGHCTGSPR,TSRWKGPSS,WSLPKSTSR,SPRPCTPFA,NGKTPTWSL,KHHGNGTPC,GSPRPCTPF,HKWNGKTPT,TPFAISCTA,SLPKSTSRWK,RWKGPSSCCR,TWSLPKSTSR,CTPFAISCTA,SPRPCTPFAI,AKHHGNGTPC,TGSPRPCTPF,FAISCTAHKW,HKWNGKTPTW,WSLPKSTSRW,TPFAISCTAH	STAD
BTBD11	c.1682C>T	p.A561V	LLPGVDCEPRQLRADDCFCASRKLD[p.A561V]VVAIEAKFKQDLGFRMLNCGRTDLVK	KLDVVAIEA,VVAIEAKFK,ASRKLDVVA,KLDVVAIEAK,ASRKLDVVAI,DVVAIEAKFK,RKLDVVAIEA,LDVVAIEAKF	STAD
BTBD11	c.794G>C	p.G265A	CMESLFRDIYSRVVASGVPRSCSGP[p.G265A]ASGSGSGPGPSSGPGAAPAADKEREA	VPRSCSGPA,VPRSCSGPAS	ACC
BTBD7	c.1307C>T	p.S436L	HPYGSKWVHRQALHFLCEEFSQVMT[p.S436L]LDVFYELSKDHLLTAIQSDYLQASEQ	MTLDVFYEL,QVMTLDVFY,SQVMTLDVF,EEFSQVMTL,VMTLDVFYEL,TLDVFYELSK,FSQVMTLDVF,SQVMTLDVFY,MTLDVFYELS,CEEFSQVMTL	CRC
BTG1	c.91C>T	p.L31F	TRAATMIGEIAAAVSFISKFLRTKG[p.L31F]FTSERQLQTFSQSLQELLAEHYKHHW	RTKGFTSER,FLRTKGFTS,SKFLRTKGF,KGFTSERQL,FLRTKGFTSE,FTSERQLQTF,ISKFLRTKGF	DLBCL
BTLA	c.256C>A	p.Q86K	KYCANRPHVTWCKLNGTTCVKLEDR[p.Q86K]KTSWKEEKNISFFILHFEPVLPNDNG	KLEDRKTSW,KLEDRKTSWK,TTCVKLEDRK,VKLEDRKTSW	CLL
BTN2A2	c.43C>T	p.L15F	MEPAAALHFSLPAS[p.L15F]FLLLLLLLLLSLCALVSAQFTVVGPA	FSLPASFLL,SLPASFLLL,SFLLLLLLL,LPASFLLLL,LHFSLPASF,ASFLLLLLL,FSLPASFLLL,SLPASFLLLL,HFSLPASFLL,SFLLLLLLL,ALHFSLPASF,LPASFLLLLL,LHFSLPASFL,ASFLLLLLLL	TGCT
BTN3A2	c.457G>A	p.E153K	FQDGDFYEKALVELKVAALGSNLHV[p.E153K]KVKGYEDGGIHLECRSTGWYPQPQIQ	ALGSNLHVK,GSNLHVKVK,NLHVKVKGY,ALGSNLHVKV,AALGSNLHVK	UCEC
BTRC	c.1248T>G	p.I416M	FNNGMMVTCSKDRSIAVWDMASPTD[p.I416M]MTLRRVLVGHRAAVNVVDFDDKYIVS	MASPTDMTL,WDMASPTDM,MASPTDMTLR,MTLRRVLVGH,DMASPTDMTL,SPTDMTLRRV	KIRC
BTRC	c.778G>T	p.G260W	TDSLWRGLAERRGWGQYLFKNKPPD[p.G260W]WNAPPNSFYRALYPKIIQDIETIESN	KNKPPDWNA,WNAPPNSFY,YLFKNKPPDW,DWNAPPNSFY,WNAPPNSFYR	LUAD
BUB1B	c.2988C>A	p.F996L	VFWDGSFWKLSQNISELKDGELWNK[p.F996L]LFVRILNANDEATVSVLGELAAEMNG	KLFVRILNA,LWNKLFVRI,ELWNKLFVR,GELWNKLFV	CRC
BZRAP1	c.4248_4249insA	p.P1416fs	CLEDMPGLVGGSSRRRGGGSPEKPP[p.P1416fs]KPQAASRSPRTLQPTSQQQWAPGLWTTGPHTGEGWPPRN*	SQQQWAPGL,HTGEGWPPR,QQQWAPGLW,QWAPGLWTT,ASRSPRTLQ,AASRSPRTL,LQPTSQQQW,QQWAPGLWT,SQQQWAPGLW,ASRSPRTLQP,TLQPTSQQQW,QQWAPGLWTT	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
BZRAP1	c.4879G>A	p.V1627I	VLRPSTAELVPARSPSETLAYQHLP[p.V1627I]IRIFVALFDYDPVSMSPNPDAGEEEL	TLAYQHLPI,HLPIRIFVA,AYQHLPIRI,LAYQHLPIR,LPIRIFVAL,YQHLPIRIF,YQHLPIRIFV,HLPIRIFVAL,AYQHLPIRIF,IRIFVALFDY,TLAYQHLPIR,ETLAYQHLPI,LPIRIFVALF,LAYQHLPIRI	CRC
C10orf95	c.253G>T	p.A85S	GRRRRSCSPAPTWPPLCCYPQSRPT[p.A85S]SSAAGPGACMRASGRPHGNTTASTAP	QSRPTSSAA,YPQSRPTSS,YPQSRPTSSA,SSAAGPGACM	ACC
C11orf30	c.3331C>T	p.R1111C	KQTASQVEQPIITQGSSVTKITFEG[p.R1111C]CQPPTVTKITGGSSVPKLTSPVTSIS	FEGCQPPTV	CRC
C11orf68	c.403G>T	p.V135L	PGSPNSEPVGWIAVYGQGYSPNSGD[p.V135L]LQGLQAAWEALQTSGRPITPGTLRQL	GDLQGLQAA,SPNSGDLQGL,GDLQGLQAAW	LUAD
C11orf9	c.782_783insC	p.S261fs	QLLQQHGAELPTHPSKKRKHSESPP[p.S261fs]QHPQCPDAEWNDQTGAWDRDSPASAPHSSPIATLASPGSALPGPWFLASQHCPCPDTALAPARCPLPRPPAGQ*	SALPGPWFL,ALPGPWFLA,FLASQHCPC,ALAPARCPL,TLASPGSAL,ASAPHSSPI,ATLASPGSA,HSSPIATLA,APHSSPIAT,AEWNDQTGA,RDSPASAPH,GSALPGPWF,HPQCPDAEW,LPGPWFLAS,CPDTALAPA,ASAPHSSPIA,ATLASPGSAL,SALPGPWFLA,LAPARCPLPR,APHSSPIATL,TALAPARCPL,RKHSESPPQH,AEWNDQTGAW,SQHCPCPDTA,SPIATLASPG,SPGSALPGPW	STAD
C12orf32	c.179A>T	p.D60V	LPITHTRQVPSKPIDHSTITSWVSP[p.D60V]VFDTAAGSLFPAYQKHQNRARHSSRK	TITSWVSPV,WVSPVFDTA,ITSWVSPVF,SPVFDTAAG,STITSWVSPV,WVSPVFDTAA,VFDTAAGSLF,TITSWVSPVF	TGCT
C12orf4	c.1004G>A	p.R335Q	KLHRLQTALSLYSTSLCGLVLLVDN[p.R335Q]QINSYSGIKRDFATVCQECTDFHFPR	LVDNQINSY,NQINSYSGI,QINSYSGIK,GLVLLVDNQI,LLVDNQINSY,QINSYSGIKR	UCEC
C12orf43	c.82G>C	p.E28Q	APSGTVSDSESSNSSSDAEELERCR[p.E28Q]QAAMPAWGLEQRPHVAGKPRAGAANS	RCRQAAMPA,QAAMPAWGL,LERCRQAAM,CRQAAMPAW,RQAAMPAWG,EELERCRQA,RQAAMPAWGL,ELERCRQAAM,RCRQAAMPAW,EELERCRQAA,AEELERCRQA	CESC
C12orf65	c.428A>C	p.K143T	VFYNGENSPVHKEKREAAKKKQERK[p.K143T]TRAKETLEKKKLLKELWESSKKVH*	KQERKTRAK,KTRAKETLE,RKTRAKETL,KTRAKETLEK,ERKTRAKETL	TGCT
C13orf33	c.200delG	p.R67fs	QPGAFQLSGDQLVVARPGEPAAARG[p.R67fs]ASTSSVTASCASTGSSTASAATSRGMWN*	STASAATSR,STGSSTASA,ASAATSRGM,SAATSRGMW,GEPAAARGA,SSTASAATSR,AARGASTSSV,STSSVTASCA,EPAAARGAST,RGASTSSVTA,TASAATSRGM,ASAATSRGMW	STAD
C14orf101	c.883G>A	p.E295K	FSLAKSEIGSSMSEILLSQVTNMRT[p.E295K]KLSFNIQALAVCANICLATKDRQNPS	KLSFNIQAL,RTKLSFNIQ,TNMRTKLSF,KLSFNIQALA,NMRTKLSFNI,LSQVTNMRTK,RTKLSFNIQA,SQVTNMRTKL,VTNMRTKLSF,TKLSFNIQAL	CRC
C14orf102	c.268delA	p.R90fs	SSDESDTNKKLKQTSRKKKKEKKKK[p.R90fs]GSISIIRKQRGSMGRRVAAGLRQTPILKRTNLPEALEAVKRNLRNRIKEIMLQLILDIALFGLRTFRL*	NLPEALEAV,IMLQLILDI,MLQLILDIA,ILDIALFGL,RIKEIMLQL,GLRQTPILK,ALFGLRTFR,KGSISIIRK,IALFGLRTF,LFGLRTFRL,IIRKQRGSM,KQRGSMGRR,RGSMGRRVA,GSMGRRVAA,MGRRVAAGL,AVKRNLRNR,KRNLRNRIK,RNRIKEIML,SISIIRKQR,TPILKRTNL,SMGRRVAAG,NLRNRIKEI,QLILDIALF,KKKKGSISI,KKKGSISII,KRTNLPEAL,LRNRIKEIM,KEIMLQLIL,LQLILDIAL,SMGRRVAAGL,IMLQLILDIA,MLQLILDIAL,LILDIALFGL,ALFGLRTFRL,ILKRTNLPEA,RIKEIMLQLI,AGLRQTPILK,IALFGLRTFR,KQRGSMGRRV,RGSMGRRVAA,MGRRVAAGLR,GLRQTPILKR,RTNLPEALEA,AVKRNLRNRI,EAVKRNLRNR,EIMLQLILDI,SIIRKQRGSM,NLRNRIKEIM,LQLILDIALF,DIALFGLRTF,KKKKGSISII,RRVAAGLRQT,VAAGLRQTPI,LKRTNLPEAL,IKEIMLQLIL	STAD
C14orf102	c.343G>A	p.D115N	RKHQHHKKTKRKHGPSSSSRSETDT[p.D115N]NSEKDKPSRGVGGSKKESEEPNQGNN	RSETDTNSEK	CRC
C14orf105	c.299G>T	p.R100I	ASRDMYFDIPLEHRETSIIKRHPPQ[p.R100I]ILQKLEPIDLPRVITSGRLLSQREAR	IIKRHPPQI,IKRHPPQIL,SIIKRHPPQI,IIKRHPPQIL,KRHPPQILQK	CRC
C14orf118	c.836G>T	p.R279I	GECVPGFTVPNLLPKWAPDHCSEVE[p.R279I]IMDSGLDKFSDSTFLLPSRPAQRGYH	EIMDSGLDK,IMDSGLDKF,EIMDSGLDKF,SEVEIMDSGL	UCEC
C14orf126	c.16C>T	p.R6W	MAEGS[p.R6W]WIPQARALLQQCLHARLQIRPADGDV	EGSWIPQAR,SWIPQARAL,AEGSWIPQA,SWIPQARALL,GSWIPQARAL	KIRP

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C14orf166B	c.690C>A	p.F230L	DSAALLCQALSTNYQIKKLDLSHNQ[p.F230L]LSDVGGEHLGQMLAINVGLTSLDLSW	KLDLSHNQL,QLSDVGGEHL,KKLDLSHNQL	UCEC
C14orf177	c.269G>T	p.G90V	CCGECSTCFCTEEKSECQRHEETSP[p.G90V]VSCNHQIMSASTISAFCATPRFKQLF	SPVSCNHQI,CQRHEETSPV,SPVSCNHQIM	CLL
C14orf43	c.939delC	p.P313fs	GLQPAGPLGQSHLAHHSMAPYPFPP[p.P313fs]TQI*	PYPFPPTQI,MAPYPFPPT,SMAPYPFPPT,APYPFPPTQI	STAD
C15orf2	c.1462G>A	p.V488I	LALPADLVPILGDQSNEKGGSYNSV[p.V488I]IGAAPLTSDPPTPPSSTPSFKPPVTR	NSVIGAAPL,KGGSYNSVI,GSYNSVIGAA,YNSVIGAAPL	CRC
C15orf2	c.2257G>T	p.V753F	PGSGNTQPSGNTASVQGSTSLPAQS[p.V753F]FRAPATASNHPLNPGATPQPKFGAPD	SLPAQSFRA,TSLPAQSFR,QSFRAPATA,LPAQSFRAP,STSLPAQSF,AQSFRAPAT,STSLPAQSFR,SFRAPATASN,LPAQSFRAPA,GSTSLPAQSF,AQSFRAPATA	LUAD
C15orf2	c.2716G>T	p.G906W	RRPTTTSSHPLNTGSISHSTLGATD[p.G906W]WQQKSDSSFILGNPATPAPVIGLTSP	WQQKSDSSF,TLGATDWQQK,WQQKSDSSFI	LUAD
C15orf23	c.71C>T	p.S24F	MAAPEAPPLDRVFRTTWLSTECD[p.S24F]FHPLPPSYRKFLFETQAADLAGGTTV	TWLSTECDF,DFHPLPPSY,STECDFHPL,DFHPLPPSYR,LSTECDFHPL,CDFHPLPPSY	SKCM
C15orf33	c.1018G>A	p.D340N	GSKKAPAKSVKERIADSQEHISTSI[p.D340N]NFNIIKILNNPRAYTLPISKEESRLS	SINFNIIKI,TSINFNIIK,ISTSINFNI,STSINFNII,EHISTSINF,INFNIIKIL,HISTSINFNI,STSINFNIIK,TSINFNIIKI,QEHISTSINF,ISTSINFNII	CRC
C15orf52	c.294delG	p.G98fs	RKKNQALLRRYQEIQEDRRQAEQGG[p.G98fs]WL*	RQAEQGGWL	STAD
C16orf3	c.193G>A	p.G65S	RACPVACPVGCPIACPVSCPVACPV[p.G65S]SCPVGSMATAPQGLSPQEWEADRETG	VACPVSCPV,PVACPVSCPV,CPVSCPVGSM	CESC
C16orf55	c.353A>C	p.D118A	RASNETLVSCSSSGSDQQRTIREPE[p.D118A]AWGPYRRHRNPSTADAYNSHLKE*	REPEAWGPY,RTIREPEAW,EAWGPYRRHR,IREPEAWGPY	KIRC
C16orf62	c.730C>A	p.L244I	SDTSVIQFYPSKFVLITDILDTFGK[p.L244I]IVYERIFSMCVDSRSVLPDHFSPENA	IVYERIFSM,TFGKIVYER,DILDTFGKI,LDTFGKIVY,GKIVYERIF,ILDTFGKIVY,TFGKIVYERI,KIVYERIFSM,DTFGKIVYER,FGKIVYERIF	TGCT
C16orf74	c.61_63delAGC	p.S21del	MGLKMSCLKGFQMCVSSSSS[p.S21del]HDEAPVLNDKHLDVPDIIITPPTPTGMM	MCVSSSSSH,QMCVSSSSSH	PRAD
C16orf87	c.452G>T	p.R151I	ANLSDEKAFVFSVALAEINRKIINQ[p.R151I]ILIL*	KIINQILIL,NRKIINQIL,RKIINQILI,EINRKIINQI,RKIINQILIL	CRC
C17orf96	c.187C>G	p.L63V	LCLRALAFCALAKPRASSLGPGPGE[p.L63V]VAARSPVLRGPQAPLRPGGWAPDGLK	SLGPGPGEV,VAARSPVLR,EVAARSPVL,GEVAARSPV,EVAARSPVLR,GEVAARSPVL	ACC
C19orf10	c.34G>C	p.G12R	MAAPSGGWNGV[p.G12R]RASLWAALLLGAVALRPAEAVSEPTT	GVRASLWAA,RASLWAALL,VRASLWAAL,GVRASLWAAL,GWNGVRASLW,RASLWAALLL,GGWNGVRASL,VRASLWAALL	ACC
C19orf21	c.784C>T	p.R262C	PHLANGHVVPIKPQVKGVVREENKV[p.R262C]CAVPTWASVQVVDDPGSLASVESPGT	CAVPTWASV,REENKVCAV,NKVCAVPTW,EENKVCAVPT	STAD
C19orf70	c.150delC	p.P50fs	YDQELLGPSDKSQAALQKAGEVVPP[p.P50fs]PCTSSASTCVSRQACRYPSSQPLQRFTFPSVTPGMQAS*	CVSRQACRY,LQRFTFPSV,SSASTCVSR,SQPLQRFTF,TFPSVTPGM,RQACRYPSS,CTSSASTCV,FTFPSVTPG,VPPPCTSSA,CRYPSSQPL,GEVVPPPCT,PLQRFTFPSV,FTFPSVTPGM,TSSASTCVSR,STCVSRQACR,SSQPLQRFTF,YPSSQPLQRF,FPSVTPGMQA,RQACRYPSSQ,LQRFTFPSVT	STAD
C1QBP	c.674C>T	p.T225I	ESDIFSIREVSFQSTGESEWKDTNY[p.T225I]ILNTDSLDWALYDHLMDFLADRGVDN	NYILNTDSL,SEWKDTNYI,ILNTDSLDW,ILNTDSLDWA,SEWKDTNYIL,YILNTDSLDW	TGCT
C1QTNF5	c.582_583insG	p.G194fs	CVWHIQVATDHAIQLKIEALSIESV[p.G194fs]GLLPF*	ALSIESVGL,IESVGLLPF,LSIESVGLL,ALSIESVGLL,EALSIESVGL,SIESVGLLPF	STAD
C1QTNF5	c.924delC	p.P308fs	NCADGSDETNCSAKFSGSVEQSHPP[p.P308fs]PRLLAP*	QSHPPPRLLA,VEQSHPPPRL	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
C1R	c.647delC	p.P216fs	AECSSELYTEASGYISSLEYPRSYP[p.P216fs]LTCAATTASGWSGASPCTSSSWSLLILMTTSKYTAPMTSYRSMPTGRTLASSVGSKGPPTSTPAAMLWICCSSQMSRGTAGAGSCATPPRSSSAPSPRP*	TSSSWSLLI,ILMTTSKYT,SMPTGRTLA,QMSRGTAGA,LLILMTTSK,TLASSVGSK,YTAPMTSYR,RSSSAPSPR,RSYPLTCAA,TTSKYTAPM,MTSYRSMPT,SYRSMPTGR,RSMPTGRTL,RTLASSVGS,SSQMSRGTA,AGSCATPPR,ATPPRSSSA,LILMTTSKY,KYTAPMTSY,TTASGWSGA,CTSSSWSLL,STPAAMLWI,YPRSYPLTC,APMTSYRSM,MPTGRTLAS,LEYPRSYPL,CAATTASGW,SSSWSLLIL,SSWSLLILM,LMTTSKYTA,SKYTAPMTS,LWICCSSQM,SQMSRGTAG,YPLTCAATT,PPTSTPAAM,TSTPAAMLW,TPAAMLWIC,CTSSSWSLLI,SLEYPRSYPL,ILMTTSKYTA,MLWICCSSQM,SQMSRGTAGA,SLLILMTTSK,RTLASSVGSK,TSYRSMPTGR,RSYPLTCAAT,MTTSKYTAPM,KYTAPMTSYR,RSMPTGRTLA,LLILMTTSKY,SKYTAPMTSY,WICCSSQMSR,TTASGWSGAS,YTAPMTSYRS,YPRSYPLTCA,YPLTCAATTA,SPCTSSSWSL,MPTGRTLASS,GPPTSTPAAM,LEYPRSYPLT,GASPCTSSSW,TSSSWSLLIL,SSSWSLLILM,YRSMPTGRTL,SKGPPTSTPA	STAD
C1RL	c.1051delC	p.L351fs	PDYRQNESHNFSGDIALLELQHSIP[p.L351fs]WAPTSSRSVCPIMRPSTAAACWATSVGLAWRWAG*	AAACWATSV,ELQHSIPWA,IMRPSTAAA,ATSVGLAWR,SSRSVCPIM,IPWAPTSSR,STAAACWAT,APTSSRSVC,CPIMRPSTA,LELQHSIPW,LQHSIPWAP,WATSVGLAW,RPSTAAACW,TSVGLAWRW,TAAACWATSV,CWATSVGLAW,SSRSVCPIMR,IMRPSTAAAC,SIPWAPTSSR,WATSVGLAWR,STAAACWATS,CPIMRPSTAA,RPSTAAACWA,LLELQHSIPW,LELQHSIPWA,LQHSIPWAPT,TSSRSVCPIM,AACWATSVGL	CRC
C1orf106	c.1612C>T	p.R538C	PPGYFPAGRYVVVAESPLPPGEWEL[p.R538C]CRAAPGPAYEEEGTPLRYQRLVPSRS	GEWELCRAA,CRAAPGPAY,WELCRAAPG,LCRAAPGPAY,WELCRAAPGP,GEWELCRAAP	ACC
C1orf167	c.367A>G	p.S123G	WWHLRALGPDATSSCTKTPSALEPL[p.S123G]GSSTLQDSLEKVPRAPTLPDTLQGSL	LEPLGSSTL,ALEPLGSSTL	TGCT
C1orf173	c.2063C>A	p.S688Y	ESFENVLKEGTEKGTQEIAEGLSEK[p.S688Y]YGKHVSAEEKEKDKSKLWEESTAQVK	IAEGLSEKY,GLSEKYGKHV,YGKHVSAEEK,EIAEGLSEKY,SEKYGKHVSA	LUAD
C1orf173	c.4360G>A	p.G1454S	AGVGTPGALERKTSGLGQEQEEGSE[p.G1454S]SQEAATGSGDGRQETGAAEKFRLGLS	EEGSESQEA,QEEGSESQEA,EEGSESQEAA	LUAD
C1orf74	c.760G>A	p.D254N	PGLRDILNTWEKDLRTRFRTQNDFA[p.D254N]NLSISSEIVTLPAVAL*	NLSISSEIV,RTQNDFANL,FANLSISSEI,RFRTQNDFAN,FRTQNDFANL,TQNDFANLSI	LUSC
C1orf87	c.1622G>T	p.R541L	LSPQKIDQALRRFRSGENMLLEPAL[p.R541L]LYLKEL*	MLLEPALLY,NMLLEPALL,LLEPALLYL,MLLEPALLYL,LLEPALLYLK,NMLLEPALLY,EPALLYLKEL	LUAD
C20orf132	c.1146A>C	p.E382D	LKLPLRFQRLGHLVALMALLCGDPQ[p.E382D]DKVAEEAAEGIHSLLHITLRLKYITH	LLCGDPQDKV	KIRC
C20orf160	c.136delC	p.P46fs	KAGRRAACRSSVSRRPLHSMPLYPP[p.P46fs]TTSSTPRFCCVTTWRKRSSSWATLPG*	HSMPLYPPT,SSTPRFCCV,RFCCVTTWR,RKRSSSWAT,KRSSSWATL,MPLYPPTTS,RFCCVTTWRK,TWRKRSSSWA,RKRSSSWATL,RSSSWATLPG,TSSTPRFCCV,MPLYPPTTSS,HSMPLYPPTT,TTWRKRSSSW,TPRFCCVTTW	STAD
C20orf26	c.3263G>A	p.R1088Q	LEVQMAQPNYGLELVTGSAKNGTYF[p.R1088Q]QIHINKYKMVETITCLSREPFPASNY	TYFQIHINK,FQIHINKYK,YFQIHINKY,AKNGTYFQI,GTYFQIHINK,TYFQIHINKY,SAKNGTYFQI,YFQIHINKYK,FQIHINKYKM,AKNGTYFQIH	CRC
C22orf26	c.83C>T	p.P28L	ASATAAWHCPPLCLPPLPASAPTSP[p.P28L]LNPATRPAPGPGRRARCPQSAHPAPT	APTSPLNPA,LPASAPTSPL,SPLNPATRPA	ACC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
C22orf40	c.96_97insC	p.P32fs	RPLGVFECELCTLTAPYSYVGQKPP[p.P32fs]QHPVDGPPGGKLCHEGSLHLRQGQIPGPRLVLQFVQQAGVCGPGMQFILLQEILPPLCPGEHQCFSSGNSARLGEKESSIKEDPQPARFSDVSATGARSSGGTLHRAPGPACARDAAELGAAMPGLVSGPLGAALQPRGAGVQLGAATGPGSCSKRVVQRQMPDKTQPGTRPGPPTCPSGPRPE*	LQFVQQAGV,MQFILLQEI,LLQEILPPL,RLGEKESSI,ALQPRGAGV,GQIPGPRLV,TLHRAPGPA,GLVSGPLGA,LVSGPLGAA,ATGPGSCSK,RSSGGTLHR,VVQRQMPDK,GQKPPQHPV,HLRQGQIPG,GNSARLGEK,KTQPGTRPG,GTRPGPPTC,CFSSGNSAR,FSSGNSARL,DAAELGAAM,GPRLVLQFV,GARSSGGTL,GPACARDAA,MPGLVSGPL,QPRGAGVQL,SLHLRQGQI,GKLCHEGSL,LCHEGSLHL,GVCGPGMQF,GEHQCFSSG,KEDPQPARF,ARFSDVSAT,LHRAPGPAC,VSGPLGAAL,SKRVVQRQM,RQMPDKTQP,AELGAAMPG,KLCHEGSLHL,VLQFVQQAGV,GMQFILLQEI,MQFILLQEIL,ILLQEILPPL,LLQEILPPLC,AMPGLVSGPL,RLVLQFVQQA,ELGAAMPGLV,GLVSGPLGAA,LVSGPLGAAL,RLGEKESSIK,RVVQRQMPDK,AATGPGSCSK,SGNSARLGEK,SIKEDPQPAR,RSSGGTLHRA,GTLHRAPGPA,IPGPRLVLQF,QQAGVCGPGM,RQGQIPGPRL,GQIPGPRLVL,LQFVQQAGVC,AGVCGPGMQF,HQCFSSGNSA,IKEDPQPARF,RDAAELGAAM,AELGAAMPGL,LQPRGAGVQL,VQLGAATGPG,CSKRVVQRQM,RQMPDKTQPG,GEHQCFSSGN	CRC
C22orf43	c.55A>G	p.K19E	MGNILTCCINSHCGWPRG[p.K19E]EDAPCYESDTDIYETVAAATSESTTV	WPRGEDAPC,GEDAPCYES,WPRGEDAPCY	TGCT
C2orf44	c.1368T>A	p.N456K	IMLEEEPSITSGESQTTYSTFSAPL[p.N456K]KKANRKKLIESLSPDFCHQNKGLLLT	YSTFSAPLK,STFSAPLKK,PLKKANRKK,SAPLKKANR,TYSTFSAPLK,YSTFSAPLKK,STFSAPLKKA,SAPLKKANRK,FSAPLKKANR	CLL
C2orf53	c.815C>A	p.P272H	VEYPICLVCLRPRSPSCPLPRYRTG[p.P272H]HRLLAFPQLLPCVQGQESGPLRIGIG	RYRTGHRLL,RTGHRLLAF,HRLLAFPQL,RYRTGHRLLA,LPRYRTGHRL,YRTGHRLLAF,GHRLLAFPQL,HRLLAFPQLL	LUAD
C2orf71	c.3675_3676insAGC	p.1225_1226insS	GRPQPPTLDPTSTSYESQLGQNSSS[p.1225_1226insS]SEESPKKDTEPGSSPCSPELQGGTRRAS	SSSSEESPK,SSSSEESPKK,SQLGQNSSSS	KIRC
C2orf81	c.943A>C	p.T315P	LELRSEGVPCIASGVLVSYPSVGGA[p.T315P]PRPSASCQQQRAGHSDVRLSAHHHRM	YPSVGGAPR,SYPSVGGAPR	ACC
C3	c.2670delC	p.P890fs	LLHNPAFCSLATTKRRHQQTVTIPP[p.P890fs]SPRCPFHMSSCR*	TVTIPPSPR,IPPSPRCPF,QTVTIPPSPR,SPRCPFHMSS,HQQTVTIPPS	STAD
C3orf15	c.1655G>A	p.R552Q	RTCHALQEDEKLVKKAEKQVTLALQ[p.R552Q]QQRNLHEHKVSLVENHLAGLEGRALA	VTLALQQQR,QQRNLHEHK,KQVTLALQQ,QQQRNLHEH,QVTLALQQQR,KQVTLALQQQ,LQQQRNLHEH,QQRNLHEHKV	CLL
C3orf20	c.2219G>T	p.R740L	IISSQNYTSTGQLQWLLNTLYNHQQ[p.R740L]LGRGSPCIQCRYDSYRLLQYDLDSPL	LYNHQQLGR,QQLGRGSPC,TLYNHQQLGR,HQQLGRGSPC,QQLGRGSPCI	LUAD
C3orf23	c.649C>T	p.R217C	SWLDNNGKSAVKKLKNSLPLRKELD[p.R217C]CLKDELSHQLQLSDIRWQRSWGIAHR	CLKDELSHQL,KELDCLKDEL,LPLRKELDCL	UCEC
C3orf30	c.681C>A	p.D227E	AERRTSEQITHRLSKLSERRPSVQI[p.D227E]ESGSSVPSDQSPSVQIDSGSSVPSDQ	VQIESGSSV,IESGSSVPS,SVQIESGSSV,VQIESGSSVP	LUSC
C3orf39	c.997C>T	p.R333W	LALAQEFQMKTVTVSLEDHTFADVV[p.R333W]WLVSNASMLVSMHGAQLVTTLFLPRG	TFADVVWLV,WLVSNASML,HTFADVVWL,DVVWLVSNA,VWLVSNASM,HTFADVVWLV,WLVSNASMLV,VWLVSNASML,VVWLVSNASM	CRC
C3orf62	c.554G>A	p.R185Q	SNMPLNNSSQEVTKDLLDMIDHTSI[p.R185Q]QTIEELAGKIEFENELNHMCGHCQDS	QTIEELAGK,IDHTSIQTI,TSIQTIEEL,MIDHTSIQTI,HTSIQTIEEL,QTIEELAGKI	UCEC
C3orf70	c.17C>T	p.S6L	MSAAA[p.S6L]LPASERGWKSEKLDEAQALARSCAAR	AAALPASER,SAAALPASER,AALPASERGW	BLCA,CESC
C4orf21	c.2398G>C	p.E800Q	SKDTEAHISEPEDLGKIRSPPPDHV[p.E800Q]QVETAREGKQYWNPRNSSELSGLVNT	VQVETAREG	CESC
C5orf30	c.10G>A	p.D4N	MEV[p.D4N]NINGESRSTLTTLPFPGAEANSPGKA	EVNINGESR	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
C5orf4	c.341G>A	p.R114Q	LFFWSFNGLLLVVDTTGKPNFISRY[p.R114Q]QIQVGKNEPVDPVKLRQSIRTVLFNQ	FISRYQIQV,ISRYQIQVGK,KPNFISRYQI,YQIQVGKNEP	CRC
C5orf65	c.734A>G	p.Q245R	PRAAGAPRPRLLLRTGSLDESLGPL[p.Q245R]RAAAGFVQTALARKLSPEAPAPSSAT	SLGPLRAAA,GPLRAAAGF,RAAAGFVQTA,ESLGPLRAAA,DESLGPLRAA	ACC
C6orf170	c.2171A>C	p.K724T	RTGAINECVTFIFNRYAKKLQVSRH[p.K724T]TKFGYGVLVTRVASTAAGGIALKKSG	KLQVSRHTK,VSRHTKFGY,HTKFGYGVL,LQVSRHTKF,RHTKFGYGV,TKFGYGVLV,KLQVSRHTKF,KKLQVSRHTK,VSRHTKFGYG,HTKFGYGVLV,QVSRHTKFGY,RHTKFGYGVL,TKFGYGVLVT	CRC
C6orf89	c.172_173insC	p.P58fs	GMSEKAIEKFIRQLLEKNEPQRPPP[p.P58fs]AVSSPYSCV*	AVSSPYSCV,EPQRPPPAV,PPPAVSSPY,RPPPAVSSPY	STAD
C7	c.2059C>A	p.R687S	GMSLEGPSAFLCGSSLKWSPEMKNA[p.R687S]SCVQKENPLTQAVPKCQRWEKLQNSR	EMKNASCVQK,SPEMKNASCV	LUAD
C7orf49	c.389delG	p.G130fs	GSSSEEEDSGKQALAPGLSPSQRPG[p.G130fs]VPALPVAGALRRRRKRMC*	SQRPGVPAL,AGALRRRRK,GALRRRRKR,ALRRRRKRM,RPGVPALPV,GLSPSQRPGV,VAGALRRRRK,SPSQRPGVPA,RPGVPALPVA,VPALPVAGAL,ALRRRRKRMC,SQRPGVPALP	STAD
C7orf50	c.535delC	p.L179fs	RARELTVQKAEALMRELDEEGSDPP[p.L179fs]CRGGPSASDRCCSCSPSGFSAGRGRCPVQGCLRPHRVQLLRRWGPGSPAGQRLSKGFQLLRWWGPGSPAPEPRKGPFPPPDPPWPVTAVTVMAGSVPSAQSVDALESPGPLALEGPSSPRNLLWREMSIFLPGIF*	RLSKGFQLL,VMAGSVPSA,NLLWREMSI,CLRPHRVQL,EMSIFLPGI,LSKGFQLLR,MSIFLPGIF,RPHRVQLLR,RVQLLRRWG,RWWGPGSPA,LWREMSIFL,TVMAGSVPS,APEPRKGPF,WPVTAVTVM,GPSSPRNLL,LLWREMSIF,RRWGPGSPA,QRLSKGFQL,SKGFQLLRW,KGFQLLRWW,LESPGPLAL,REMSIFLPG,DPPWPVTAV,TVMAGSVPSA,LLWREMSIFL,FSAGRGRCPV,CLRPHRVQLL,RLSKGFQLLR,REMSIFLPGI,RGRCPVQGCL,RPHRVQLLRR,GSPAGQRLSK,CSPSGFSAGR,LALEGPSSPR,FPPPDPPWPV,TAVTVMAGSV,GPGSPAGQRL,VPSAQSVDAL,SPRNLLWREM,EMSIFLPGIF,RCCSCSPSGF,LRRWGPGSPA,RRWGPGSPAG,GQRLSKGFQL,QRLSKGFQLL,LSKGFQLLRW,FQLLRWWGPG,LRWWGPGSPA,ALESPGPLAL,LEGPSSPRNL,RNLLWREMSI,NLLWREMSIF,CPVQGCLRPH,WPVTAVTVMA,PPWPVTAVTV,GPFPPPDPPW,GPSSPRNLLW	STAD
C7orf57	c.88G>A	p.E30K	SKELQGATHRYAPCDWYYHVPVKRS[p.E30K]KKAVDAPPASQIPGLSNLGDSHSENL	HVPVKRSKK,KKAVDAPPA,YYHVPVKRSK,RSKKAVDAPP,VPVKRSKKAV	HNSC
C7orf58	c.418G>T	p.G140W	HQHILTQHGYTVVIAEERLNAGLGP[p.G140W]WLLEQGDLGSWDLLICLSSKKAEGTP	RLNAGLGPW,RLNAGLGPWL	LUAD
C7orf58	c.713G>T	p.R238L	PSVCLDQGMQLKPSTSSHLLKTVKP[p.R238L]LVWKPGDWSREQLNETTVLAPHETIF	LLKTVKPLV,KTVKPLVWK,HLLKTVKPL,LKTVKPLVW,HLLKTVKPLV,LVWKPGDWSR,SHLLKTVKPL,LLKTVKPLVW	LUAD
C7orf63	c.28G>A	p.A10T	MWTEEAGAT[p.A10T]TEAQESGIRNKSSSSSQIPVVGVVTE	EEAGATTEA,TEEAGATTEA	CRC
C9orf131	c.1024delC	p.P342fs	GYETHLETTGHKKMPQAFEPPMPPP[p.P342fs]ANPQLLCQNPEKLALKEDLLYLRTSGEPWDTERNLRPLSLQCQSLALP*	LALKEDLLY,ALKEDLLYL,SLQCQSLAL,KLALKEDLL,QLLCQNPEK,MPPPANPQL,ERNLRPLSL,YLRTSGEPW,CQNPEKLAL,FEPPMPPPA,QLLCQNPEKL,KLALKEDLLY,CQNPEKLALK,LYLRTSGEPW,ALKEDLLYLR,MPPPANPQLL,RPLSLQCQSL,LALKEDLLYL,TERNLRPLSL,LSLQCQSLAL,GEPWDTERNL	STAD
C9orf174	c.406C>T	p.R136W	ITNHREKKLQQSTKYWCLNQSAESL[p.R136W]WICAMRGGENRPPARVQSSSEELELR	ESLWICAMR,NQSAESLWI,AESLWICAM,QSAESLWICA,CLNQSAESLW,SAESLWICAM	BRCA
CABP5	c.433delC	p.R145fs	NGDGEITLVELQQAMQRLLGERLTP[p.R145fs]GRSLRLSGRLMLMETAQLTLKSL*	RLSGRLMLM,LMLMETAQL,MLMETAQLT,RLTPGRSLR,RSLRLSGRL,SLRLSGRLM,ERLTPGRSL,LRLSGRLML,LMETAQLTL,RLMLMETAQL,MLMETAQLTL,RLTPGRSLRL,LMETAQLTLK,RSLRLSGRLM,SLRLSGRLML,SGRLMLMETA,ETAQLTLKSL,GERLTPGRSL,LRLSGRLMLM	STAD
CACHD1	c.2159C>A	p.S720Y	SLMDKAFDPTRRQWYLHAVANPGLI[p.S720Y]YLTGPYLDVGGAGYVVTISHTIHSSS	AVANPGLIY,LIYLTGPYL,YLTGPYLDV,GLIYLTGPY,VANPGLIYL,AVANPGLIYL,GLIYLTGPYL,IYLTGPYLDV,HAVANPGLIY	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
CACNA1A	c.1994C>T	p.T665M	NFDEGTPPTNFDTFPAAIMTVFQIL[p.T665M]MGEDWNEVMYDGIKSQGGVQGGMVFS	LMGEDWNEV,IMTVFQILM,FQILMGEDW,MGEDWNEVM,MGEDWNEVMY,ILMGEDWNEV,LMGEDWNEVM,VFQILMGEDW,AIMTVFQILM	CRC
CACNA1A	c.2315C>A	p.S772Y	EVSPLSAANMSIAVKEQQKNQKPAK[p.S772Y]YVWEQRTSEMRKQNLLASREALYNEM	PAKYVWEQR,NQKPAKYVW,YVWEQRTSEM,QQKNQKPAKY	LUAD
CACNA1C	c.2129C>T	p.S710L	RRSTFDNFPQSLLTVFQILTGEDWN[p.S710L]LVMYDGIMAYGGPSFPGMLVCIYFII	ILTGEDWNL,LTGEDWNLV,GEDWNLVMY,NLVMYDGIM,TGEDWNLVMY,ILTGEDWNLV,LVMYDGIMAY,LTGEDWNLVM	UCEC
CACNA1D	c.3218G>T	p.R1073L	AKSNPEECRGLFILYKDGDVDSPVV[p.R1073L]LERIWQNSDFNFDNVLSAMMALFTVS	SPVVLERIW,DVDSPVVLER,LERIWQNSDF	LUAD
CACNA2D1	c.1055C>A	p.A352E	AKGITDYKKGFSFAFEQLLNYNVSR[p.A352E]ENCNKIIMLFTDGGEERAQEIFNKYN	RENCNKIIM,RENCNKIIML	LUAD
CACNA2D3	c.994G>A	p.A332T	CLNGTLVQADRTNKEHFREHLDKLF[p.A332T]TKGIGMLDIALNEAFNILSDFNHTGQ	KLFTKGIGM,REHLDKLFT,KLFTKGIGML	CRC
CACNB2	c.1823G>A	p.R608H	ASHRDHNHRDETHGSSDHRHRESRH[p.R608H]HSRDVDREQDHNECNKQRSRHKSKDR	RHRESRHHSR,RESRHHSRDV	CRC
CACNG3	c.400G>A	p.V134I	ILSVTLLFFGGLCVAASEFHRSRHN[p.V134I]IILSAGIFFVSAGLSNIIGIIVYISA	RSRHNIILS,FHRSRHNII,HRSRHNIIL,SRHNIILSA,RSRHNIILSA,EFHRSRHNII,FHRSRHNIIL,SEFHRSRHNI	CRC
CACNG3	c.413C>T	p.A138V	TLLFFGGLCVAASEFHRSRHNVILS[p.A138V]VGIFFVSAGLSNIIGIIVYISANAGD	ILSVGIFFV,VILSVGIFF,NVILSVGIF,SRHNVILSV,VILSVGIFFV,RSRHNVILSV,LSVGIFFVSA,NVILSVGIFF,RHNVILSVGI,HNVILSVGIF	CRC
CACNG3	c.694C>T	p.R232W	LRAKSHSEFLKKSTFARLPPYRYRF[p.R232W]WRRSSSRSTEPRSRDLSPISKGFHTI	RYRFWRRSS,RFWRRSSSR,PPYRYRFWR,PYRYRFWRR,YRFWRRSSS,LPPYRYRFW,RLPPYRYRFW,RYRFWRRSSS,RFWRRSSSRS,LPPYRYRFWR,PPYRYRFWRR,YRYRFWRRSS	LUAD
CACNG5	c.361G>A	p.G121R	MIRSATPFPLVSLFFMFIGFILNNI[p.G121R]RHIRPHRTILAFVSGIFFILSGLSLV	FILNNIRHI,NIRHIRPHR,ILNNIRHIR,RHIRPHRTI,GFILNNIRHI,FIGFILNNIR,FILNNIRHIR,NNIRHIRPHR,RHIRPHRTIL	CRC
CACNG8	c.437T>G	p.V146G	LRVVRASSIFPILSAILLLLGGVCV[p.V146G]GASRVYKSKRNIILGAGILFVAAGLS	LLGGVCVGA,CVGASRVYK,GASRVYKSK,VCVGASRVY,LLLGGVCVGA,VGASRVYKSK,GVCVGASRVY	BLCA
CADM1	c.569C>T	p.S190L	NCTAMASKPATTIRWFKGNTELKGK[p.S190L]LEVEEWSDMYTVTSQLMLKVHKEDDG	LEVEEWSDM,TELKGKLEV,LEVEEWSDMY	CRC
CADPS	c.2875C>A	p.R959S	DAALEVQPPDTWDSFPLFQLLNDFL[p.R959S]STDYNLCNGKFHKHLQDLFAPLVVRY	LNDFLSTDY,FLSTDYNLC,DFLSTDYNL,LLNDFLSTDY,STDYNLCNGK,FQLLNDFLST,NDFLSTDYNL	LUAD
CADPS	c.3217G>A	p.A1073T	PSWMAAIYDADNGSGTSEDLFWKLD[p.A1073T]TLQTFIRDLHWPEEEFGKHLEQRLKL	KLDTLQTFI,WKLDTLQTF,KLDTLQTFIR,FWKLDTLQTF,WKLDTLQTFI	CRC
CALB2	c.180G>C	p.K60N	YIEGKELENFFQELEKARKGSGMMS[p.K60N]NSDNFGEKMKEFMQKYDKNSDGKIEM	NSDNFGEKM,GMMSNSDNF,SNSDNFGEK,MSNSDNFGEK,SGMMSNSDNF	CESC
CALB2	c.772C>T	p.R258C	KEMNIQQLTNYRKSVMSLAEAGKLY[p.R258C]CKDLEIVLCSEPPM*	KLYCKDLEI,KLYCKDLEIV,LYCKDLEIVL	LUAD
CALCB	c.242G>C	p.R81T	DYVQMKASELKQEQETQGSSSAAQK[p.R81T]TACNTATCVTHRLAGLLSRSGGMVKS	AQKTACNTA,KTACNTATCV,AQKTACNTAT	CESC
CALD1	c.1018G>A	p.E340K	ERMREEEKRAAEERQRIKEEEKRAA[p.E340K]KERQRIKEEEKRAAEERQRIKEEEKR	AAKERQRIK,RAAKERQRI,RAAKERQRIK	CLL
CALN1	c.691G>A	p.V231I	LNETSGNCQTEFEGVHSQKQNRQTC[p.V231I]IRKSLICAFAMAFIISVMLIAANQIL	KQNRQTCIR,QNRQTCIRK,CIRKSLICA,RQTCIRKSL,IRKSLICAF,KQNRQTCIRK,SQKQNRQTCI,CIRKSLICAF,RQTCIRKSLI	GBM
CAMK2B	c.392G>T	p.G131V	EYYSEADASHCIQQILEAVLHCHQM[p.G131V]VVVHRDLKPENLLLASKCKGAAVKLA	AVLHCHQMV,VLHCHQMVV,MVVVHRDLK,AVLHCHQMVV,VLHCHQMVVV,QMVVVHRDLK,EAVLHCHQMV,HQMVVVHRDL	LUAD
CAMSAP1	c.1396_1397insA	p.T466fs	RHRSNSLTRVDGQPRGAAIAWPEKK[p.T466fs]NQACVPANTFCSTSRCEL*	VPANTFCST,QACVPANTF,KKNQACVPA,WPEKKNQACV,NQACVPANTF	BLCA

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
CAMSAP1	c.1396delA	p.T466fs	RHRSNSLTRVDGQPRGAAIAWPEKK[p.T466fs]PGLRPSQHLLLYITLRVVKWIPALATASAWPAPSAKTVWHPTLLI*	LLLYITLRV,LLYITLRVV,RVVKWIPAL,GLRPSQHLL,VVKWIPALA,SAWPAPSAK,HLLLYITLR,KWIPALATA,LYITLRVVK,ASAWPAPSA,SAKTVWHPT,KTVWHPTLL,RPSQHLLLY,LATASAWPA,TVWHPTLLI,IPALATASA,WPAPSAKTV,SQHLLLYIT,VKWIPALAT,AKTVWHPTL,HLLLYITLRV,LLLYITLRVV,ALATASAWPA,GLRPSQHLLL,YITLRVVKWI,RVVKWIPALA,WIPALATASA,LLYITLRVVK,ASAWPAPSAK,LYITLRVVKW,TLRVVKWIPA,SAKTVWHPTL,KTVWHPTLLI,LRPSQHLLLY,TASAWPAPSA,KPGLRPSQHL,RPSQHLLLYI,IPALATASAW,WPAPSAKTVW,SQHLLLYITL,LRVVKWIPAL,VKWIPALATA,AKTVWHPTLL	KICH
CANT1	c.392A>G	p.K131R	RIAVIADLDTESRAQEENTWFSYLK[p.K131R]RGYLTLSDSGDKVAVEWDKDHGVLES	YLKRGYLTL,NTWFSYLKR,SYLKRGYLT,WFSYLKRGY,FSYLKRGYL,YLKRGYLTLS,SYLKRGYLTL,TWFSYLKRGY,ENTWFSYLKR	PRAD
CAPNS1	c.906_911delGCTGGT	p.LV303del	LHTSSELQSPSSYFASRPWVRAKGL[p.LV303del]LGFPVLTLHPPLPSGC5*	GLLGFPVLT,WVRAKGLLG,VRAKGLLGF,AKGLLGFPV,KGLLGFPVL,GLLGFPVLTL,RAKGLLGFPV,WVRAKGLLGF,RPWVRAKGLL,AKGLLGFPVL	TGCT
CAPRIN2	c.37G>A	p.E13K	MEVQVSQASLGF[p.E13K]KLTSVEKSLREWSRLSREVIAWLCPS	SLGFKLTSV,VSQASLGFK,GFKLTSVEK,SQASLGFKL,QVSQASLGFK,LGFKLTSVEK,KLTSVEKSLR,SQASLGFKLT,FKLTSVEKSL	CRC
CARD11	c.1268G>A	p.R423Q	IEKDKYRKQIRELEEKNDEMRIEMV[p.R423Q]QREACIVNLESKLRRLSKDSNNLDQS	EMRIEMVQR,DEMRIEMVQ,IEMVQREAC,MRIEMVQREA,IEMVQREACI,VQREACIVNL	CRC
CARD11	c.1876G>A	p.E626K	LDDDSHERYSFGPSSIHSSSSSHQS[p.E626K]KGLDAYDLEQVNLMFRKFSLERPFRP	SSSSSHQSK,HQSKGLDAY,HSSSSSHQSK,SHQSKGLDAY	DLBCL
CARD11	c.279G>C	p.E93D	SKINRAGRLLDILHTKGQRGYVVFL[p.E93D]DSLEFYYPELYKLVTGKEPTRRFSTI	FLDSLEFYY,GYVVFLDSL,VVFLDSLEF,VFLDSLEFY,FLDSLEFYYP,VVFLDSLEFY,YVVFLDSLEF,RGYVVFLDSL,VFLDSLEFYY,DSLEFYYPEL	DLBCL
CARD11	c.3195C>G	p.I1065M	ANIEAVAAKNKHCLLEAGIGCTRDL[p.I1065M]MKSNIYPiVLFIRVCEKNIKRFRKLL	LMKSNIYPI,RDLMKSNIY,MKSNIYPIV,DLMKSNIYPI,LMKSNIYPIV,GIGCTRDLMK,CTRDLMKSNI,MKSNIYPIVL	LUAD
CARM1	c.605C>T	p.A202V	LQNHTDFKDKIVLDVGCGSGILSFF[p.A202V]VAQAGARKIYAVEASTMAQHAEVLVK	ILSFFVAQA,FVAQAGARK,SFFVAQAGA,FFVAQAGAR,LSFFVAQAG,GILSFFVAQA,FVAQAGARKI,SFFVAQAGAR,VAQAGARKIY,CGSGILSFFV,LSFFVAQAGA	GBM
CASC1	c.161G>A	p.R54Q	ERRLKEEEEARLKYEKEEMERLEIQ[p.R54Q]QIEKEKWHRLEAKDLERRNEELEELY	RLEIQQIEK,MERLEIQQI	CRC
CASC3	c.1808C>T	p.P603L	MNLPHPGLHPHQTPAPLPNPGLYPP[p.P603L]LVSMSPGQPPPQQLLAPTYFSAPGVM	GLYPPLVSM,NPGLYPPLV,GLYPPLVSMS,LPNPGLYPPL	STAD
CASC3	c.1934C>T	p.P645L	TYFSAPGVMNFGNPSYPYAPGALPP[p.P645L]LPPPHLYPNTQAPSQVYGGVTYYNPA	YAPGALPPL,LPPLPPPHL,ALPPLPPPHL,PYAPGALPPL,LPPLPPPHLY	STAD
CASC3	c.1973C>T	p.S658L	PSYPYAPGALPPPPPPHLYPNTQAP[p.S658L]LQVYGGVTYYNPAQQQVQPKPSPPRR	NTQAPLQVY,LYPNTQAPL,LQVYGGVTY,APLQVYGGV,HLYPNTQAPL,LQVYGGVTYY,QAPLQVYGGV,YPNTQAPLQV	STAD
CASC3	c.695C>T	p.S232F	RQRKLWKDEGRWEHDKFREDEQAPK[p.S232F]FRQELIALYGYDIRSAHNPDDIKPRR	KFRQELIAL,APKFRQELI,REDEQAPKF,FRQELIALY,KFRQELIALY,EQAPKFRQEL	STAD
CASD1	c.2341delT	p.F781fs	DLAQIIIPKDNSSLLKRLACIAAFF[p.F781fs]VDSSSYHPFKINQNIRFQKF*	DSSSYHPFK,INQNIRFQK,AFFVDSSSY,LACIAAFFV,HPFKINQNI,VDSSSYHPF,FKINQNIRF,NQNIRFQKF,FVDSSSYHPF,RLACIAAFFV,KINQNIRFQK,INQNIRFQKF,AAFFVDSSSY,HPFKINQNIR,DSSSYHPFKI	STAD
CASP14	c.13C>T	p.R5W	MSNP[p.R5W]WSLEEEKYDMSGARLALILCVTKARE	NPWSLEEEKY	CRC
CASP5	c.67delA	p.R23fs	MAAVPRVEGVFIFLIEDSGKKK[p.R23fs]GVRILKLCSKVSFRVDWITS*	RILKLCSKV,KVSFRVDWI,KLCSKVSFR,KKKGVRILK,GKKKGVRIL,KKGVRILKL,LKLCSKVSF,SKVSFRVDW,KLCSKVSFRV,GVRILKLCSK,SGKKKGVRIL,ILKLCSKVSF,KKKGVRILKL,SKVSFRVDWI	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
CASP8	c.1413delA	p.R471fs	YEVSNKDDKKNMGKQMPQPTFTLRK[p.R471fs]NLSSLLIDGAILFVLFCFVFLRQNLALSPRLECSGVISAHRKLRLPGSGHSPASASRVAGTTGARHHTWLIF*	LLIDGAILF,LIDGAILFV,ILFVLFCFV,FVLFCFVFL,TLRKNLSSL,FVFLRQNLA,VLFCFVFLR,CSGVISAHR,SGVISAHRK,RVAGTTGAR,DGAILFVLF,AILFVLFCF,LFVLFCFVF,CFVFLRQNL,VFLRQNLAL,RQNLALSPR,VISAHRKLR,KLRLPGSGH,GARHHTWLI,LPGSGHSPA,LRKNLSSLL,RKNLSSLLI,ARHHTWLIF,IDGAILFVL,FTLRKNLSSL,NLSSLLIDGA,LLIDGAILFV,LIDGAILFVL,AILFVLFCFV,FVFLRQNLAL,TLRKNLSSLL,RLECSGVISA,RLPGSGHSPA,FVLFCFVFLR,CSGVISAHRK,IDGAILFVLF,GAILFVLFCF,ILFVLFCFVF,RQNLALSPRL,KLRLPGSGHS,SGHSPASASR,ASRVAGTTGA,GARHHTWLIF,RVAGTTGARH,ECSGVISAHR,GVISAHRKLR,QPTFTLRKNL,SLLIDGAILF	STAD
CAST	c.1917T>A	p.D639E	DDALDKLSDSLGQRQPDPDENKPME[p.D639E]EKVKEKAKAEHRDKLGERDDTIPPEY	MEEKVKEKA	CLL
CATSPER4	c.1274C>T	p.T425M	MIVEEVRAIRFNQEQESEVLNRRSS[p.T425M]MSGSLETTSSKDIRQMSQQQDLLSAL	SMSGSLETT,EVLNRRSSM,RRSSMSGSL,NRRSSMSGSL,SEVLNRRSSM	KIRC
CBFB	c.454G>A	p.E152K	FDEERAQQEDALAQQAFEEARRRTR[p.E152K]KFEDRDRSHREEMEVRVSQLLAVTGK	EARRRTRKF,RTRKFEDRDR,RKFEDRDRSH,EEARRRTRKF	CRC
CBLL1	c.413delA	p.E138fs	PIKIYGRMIPCKHVFCYDCAILHEK[p.E138fs]REIRCVQAVVILCSELSSVHEVLSSCVALFKGAREHICLRETYRLISTIAI*	ILCSELSSV,VLSSCVALF,CLRETYRLI,LSSCVALFK,CVALFKGAR,HICLRETYR,GAREHICLR,TYRLISTIA,ILHEKREIR,EIRCVQAVV,ELSSVHEVL,EVLSSCVAL,ETYRLISTI,REIRCVQAV,RCVQAVVIL,SELSSVHEV,HEVLSSCVA,ALFKGAREH,EHICLRETY,RETYRLIST,YRLISTIAI,REHICLRET,HEKREIRCV,VILCSELSSV,SVHEVLSSCV,ALFKGAREHI,VLSSCVALFK,TYRLISTIAI,EHICLRETYR,ETYRLISTIA,EVLSSCVALF,REIRCVQAVV,SELSSVHEVL,HEVLSSCVAL,REHICLRETY,RETYRLISTI	STAD
CBLN3	c.206delC	p.P69fs	ECLVVCEPGRAAAGGPGGAALGEAP[p.P69fs]LGEWHLLRSEATTMSQQGKPAMAPVGPSTSTRSW*	AMAPVGPST,ATTMSQQGK,QGKPAMAPV,APLGEWHLL,MSQQGKPAM,APVGPSTST,LLRSEATTM,GAALGEAPL,GEWHLLRSE,GPSTSTRSW,EAPLGEWHLL,TTMSQQGKPA,KPAMAPVGPS,TMSQQGKPAM,HLLRSEATTM,GEAPLGEWHL,GEWHLLRSEA,QQGKPAMAPV,AMAPVGPSTS	STAD
CBWD6	c.304_305insG	p.E102fs	ESGEGSALEKSLAVSQGGELYEEWL[p.E102fs]GT*	GELYEEWLGT	KICH
CC2D2A	c.3850C>T	p.R1284C	ESQEDEKLLQATEKFQAECALKFPN[p.R1284C]CQCLTTVIDISGKTVFITRYLKPLNP	LKFPNCQCL,FPNCQCLTT,ALKFPNCQCL,CQCLTTVID,FPNCQCLTTV,AECALKFPNC	CRC
CCDC108	c.3492delC	p.P1164fs	LERDPTPCELTYKVPTRHSMSQIPP[p.P1164fs]SSPL*	SQIPPSSPL,MSQIPPSSPL	STAD
CCDC111	c.1250G>T	p.R417L	GIKGGIRRWNYFFPEELLVYDICKY[p.R417L]LWCENIGRAHKSNNIMILVDLKNEVW	LVYDICKYL,VYDICKYLW,YLWCENIGR,CKYLWCENI,LLVYDICKYL,YLWCENIGRA,LVYDICKYLW	LUAD
CCDC120	c.22A>G	p.I8V	MEVKGQL[p.I8V]VSSPTFNAPAALFGEAAPQVKSERLR	LVSSPTFNA,GQLVSSPTF,MEVKGQLVS,QLVSSPTFNA,MEVKGQLVSS,KGQLVSSPTF	KIRC
CCDC121	c.1190G>T	p.W397L	IEQAQKLTATQSHLENRKQQLQQEQ[p.W397L]LYLESLIQARQRLQGSHNQCLNRQDV	QQLQQEQLY,KQQLQQEQL,QEQLYLESL,QLYLESLIQA,KQQLQQEQLY,LYLESLIQAR,RKQQLQQEQL,QQLQQEQLYL,QQEQLYLESL,QEQLYLESLI	LUSC
CCDC132	c.2512C>T	p.R838C	NIYVDALLKEFEQFNRRLNEVSKRV[p.R838C]CIPLPVSNILWEHCIRLANRTIVEGY	CIPLPVSNI,VSKRVCIPL,KRVCIPLPV,NEVSKRVCI,EVSKRVCIPL,SKRVCIPLPV	UCEC
CCDC135	c.937G>A	p.E313K	AEKAKPDALHGLRVHSWVLVLSGKR[p.E313K]KVPENFFIDPFTGHSYSTQDEHFLGI	GKRKVPENF,RKVPENFFI,WVLVLSGKRK,KRKVPENFFI,GKRKVPENFF	HNSC
CCDC144A	c.3791C>T	p.S1264L	NTTSIKTQMELTIKDLESEISRIKT[p.S1264L]LQADFNKTELERYKELYLEEVKVRES	KTLQADFNK,ISRIKTLQA,RIKTLQADF,SEISRIKTL,LQADFNKTEL,RIKTLQADFN,EISRIKTLQA,SRIKTLQADF	UCEC
CCDC148	c.1260delA	p.K420fs	KEEEKEKLWKKKELLQRAEKKKKIK[p.K420fs]NTGPRKNRSGKKWK*	KIKNTGPRK,KNRSGKKWK,RKNRSGKKW	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
CCDC15	c.1463C>A	p.P488H	ILPKYQDQNFLPKDQNFLSRDQHVL[p.P488H]HKDQDILPKYQDQNFLPKDQNFLSRD	LSRDQHVLH,LSRDQHVLHK	CLL
CCDC152	c.457G>C	p.E153Q	GYKKEISKLYQDMQRKVELNEEKHK[p.E153Q]QLIEKKEMEISELNAKLRSQEKEKQN	KHKQLIEKK,KQLIEKKEM,QLIEKKEMEI,HKQLIEKKEM	CESC
CCDC153	c.598_599insC	p.P200fs	QWDGAALRLHARHKEQQRQFGLTPP[p.P200fs]WIFEATSP*	LTPPWIFEA,RQFGLTPPW,QFGLTPPWI,FGLTPPWIF,RQFGLTPPWI,GLTPPWIFEA,QFGLTPPWIF,QRQFGLTPPW	STAD
CCDC153	c.599delC	p.P200fs	QQWDGAALRLHARHKEQQRQFGLTP[p.P200fs]LDL*	QRQFGLTPL,RQFGLTPLD,RQFGLTPLDL,QQRQFGLTPL	STAD
CCDC159	c.994G>T	p.A332S	KELSDIWSAVHVLQNSIDSLTLCSG[p.A332S]SCPKASSLRGHKGHQCLSPPLPSWDS	TLCSGSCPK,TLCSGSCPKA,LTLCSGSCPK,GSCPKASSLR	TGCT
CCDC168	c.15058G>T	p.D5020Y	GYTLSNSKGPVQPTAQGEEKGGLRI[p.D5020Y]YMEDKMLPKCTDLKAKQLLLSDILNT	YMEDKMLPK,GLRIYMEDK,EEKGGLRIY,LRIYMEDKM,RIYMEDKML,IYMEDKMLPK,GEEKGGLRIY,EEKGGLRIYM	UCEC
CCDC169-SOHLH2	c.485A>G	p.K162R	LDDCIFNMVLLKVPSSLSAEELEAI[p.K162R]RLIRFGKKKNTHSLFVFIIPENFKGC	AIRLIRFGK,RLIRFGKKK,ELEAIRLIR,LEAIRLIRF,EELEAIRLI,AEELEAIRL,AIRLIRFGKK,EAIRLIRFGK,EELEAIRLIR,AEELEAIRLI	STAD
CCDC19	c.620G>T	p.R207L	KLRMEQEEELKDMSKIILNAKCHAI[p.R207L]LDAQILEKQQIQKELDTEEKRLDQMM	ILDAQILEK,LNAKCHAIL,HAILDAQIL,ILNAKCHAIL,AILDAQILEK	LUAD
CCDC19	c.836G>T	p.R279L	RIRGRRQIVEQMEKNQEERSLLAEQ[p.R279L]LEQEKEQMLEYMEQLQEEDLKDMERR	LEQEKEQML,EERSLLAEQL	LUAD
CCDC36	c.626G>T	p.R209I	AQNDLVFEAVQDKGNMEQAILEMKK[p.R209I]IFEARQGEFIEMKSNLKHLEVLVAQQ	IFEARQGEF,EMKKIFEAR,AILEMKKIF,LEMKKIFEA,KIFEARQGEF,QAILEMKKIF	UCEC
CCDC53	c.172C>T	p.R58C	FVVHTVQFLNRFSTVCEEKLADLSL[p.R58C]CIQQIETTLNILDAKLSSIPGLDDVT	KLADLSLCI,ADLSLCIQQI	CESC
CCDC60	c.689G>A	p.R230H	GQKWEHFITAPKTKKFKIPTMRVTN[p.R230H]HKPSRRGSTLSLSRASGGSSPQSSMI	PTMRVTNHK,RVTNHKPSR,VTNHKPSRR,RVTNHKPSRR	CRC
CCDC79	c.1319A>C	p.N440T	IEQLEREGNEEEIQRENYQDNISSM[p.N440T]TISIQNTWKHLHADRIGRGSKAEDED	NISSMTISI,TISIQNTWK,MTISIQNTW,YQDNISSMT,YQDNISSMTI,MTISIQNTWK,SMTISIQNTW	CLL
CCDC81	c.776G>T	p.R259I	NRERKCKLKDQSDKEEGTRDISSPK[p.R259I]ILRDRQALFPAKVTNVSLLEKFERSE	ILRDRQALF,DISSPKILR,RDISSPKIL,KILRDRQAL,GTRDISSPKI,KILRDRQALF	CRC
CCDC88A	c.2031_2032insA	p.K677fs	ITCEKIEALEQENSELERENRKLKK[p.K677fs]NIG*	RENRKLKKNI	STAD
CCDC88C	c.5553_5554insC	p.P1851fs	QKLGAPEALGGRETGSHTLQSPAPP[p.P1851fs]QLP*	LQSPAPPQL,TLQSPAPPQL	CRC
CCKAR	c.811C>A	p.L271M	QKKSAKERKPSTTSSGKYEDSDGCY[p.L271M]MQKTRPPRKLELRQLSTGSSSRANRI	YMQKTRPPR,MQKTRPPRK,YEDSDGCYM,YMQKTRPPRK,MQKTRPPRKL,CYMQKTRPPR	LUAD
CCKBR	c.706G>A	p.V236M	SARVRQTWSVLLLLLLFFIPGVVMA[p.V236M]MAYGLISRELYLGLRFDGDSDSDSQS	FIPGVVMAM,VVMAMAYGL,VMAMAYGLI,AMAYGLISR,MAMAYGLIS,FIPGVVMAMA,VVMAMAYGLI,MAMAYGLISR,FFIPGVVMAM,MAYGLISREL,IPGVVMAMAY	CRC
CCNB3	c.2794G>A	p.A932T	ETLLKKPLALKMSTINEAVLFEDMI[p.A932T]TLNEKPTTGKELSFKEPLALQESPTY	VLFEDMITL	CLL
CCR5	c.554G>T	p.S185I	SLPGIIFTRSQKEGLHYTCSSHFPY[p.S185I]IQYQFWKNFQTLKIVILGLVLPLLVM	SSHFPYIQY,HFPYIQYQF,IQYQFWKNF,FPYIQYQFW,CSSHFPYIQY,YTCSSHFPYI,SHFPYIQYQF,HFPYIQYQFW,YIQYQFWKNF	KIRC
CCZ1	c.642G>C	p.E214D	IFGGISFFPLDKMTYLKIQSFINRM[p.E214D]DESLNIVKYTAFLYNDQLIWSGLEQD	FINRMDESL,RMDESLNIV,DESLNIVKY,RMDESLNIVK,SFINRMDESL,MDESLNIVKY	KIRC
CD101	c.1781G>A	p.R594Q	SDLKVPLTVTWQFQPASSHIFHQLI[p.R594Q]QITHNGTIEWGNFLSRFQKKTKVSQS	HIFHQLIQI,IQITHNGTI,SHIFHQLIQI	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
CD101	c.847G>T	p.D283Y	PDETWMFITKKQTDQTTLRIQPAVK[p.D283Y]YFQVNITADSLFAEGKPLELVCLVVS	RIQPAVKYF,KYFQVNITA,AVKYFQVNI,LRIQPAVKY,QPAVKYFQV,IQPAVKYFQV,TLRIQPAVKY,LRIQPAVKYF,VKYFQVNITA	CRC
CD109	c.1409T>A	p.L470Q	AYFLGSKSSMAVHSLFKSPSKTYIQ[p.L470Q]QKTRDENIKVGSPFELVVSGNKRLKE	KTYIQQKTR,PSKTYIQQK,QQKTRDENIK,IQQKTRDENI	CLL
CD163L1	c.2161G>A	p.V721M	SDMELRLVGGSSRCAGKVEVNVQGA[p.V721M]MGILCANGWGMNIAEVVCRQLECGSA	VEVNVQGAM,MGILCANGW,EVNVQGAMGI,KVEVNVQGAM,VQGAMGILCA,AMGILCANGW	GBM
CD180	c.683A>C	p.N228T	SLNFNGNNVKGIELGAFDSTIFQSL[p.N228T]TFGGTPNLSVIFNGLQNSTTQSLWLG	LTFGGTPNL,STIFQSLTF,SLTFGGTPNL,FQSLTFGGTP	CRC
CD1B	c.122G>T	p.W41L	GNSEHAFQGPTSFHVIQTSSFTNST[p.W41L]LAQTQGSGWLDDLQIHGWDSDSGTAI	FTNSTLAQT,SSFTNSTLA,TSSFTNSTL,LAQTQGSGW,QTSSFTNSTL,TSSFTNSTLA,TLAQTQGSGW	LUAD
CD1C	c.265C>T	p.R89C	TIIFLHNWSKGNFSNEELSDLELLF[p.R89C]CFYLFGLTREIQDHASQDYSKYPFEV	LSDLELLFC,ELLFCFYLF,LFCFYLFGL,CFYLFGLTR,SDLELLFCF,LELLFCFYL,LSDLELLFCF,LLFCFYLFGL,SDLELLFCFY,FCFYLFGLTR,LELLFCFYLF	SKCM
CD1D	c.74delT	p.L25fs	MGCLLFLLLWALLQAWGSAEVPQRL[p.L25fs]SPSAASRSRPSPIAAGRAPTAWRGWGSCRRTAGATTRTPSAL*	RLSPSAASR,ASRSRPSPI,RSRPSPIAA,AGRAPTAWR,VPQRLSPSA,SPIAAGRAP,AAGRAPTAW,AASRSRPSPI,ASRSRPSPIA,RSRPSPIAAG,AWRGWGSCRR,TAWRGWGSCR,EVPQRLSPSA,VPQRLSPSAA,RPSPIAAGRA,SPIAAGRAPT,AEVPQRLSPS,IAAGRAPTAW	GBM
CD1E	c.253T>G	p.F85V	GDLQTHGWDTVLGTIRFLKPWSHGN[p.F85V]VSKQELKNLQSLFQLYFHSFIQIVQA	KPWSHGNVS,FLKPWSHGNV,KPWSHGNVSK,HGNVSKQELK	STAD
CD209	c.847G>A	p.A283T	WEWTFFQGNCYFMSNSQRNWHDSIT[p.A283T]TCKEVGAQLVVIKSAEEQNFLQLQSS	DSITTCKEV	GBM
CD4	c.492delG	p.Q164fs	TLESPPGSSPSVQCRSPRGKNIQGG[p.Q164fs]RPSPCLSWSSRIVAPGHALSCRTRRRWSSK*	CLSWSSRIV,RIVAPGHAL,RTRRRWSSK,RGKNIQGGR,SSRIVAPGH,HALSCRTRR,LSWSSRIVA,SSRIVAPGHA,HALSCRTRRR,IQGGRPSPCL,GGRPSPCLSW,SRIVAPGHAL,SPCLSWSSRI	STAD
CD55	c.466G>A	p.E156K	PGYRREPSLSPKLTCLQNLKWSTAV[p.E156K]KFCKKKSCPNPGEIRNGQIDVPGGIL	NLKWSTAVK,STAVKFCKK,WSTAVKFCK,TAVKFCKKK,LKWSTAVKF,KWSTAVKFCK,WSTAVKFCKK,STAVKFCKKK,NLKWSTAVKF	UCEC
CD7	c.521delC	p.P174fs	ASALPAPPTGSALPDPQTASALPDP[p.P174fs]QQPLPSLRPWR*	ALPDPQQPL,DPQQPLPSL,QPLPSLRPW,SALPDPQQPL,QQPLPSLRPW	KIRC
CD79B	c.589T>C	p.Y197H	LFIIVPIFLLLDKDDSKAGMEEDHT[p.Y197H]HEGLDIDQTATYEDIVTLRTGEVKWS	EEDHTHEGL,MEEDHTHEGL,HEGLDIDQTA	DLBCL
CD79B	c.589T>G	p.Y197D	LFIIVPIFLLLDKDDSKAGMEEDHT[p.Y197D]DEGLDIDQTATYEDIVTLRTGEVKWS	MEEDHTDEGL	DLBCL
CD93	c.838delG	p.D280fs	PLCVSPKYGCNFNNGGCHQDCFEGG[p.D280fs]MAPSSAAADQDSGCWMTW*	GMAPSSAAA,HQDCFEGGM,FEGGMAPSS,FEGGMAPSSA	STAD
CDAN1	c.1936_1937insC	p.L646fs	GERKQFAVVLLSLRLLAKFLGFVAF[p.L646fs]PAIPGA*	FLGFVAFPA,FVAFPAIPG,LGFVAFPAI,FLGFVAFPAI,FVAFPAIPGA,KFLGFVAFPA	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
CDC14A	c.369delC	p.N123fs	AYAVIYLKKTPEEAYRALLSGSNPP[p.N123fs]IFHSGMLPLEIALTISPFSTVCRESERDYNMDFLTLRHLMWMNMNIMSELKMVTSTGLFQENF*	NMDFLTLRH,LLSGSNPPI,GMLPLEIAL,MLPLEIALT,LTISPFSTV,HLMWMNMNI,NIMSELKMV,IMSELKMVT,STVCRESER,NMNIMSELK,IFHSGMLPL,DYNMDFLTL,KMVTSTGLF,YNMDFLTLR,EIALTISPF,MNMNIMSEL,PPIFHSGML,LPLEIALTI,LMWMNMNIM,LSGSNPPIF,LEIALTISP,RESERDYNM,SERDYNMDF,MDFLTLRHL,LRHLMWMNM,MNIMSELKM,SELKMVTST,LKMVTSTGL,RDYNMDFLT,ALLSGSNPPI,MLPLEIALTI,ALTISPFSTV,NMDFLTLRHL,FLTLRHLMWM,HLMWMNMNIM,WMNMNIMSEL,TISPFSTVCR,MNMNIMSELK,DFLTLRHLMW,RHLMWMNMNI,TLRHLMWMNM,FSTVCRESER,DYNMDFLTLR,EIALTISPFS,NPPIFHSGML,ELKMVTSTGL,LLSGSNPPIF,LEIALTISPF,LKMVTSTGLF,FHSGMLPLEI,SGMLPLEIAL,SERDYNMDFL,RDYNMDFLTL,YNMDFLTLRH,MDFLTLRHLM,NMNIMSELKM,TSTGLFQENF,LPLEIALTIS	STAD
CDC14B	c.1123C>T	p.R375C	GSVIGPQQQFLVMKQTNLWLEGDYF[p.R375C]CQKLKGQENGQHRAAFSKLLSGVDDI	LEGDYFCQKL	CRC
CDC25C	c.965delA	p.K322fs	ENLNRPRLKQVEKFKDNTIPDKVKK[p.K322fs]SIFLAKESSGRAYV*	KVKKSIFLA,IPDKVKKSI,AKESSGRAY,KESSGRAYV,FLAKESSGRA,KVKKSIFLAK,LAKESSGRAY,IFLAKESSGR,IPDKVKKSIF	STAD
CDC27	c.1379delT	p.L460fs	ITKLDSSIISEGKISTITPQIQAFN[p.L460fs]HKKQQQKV*	QIQAFNHKK,AFNHKKQQQK	UCS
CDC27	c.1665T>G	p.D555E	EVRRIENYRVEGMEIYSTTLWHLQK[p.D555E]EVALSVLSKDLTDMDKNSPEAWCAAG	TLWHLQKEV,LQKEVALSV,EVALSVLSK,WHLQKEVAL,QKEVALSVL,KEVALSVLS,HLQKEVALSV,LQKEVALSVL,TTLWHLQKEV,KEVALSVLSK	CRC
CDC27	c.1712A>T	p.N571I	STTLWHLQKDVALSVLSKDLTDMDK[p.N571I]ISPEAWCAAGNCFSLQREHDIAIKFF	MDKISPEAW,KISPEAWCAA	TGCT
CDC27	c.271delA	p.I91fs	CTTPQCKYLLAKCCVDLSKLAEGEQ[p.I91fs]SYLVECLISRKAMMILLLSLVIQLALLFHCWDMYIARQIGLPKDQNVTKRALV*	AMMILLLSL,MMILLLSLV,LLLSLVIQL,LLSLVIQLA,SLVIQLALL,ALLFHCWDM,CLISRKAMM,LISRKAMMI,LVECLISRK,IARQIGLPK,LVIQLALLF,LFHCWDMYI,MYIARQIGL,ISRKAMMIL,KLAEGEQSY,LLFHCWDMY,YLVECLISR,HCWDMYIAR,SRKAMMILL,RKAMMILLL,MILLLSLVI,LSLVIQLAL,DQNVTKRAL,AEGEQSYLV,GEQSYLVEC,VECLISRKA,WDMYIARQI,KLAEGEQSYL,CLISRKAMMI,KAMMILLLSL,AMMILLLSLV,MMILLLSLVI,ILLLSLVIQL,LLLSLVIQLA,LLSLVIQLAL,LLFHCWDMYI,YIARQIGLPK,YLVECLISRK,SLVIQLALLF,IQLALLFHCW,ISRKAMMILL,ALLFHCWDMY,SKLAEGEQSY,GEQSYLVECL,VECLISRKAM,SRKAMMILLL,LALLFHCWDM	BLCA
CDC27	c.724C>T	p.P242S	LESSNSKYSLNTDSSVSYIDSAVIS[p.P242S]SDTVPLGTGTSILSKQVQNKPKTGRS	VISSDTVPL,AVISSDTVPL,DSAVISSDTV	CESC,TGCT
CDC42BPA	c.2023C>A	p.P675T	EQSEHYSKQLENELEGLKQKQISYS[p.P675T]TGVCSIEHQQEITKLKTDLEKKSIFY	KQISYSTGV,SYSTGVCSI,KQKQISYST,KQKQISYSTG,KQISYSTGVC,ISYSTGVCSI	BRCA
CDCA7L	c.1215delC	p.P405fs	GPCLRNRYGEDVRSALLDPDWVCPP[p.P405fs]VVGSAIAATVGSVTAAVPQESSFIWPSFMVMTMLRNIWRAYKRSW*	AIAATVGSV,FIWPSFMVM,MVMTMLRNI,TMLRNIWRA,ATVGSVTAA,TVGSVTAAV,MTMLRNIWR,SSFIWPSFM,SFMVMTMLR,SFIWPSFMV,MLRNIWRAY,LRNIWRAYK,RNIWRAYKR,CPPVVGSAI,WPSFMVMTM,AAVPQESSF,ESSFIWPSF,VMTMLRNIW,QESSFIWPS,VPQESSFIW,DPDWVCPPV,VVGSAIAATV,ATVGSVTAAV,SSFIWPSFMV,FIWPSFMVMT,FMVMTMLRNI,MTMLRNIWRA,SAIAATVGSV,MLRNIWRAYK,PSFMVMTMLR,SFIWPSFMVM,IWPSFMVMTM,MVMTMLRNIW,TMLRNIWRAY,VMTMLRNIWR,WVCPPVVGSA,ESSFIWPSFM,WPSFMVMTML,TAAVPQESSF,IAATVGSVTA,QESSFIWPSF,DPDWVCPPVV,CPPVVGSAIA	CRC
CDH1	c.727G>A	p.E243K	EPLDRERIATYTLFSHAVSSNGNAV[p.E243K]KDPMEILITVTDQNDNKPEFTQEVFK	VSSNGNAVK,AVSSNGNAVK,AVKDPMEIL	BRCA

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
CDH1	c.760G>T	p.D254Y	TLFSHAVSSNGNAVEDPMEILITVT[p.D254Y]YQNDNKPEFTQEVFKGSVMEGALPGT	TVTYQNDNK,MEILITVTY,YQNDNKPEF,ITVTYQNDNK,TYQNDNKPEF	STAD
CDH10	c.1045G>A	p.E349K	DTQEGIITVKKPLDYESRRLYTLKV[p.E349K]KAENTHVDPRFYYLGPFKDTTIVKIS	RLYTLKVKA,KVKAENTHV,LKVKAENTH,LKVKAENTHV	CRC
CDH10	c.1414C>T	p.R472C	LDRELSQWHNLTVIAAEINNPKETT[p.R472C]CVAVFVRILDVNDNAPQFAVFYDTFV	TTCVAVFVR,ETTCVAVFV,KETTCVAVF,ETTCVAVFVR,TTCVAVFVRI,NPKETTCVAV,KETTCVAVFV	LUAD
CDH10	c.1731C>G	p.S577R	NGFNRHEISTYLLPVVISDNDYPIQ[p.S577R]RSTGTLTIRVCACDSQGNMQSCSAEA	YPIQRSTGT,IQRSTGTLT,QRSTGTLTI,IQRSTGTLTI,YPIQRSTGTL	LUAD
CDH10	c.382C>A	p.R128S	IIDEKTGDIHATRRIDREEKAFYTL[p.R128S]SAQAINRRTLRPVEPESEFVIKIHDI	TLSAQAINR,FYTLSAQAI,EKAFYTLSA,KAFYTLSAQ,YTLSAQAINR,AFYTLSAQAI,KAFYTLSAQA,TLSAQAINRR,SAQAINRRTL,EEKAFYTLSA,REEKAFYTLS	LUAD
CDH11	c.1070A>C	p.K357T	KKPVDFETKRAYSLKVEAANVHIDP[p.K357T]TFISNGPFKDTVTVKISVEDADEPPM	TFISNGPFK,NVHIDPTFI,ANVHIDPTF,PTFISNGPF,PTFISNGPFK,EAANVHIDPT,AANVHIDPTF,DPTFISNGPF	STAD
CDH12	c.2020G>A	p.D674N	SKEDIRDNVIHYDDEGGGEEDTQAF[p.D674N]NIGALRNPKVIEENKIRRDIKPDSLC	TQAFNIGAL,QAFNIGALR,NIGALRNPK,DTQAFNIGA,EEDTQAFNI,TQAFNIGALR,DTQAFNIGAL,GEEDTQAFNI	CRC
CDH12	c.2116C>A	p.P706T	PKVIEENKIRRDIKPDSLCLPRQRP[p.P706T]TMEDNTDIRDFIHQRLQENDVDPTAP	LCLPRQRPTM,RQRPTMEDNT	HNSC
CDH18	c.2161G>T	p.A721S	KLTPRHQTSSTLESIDVQEFIKQRL[p.A721S]SEADLDPSVPPYDSLQTYAYEGQRSE	FIKQRLSEA,KQRLSEADL,SEADLDPSV	LUAD
CDH18	c.583G>A	p.A195T	EMSDMGTSVLQVTATDADDPTYGNS[p.A195T]TRVVYSILQGQPYFSVDPKTGVIRTA	STRVVYSIL,YGNSTRVVY,NSTRVVYSI,STRVVYSILQ	GBM
CDH2	c.1639G>T	p.D547Y	QDPDRYMQQNIRYTKLSDPANWLKI[p.D547Y]YPVNGQITTIAVLDRESPNVKNNIYN	KIYPVNGQI,DPANWLKIY,YPVNGQITT,YPVNGQITTI,LKIYPVNGQI	CRC
CDH20	c.1298C>A	p.P433H	IQIISAKDPDVTNNSIRYSIDRSSD[p.P433H]HGRFFYVDITTGALMTARPLDREEFS	SSDHGRFFY,RSSDHGRFF,HGRFFYVDI,RSSDHGRFFY,SSDHGRFFYV,IDRSSDHGRF	LUAD
CDH20	c.401C>T	p.A134V	IDDTTGDIHAIQRLDREERAQYTLR[p.A134V]VQALDRRTGRPMEPESEFIKIQDIN	QYTLRVQAL,AQYTLRVQA,AQYTLRVQAL,YTLRVQALDR,RAQYTLRVQA,TLRVQALDRR	CRC
CDH23	c.1207G>A	p.V403I	EGLNSMFEVYLVGNNSHHFIISPTS[p.V403I]IQGKADIRIRVAIPLDYETVDRYDFD	HFIISPTSI,IQGKADIRI,IISPTSIQGK,HHFIISPTSI	STAD
CDH23	c.3395T>A	p.F1132Y	ASVPEDIPEGHSILQLKATDADEGE[p.F1132Y]YGRVWYRILHGNHGNNFRIHVSNGLL	ATDADEGEY,EYGRVWYRI,YGRVWYRIL,DEGEYGRVW,EYGRVWYRIL,KATDADEGEY,EGEYGRVWYR,GEYGRVWYRI,DEGEYGRVWY	KIRC
CDH23	c.531C>A	p.F177L	FIVNATDPDLGAGGSVLYSFQPPSQ[p.F177L]LFAIDSARGIVTVIRELDYETTQAYQ	FQPPSQLFA,SFQPPSQLF,QLFAIDSAR,YSFQPPSQL,SQLFAIDSA,QPPSQLFAI,FQPPSQLFAI,LYSFQPPSQL,YSFQPPSQLF,SFQPPSQLFA,SQLFAIDSAR	CRC
CDH6	c.709C>A	p.Q237K	SETGIIKTALLNMDRENREQYQVVI[p.Q237K]KAKDMGGQMGGLSGTTTVNITLTDVN	KAKDMGGQM,REQYQVVIKA,YQVVIKAKDM,IKAKDMGGQM	LUAD
CDH7	c.673C>A	p.Q225K	PYFSVEPKTGVIKTALPNMDREAKD[p.Q225K]KYLLVIQAKDMVGQNGGLSGTTSVTV	KYLLVIQAK,EAKDKYLLV,REAKDKYLL,AKDKYLLVI,NMDREAKDKY,EAKDKYLLVI,REAKDKYLLV	HNSC
CDH9	c.1569C>A	p.F523L	ENAKPGQLIQTVSVMDKDDPPRGHK[p.F523L]LFFEPVPEFTLNPNFTIVDNKDNTAG	LFFEPVPEF,KLFFEPVPEF,RGHKLFFEPV	CRC
CDHR1	c.652A>G	p.R218G	QAGATLDYERSRTHYITVVAKDGGG[p.R218G]GLHGADVVFSATTTVTVNVEDVQDMA	GLHGADVVF,GGLHGADVVF	MM

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
CDK11B	c.237_239delAGA	p.E79del	SPYRREDSMEDRGEEDDSLAIKPPQ[p.E79delJMSRKEKVHHRKDEKRKEKCRHHSHSAEG	SLAIKPPQM,AIKPPQMSR,AIKPPQMSRK,LAIKPPQMSR	HNSC
CDK13	c.2638C>A	p.R880S	DFGLARLYSSEESRPYTNKVITLWY[p.R880S]SPPELLLGEERYTPAIDVWSCGCILG	TLWYSPPEL,LWYSPPELL,WYSPPELLL,ITLWYSPPEL,TLWYSPPELL,LWYSPPELLL	LUAD
CDK16	c.322C>T	p.R108C	GSDGESDQASATSSDEVQSPVRVRM[p.R108C]CNHPPRKISTEDINKRLSLPADIRLP	RMCNHPPRK,RVRMCNHPP,RVRMCNHPPR,RMCNHPPRKI	CRC
CDK5RAP2	c.4776C>G	p.H1592Q	LDEEHRRLREASGEGWKGQDPFRDL[p.H1592Q]QSLLMEIQALRLQLERSIETSSTLQS	RDLQSLLMEI,LQSLLMEIQA,DPFRDLQSLL	KIRC
CDKAL1	c.1226_1227CA>TG	p.P409L	YKFPSLFINQFYPRPGTPAAKMEQV[p.P409L]LAQVKKQRTKDLSRVFHSYSPYDHKIG	KMEQVLAQV,AAKMEQVLA,AKMEQVLAQ,MEQVLAQVK,KMEQVLAQVK,LAQVKKQRTK,QVLAQVKKQR,TPAAKMEQVL,AKMEQVLAQV	TGCT
CDKN2A	c.247C>T	p.H83Y	RVAELLLLHGAEPNCADPATLTRPV[p.H83Y]YDAAREGFLDTLVVLHRAGARLDVRD	VYDAAREGF,LTRPVYDAA,TLTRPVYDAA,LTRPVYDAAR,DPATLTRPVY	HNSC
CDKN2A	c.322G>T	p.D108Y	HDAAREGFLDTLVVLHRAGARLDVR[p.D108Y]YAWGRLPVDLAEELGHRDVARYLRAA	RYAWGRLPV,GARLDVRYA,AGARLDVRY,ARLDVRYAW,RAGARLDVRY,RLDVRYAWGR,GARLDVRYAW,VRYAWGRLPV,YAWGRLPVDL	LUSC
CDR1	c.92T>C	p.V31A	DVDFLEDVPLLEDIPLLEDVPLLED[p.V31A]APLLEDTSRLEDINLMEDMALLEDVD	PLLEDAPLL,VPLLEDAPL,APLLEDTSRL,LEDVPLLEDA,VPLLEDAPLL	KIRP
CDYL	c.179C>G	p.A60G	VSAPDGPSDPSISVSSEQSGAQQPP[p.A60G]GLQVERIVDKRKNKKGKTEYLVRWKG	AQQPPGLQV,AQQPPGLQVE	TGCT
CEACAM5	c.1918C>A	p.L640I	CHSASNPSPQYSWRINGIPQQHTQV[p.L640I]IFIAKITPNNNGTYACFVSNLATGRN	HTQVIFIAK,IPQQHTQVI,PQQHTQVIF,QQHTQVIFI,TQVIFIAKI,HTQVIFIAKI,IPQQHTQVIF,QQHTQVIFIA	CRC
CELF4	c.925G>C	p.A309P	YLNPMAAFAAAQMQQMAALNMNGLA[p.A309P]PAPMTPTSGGSTPPGITAPAVPSIPS	APAPMTPTS,LNMNGLAPA,MNGLAPAPM,ALNMNGLAPA,GLAPAPMTPT,NMNGLAPAPM	LUAD
CELSR1	c.1841delG	p.G614fs	AVDADSGENARLHYRLVDTASTFLG[p.G614fs]AAALGLRILPPPLTSPSRSTTAPVGSQCVPSWTARRWSTTASGWRRWTTARPP*	FLGAAALGL,STFLGAAAL,STTASGWRR,GLRILPPPL,PSRSTTAPV,TARRWSTTA,SGWRRWTTA,GWRRWTTAR,CVPSWTARR,DTASTFLGA,TASTFLGAA,GAAALGLRI,AAALGLRIL,VGSQCVPSW,SQCVPSWTA,RRWSTTASG,RWSTTASGW,RRWTTARPP,VPSWTARRW,ILPPPLTSPS,TFLGAAALGL,RWSTTASGWR,ASGWRRWTTA,SGWRRWTTAR,SQCVPSWTAR,DTASTFLGAA,TASTFLGAAA,TTAPVGSQCV,WTARRWSTTA,SPSRSTTAPV,ASTFLGAAAL,GAAALGLRIL,RRWSTTASGW	STAD
CELSR2	c.34_35insCGC	p.16_17insP	MRSPATGVPLPTPPPP[p.16_17insP]PLLLLLLLLLPPPLLGDQVGPCRSLGSR	LPTPPPPPL,TPPPPPLLL,LPTPPPPPLL,TPPPPPLLLL	ACC
CELSR2	c.50T>C	p.L17P	MRSPATGVPLPTPPPP[p.L17P]PLLLLLLLPPPLLGDQVGPCRSLGS	LPTPPPPPL,TPPPPPLLL,LPTPPPPPLL,TPPPPPLLLL	TGCT
CEP152	c.61G>A	p.E21K	MSLDFGSVALPVQNEDEEYD[p.E21K]KEDYEREKELQQLLTDLPHDMLDDDL	KEDYEREKEL	CRC
CEP192	c.6173C>T	p.S2058L	TEVYDLPQRPNDVQLFYGSMCKIIL[p.S2058L]LVIGEFRDCISSREFLQPSSKASLES	SMCKIILLV,ILLVIGEFR,IILLVIGEF,GSMCKIILLV,SMCKIILLVI,IILLVIGEFR,KIILLVIGEF	BLCA
CEP44	c.758C>T	p.S253L	VNVNPEITALQTMLAECQENLKKLT[p.S253L]LIEKRLDCLEQKMKGKVMVDENTWTN	QENLKKLTL,TLIEKRLDCL,NLKKLTLIEK,CQENLKKLTL,KKLTLIEKRL,QENLKKLTLI	UCEC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
CERCAM	c.254_260delCGGCTGT	p.A85fs	RARMALWCATDHNVDNTTEMLQEWL[p.A85fs]GAMTMLLWSGGLRASPGSTQMKRVPSTGPKKGTSF*	MLQEWLGAM,WLGAMTMLL,TMLLWSGGL,LLWSGGLRA,MLLWSGGLR,RVPSTGPKK,RASPGSTQM,STQMKRVPS,MTMLLWSGG,TQMKRVPST,LQEWLGAMT,QEWLGAMTM,LGAMTMLLW,MLQEWLGAMT,MTMLLWSGGL,MLLWSGGLRA,TMLLWSGGLR,RASPGSTQMK,EWLGAMTML,WLGAMTMLLW,MKRVPSTGPK,EMLQEWLGAM,LQEWLGAMTM,QEWLGAMTML,LRASPGSTQM,TQMKRVPSTG,TEMLQEWLGA	KIRC
CERS3	c.285G>T	p.E95D	FVASPLAKSFGIKETVRKVTPNTVL[p.E95D]DNFFKHSTRQPLQTDIYGLAKKCNLT	NTVLDNFFK,TVLDNFFKH,DNFFKHSTR,TPNTVLDNF,VTPNTVLDNF,TPNTVLDNFF	CRC
CETN3	c.189delA	p.K63fs	TDKDEAIDYHELKVAMRALGFDVKK[p.K63fs]LMY*	GFDVKKLMY,LGFDVKKLM,LGFDVKKLMY,RALGFDVKKL	STAD
CFB	c.940_941CG>AT	p.R314M	INVSVAIITFASEPKVLMSVLNDNS[p.R314M]MDMTEVISSLENANYKDHENGTGTNTY	VLNDNSMDM,NSMDMTEVI,MSVLNDNSM,LMSVLNDNSM,VLNDNSMDMT,MDMTEVISSL	SKCM
CFDP1	c.386_387insC	p.P129fs	ARKKKEDELWASFLNDVGPKSKVPP[p.P129fs]KYTS*	GPKSKVPPK,KSKVPPKYT,KSKVPPKYTS	LUAD
CFHR5	c.1322G>A	p.R441H	LCKENYLLPEAKEIVCKDGRWQSLP[p.R441H]HCVESTAYCGPPPSINNGDTTSFPLS	SLPHCVEST,RWQSLPHCV,LPHCVESTA,SLPHCVESTA,LPHCVESTAY,GRWQSLPHCV,WQSLPHCVES	CESC
CFI	c.111delA	p.K37fs	CFHLRFCKVTYTSQEDLVEKKCLAK[p.K37fs]NILTSPAIKSSASHGRDALRAPVFVNYRISAQRMALQCVQLTGEASQHTVNKRVWNVFIQGQSF*	RMALQCVQL,TVNKRVWNV,AQRMALQCV,NILTSPAIK,ASHGRDALR,RAPVFVNYR,RISAQRMAL,LRAPVFVNY,VNYRISAQR,DALRAPVFV,SPAIKSSAS,SASHGRDAL,APVFVNYRI,NVFIQGQSF,KKCLAKNIL,AKNILTSPA,KNILTSPAI,RDALRAPVF,YRISAQRMA,SQHTVNKRV,VNKRVWNVF,RMALQCVQLT,ALRAPVFVNY,FVNYRISAQR,RAPVFVNYRI,TVNKRVWNVF,LAKNILTSPA,KNILTSPAIK,AIKSSASHGR,KSSASHGRDA,HGRDALRAPV,SASHGRDALR,EASQHTVNKR,LTSPAIKSSA,LTGEASQHTV,HTVNKRVWNV,SPAIKSSASH,SSASHGRDAL,AKNILTSPAI,GRDALRAPVF,VNYRISAQRM,YRISAQRMAL,QRMALQCVQL,VQLTGEASQH,SQHTVNKRVW,WNVFIQGQSF,VEKKCLAKNI	STAD
CGB8	c.52A>G	p.T18A	MEMFQGLLLLLLLSMGG[p.T18A]AWASREMLRPRCRPINATLAVEKEGC	AWASREMLR,GGAWASREM,GAWASREML,GAWASREMLR,MGGAWASREM	BLCA
CHCHD4	c.236C>T	p.T79M	PCLGGMASGPCGEQFKSAFSCFHYS[p.T79M]MEEIKGSDCVDQFRAMQECMQKYPDL	AFSCFHYSM,SAFSCFHYSM,CFHYSMEEIK,MEEIKGSDCV	HNSC
CHD3	c.1789delC	p.P597fs	WRWGEPPVAVPAPQQADGNPDVPPP[p.P597fs]VLFKADQSESSLSSG*	NPDVPPPVL,KADQSESSL,VPPPVLFKA,DVPPPVLFKA,FKADQSESSL,NPDVPPPVLF	STAD
CHD4	c.2924G>A	p.R975H	LGPHMLRRLKADVFKNMPSKTELIV[p.R975H]HVELSPMQKKYYKYILTRNFEALNAR	HVELSPMQK,IVHVELSPM,TELIVHVEL,HVELSPMQKK,LIVHVELSPM,MPSKTELIVH,TELIVHVELS	CRC,UCEC
CHD5	c.2401G>A	p.A801T	YVVTYTGDKESRSVIRENEFSFEDN[p.A801T]TIRSGKKVFRMKKEVQIKFHVLLTSY	FSFEDNTIR,NTIRSGKKV,TIRSGKKVFR,EFSFEDNTIR,NTIRSGKKVF,NEFSFEDNTI	CRC
CHDH	c.119A>C	p.E40A	ARGALGQQQSLGARALASAGSESRD[p.E40A]AYSYVVVGAGSAGCVLAGRLTEDPAE	AGSESRDAY,SESRDAYSY,ESRDAYSYV,RDAYSYVVV,GSESRDAYSY,ESRDAYSYV,DAYSYVVVGA,SAGSESRDAY,SESRDAYSYV	ACC
CHEK2	c.1116_1117CA>TG	p.K373E	LKPENVLLSSQEEDCLIKITDFGHS[p.K373E]EILGETSLMRTLCGTPTYLAPEVLSV	ITDFGHSEI,EILGETSLM,SEILGETSL,TDFGHSEIL,KITDFGHSEI,EILGETSLMR,SEILGETSLM	GBM
CHEK2	c.1117A>G	p.K373E	LKPENVLLSSQEEDCLIKITDFGHS[p.K373E]EILGETSLMRTLCGTPTYLAPEVLVS	ITDFGHSEI,EILGETSLM,SEILGETSL,TDFGHSEIL,KITDFGHSEI,EILGETSLMR,SEILGETSLM	KIRC,PRAD,UCS
CHIT1	c.851_852insC	p.P284fs	LILGMPTYGRSFTLASSSDTRVGAP[p.P284fs]SHRVWHSRPLHQGRRDAGLL*	RVWHSRPLH,RVGAPSHRV,HSRPLHQGR,PSHRVWHSR,HRVWHSRPL,VGAPSHRVW,HQGRRDAGL,RVWHSRPLHQ,HSRPLHQGRR,DTRVGAPSHR,RPLHQGRRDA,SHRVWHSRPL,RVGAPSHRVW,HQGRRDAGLL	KIRC
CHN1	c.792G>C	p.K264N	CGLNVHKQCSKMVPNDCKPDLKHVK[p.K264N]NVYSCDLTTLVKAHTTKRPMVVDMCI	DLKHVKNVY,VKNVYSCDL,NVYSCDLTTL,HVKNVYSCDL	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
CHN2	c.129C>G	p.I43M	AEEYQPPIWKSYLYQLQQEAPRPKR[p.I43M]MICPREVENRPKYYGREFHGIISREQ	RPKRMICPR,APRPKRMIC,QEAPRPKRM,KRMICPREV,RMICPREVE,MICPREVENR,QQEAPRPKRM	LUSC
CHRNA3	c.67_69delCTG	p.L23del	MGSGPLSLPLALSPPRLLLLLL[p.L23del]SLLPVARASEAEHRLFERLFEDYNEIIR	RLLLLLLSL,RLLLLLLSLL	BLCA
CHRNA4	c.1188C>G	p.S396R	LIESMHKMASAPRFWPEPEGEPPAT[p.S396R]RGTQSLHPPSPSFCVPLDVPAEPGPS	ATRGTQSLH,PPATRGTQSL	LUAD
CHRNA9	c.1082C>A	p.P361Q	WARVVILKYMSRVLFVYDVGESCLS[p.P361Q]QHHSRERDHLTKVYSKLPESNLKAAR	ESCLSQHHSR,CLSQHHSRER,SQHHSRERDH,GESCLSQHHS	LUAD
CIC	c.1521delC	p.R507fs	PEGNKGFGRKVFSPVIRSSFTHCRP[p.R507fs]HWTLSPQGPRILL*	TLSPQGPRI,WTLSPQGPR,SFTHCRPHW,SSFTHCRPH,RPHWTLSPQ,SPQGPRILL,FTHCRPHWTL,RSSFTHCRPH,HWTLSPQGPR,WTLSPQGPRI,SSFTHCRPHW	STAD
CIC	c.3341_3342insC	p.A1114fs	ITAFYSGSPAPTSSAPLAQPSQAPP[p.A1114fs]KPGLHCGHQHNPTCSHHSAQGPASPCHCHPSPD*	AQPSQAPPK,SQAPPKPGL,HQHNPTCSH,SHHSAQGPA,AQGPASPCH,NPTCSHHSA,LAQPSQAPPK,SQAPPKPGLH,HQHNPTCSHH	STAD
CIC	c.3341delC	p.A1114fs	VITAFYSGSPAPTSSAPLAQPSQAP[p.A1114fs]QAWSTLWPPAQPHLQPPFCPRARQPLPLPPQPRLALSPAPQQVP*	ALSPAPQQV,HLQPPFCPR,LWPPAQPHL,AWSTLWPPA,RARQPLPLP,LPLPPQPRL,LPPQPRLAL,QPRLALSPA,AQPHLQPPF,SQAPQAWST,TLWPPAQPH,QPSQAPQAW,APQAWSTLW,TLWPPAQPHL,SQAPQAWSTL,HLQPPFCPRA,RARQPLPLPP,CPRARQPLPL,AQPSQAPQAW,QAWSTLWPPA,LPLPPQPRLA,LALSPAPQQV	STAD
CIITA	c.2182G>A	p.E728K	AESELAFPSFLLQCFLGALWLALSG[p.E728K]KIKDKELPQYLALTPRKKRPYDNWLE	ALWLALSGK,LWLALSGKI,ALWLALSGKI,GALWLALSGK,LWLALSGKIK,KIKDKELPQY	UCEC
CILP2	c.1657G>A	p.V553M	VTFVDPSGEFMDAVRVLPFDPRGAG[p.V553M]MYHEVKAMRKKAPVILHTSQSNTIPL	GMYHEVKAM,MYHEVKAMR,RGAGMYHEVK,MYHEVKAMRK,GMYHEVKAMR,LPFDPRGAGM,AGMYHEVKAM	GBM
CIRH1A	c.749G>T	p.S250I	TGTLVKSHLIANADVQSIAVADQED[p.S250I]IFVVGTAEGTVFHFQLVPVTSNSSEK	AVADQEDIFV,IAVADQEDIF,QEDIFVVGTA	HNSC
CIZ1	c.2003T>C	p.V668A	SEPQHQQRLGEIQHMSQACLLSLLP[p.V668A]APRDVLETEDEEPPPRRWCNTCQLYY	SLLPAPRDV,LLSLLPAPR,CLLSLLPAPR,SLLPAPRDVL,LPAPRDVLET	CRC
CIZ1	c.266T>C	p.L89P	QLLQLQQLLQQSPPQAPLPMAVSRG[p.L89P]PPPQQPQQPLLNLQGTNSASLLNGSM	LPMAVSRGPP	GBM
CKAP2	c.2050T>A	p.*684K	GRETDAFVCRPNAALCRVYYEADTT[p.*684K]KEK*	RVYYEADTTK	CLL
CKAP5	c.1727G>C	p.G576A	AGGPPKKGKPAAPGGAGNTGTKNKK[p.G576A]ALETKEIVEPELSIEVCEEKASAVLP	KNKKALETK,KKALETKEI	TGCT
CLCN2	c.1934_1935insCCG	p.645_645R>RR	ILLGSIERSQVVALLGAQLSPARRR[p.645_645R>RR]RQHMQERRATQTSPLSDQEGPPTPEASV	QLSPARRRR,SPARRRRQH,RRRRQHMQER,SPARRRRQHM	KIRC
CLCNKA	c.371C>A	p.P124Q	YPVALVSFSSGFSQSITPSSGGSGI[p.P124Q]QELKTMLAGVILEDYLDIKNFGAKVV	SGIQELKTM,QELKTMLAG,QELKTMLAGV	LUAD
CLDN23	c.628G>A	p.V210M	CDERCRRRRKGPSAGPRRSSVSTIQ[p.V210M]MEWPEPDLAPAIKYYSDGQHRPPPAQ	RSSVSTIQM,IQMEWPEPD,MEWPEPDLA,IQMEWPEPDL,RRSSVSTIQM,SSVSTIQMEW,MEWPEPDLAP	ACC
CLDN7	c.514T>G	p.S172A	DFYNPLIPTNIKYEFGPAIFIGWAG[p.S172A]AALVILGGALLSCSCPGNESKAGYRV	AIFIGWAGA,FIGWAGAAL,GWAGAALVI,FIGWAGAALV,AIFIGWAGAA,IFIGWAGAAL,GWAGAALVIL,IGWAGAALVI	KIRP
CLEC12B	c.650G>T	p.W217L	MSQPLLMFSFFWLGLSWDSSGRSWF[p.W217L]LEDGSVPSPSLFSTKELDQINGSKGC	FLEDGSVPS,DSSGRSWFL,RSWFLEDGSV	LUAD
CLEC18A	c.1268G>A	p.R423H	GQPDNHGFGNCVELQASAAFNWNNQ[p.R423H]HCKTRNRYICQFAQEHISRWGPGS*	NQHCKTRNR,AAFNWNNQH,AFNWNNQHCK,NWNNQHCKTR,NQHCKTRNRY	CRC

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CLEC4A	c.626G>A	p.R209H	YNESSTFWHPREPSDPNERCVVLNF[p.R209H]HKSPKRWGWNDVNCLGPQRSVCEMMK	VLNFHKSPK,RCVVLNFHK,LNFHKSPKR,VVLNFHKSPK,VLNFHKSPKR,LNFHKSPKRW,NERCVVLNFH	PRAD
CLEC4C	c.536G>T	p.R179L	QWVDQTPYNENVTFWHSGEPNNLDE[p.R179L]LCAIINFRSSEEWGWNDIHCHVPQKS	NLDELCAII,ELCAIINFR,DELCAIINF,GEPNNLDEL	LUSC
CLIC6	c.892C>G	p.Q298E	EGPAGDSMDAEGPAGRARRVSGEPQ[p.Q298E]ESGDGSLSPQAEAIEVAAGESAGRSP	EPQESGDGSL	ACC
CLIP1	c.3052_3053insA	p.S1018fs	AAKKHEEEKKELERKLSDLEKKMET[p.S1018fs]KPQPVSGAESQV*	KMETKPQPV,METKPQPVS,ETKPQPVSGA,KKMETKPQPV	BLCA,KIRP
CLK4	c.203G>T	p.R68L	CKPHHQFKESDCHYLEARSLNERDY[p.R68L]LDRRYVDEYRNDYCEGYVPRHYHRDI	RSLNERDYL,LDRRYVDEY,RDYLDRRYV,YLDRRYVDEY,SLNERDYLDR,NERDYLDRRY	LUAD
CLN3	c.616G>A	p.G206S	ISWWSSGTGGAGLLGALSYLGLTQA[p.G206S]SLSPQQTLLSMLGIPALLLASYFLLL	YLGLTQASL,SLSPQQTLL,ASLSPQQTL,SYLGLTQASL,LSYLGLTQAS,ASLSPQQTLL	LUSC
CLSTN1	c.1844C>T	p.T615M	LEGEDLGELDKAMQHISYLNSRQFP[p.T615M]MPGIRRLKITSTIKCFNEATCISVPP	YLNSRQFPM,RQFPMPGIR,QFPMPGIRR,FPMPGIRRL,MPGIRRLKI,RQFPMPGIRR,SYLNSRQFPM,NSRQFPMPGI	STAD
CLSTN2	c.2276C>T	p.P759L	YSIYGVGSMSRYEQVLHHIRYRNWR[p.P759L]LASLEARRFRIKCSELNGRYTSNEFN	HIRYRNWRL,RYRNWRLAS,RLASLEARR,YRNWRLASL,LASLEARRF,RYRNWRLASL,HIRYRNWRLA,RLASLEARRF,NWRLASLEAR,LASLEARRFR,HHIRYRNWRL,RNWRLASLEA	HNSC
CLUL1	c.1387G>C	p.G463R	SELANQAPETEIIFNSIQVVPRIHE[p.G463R]RNISKQDETMMTDLSILPSSNFTLKI	RIHERNISK,QVVPRIHER,VPRIHERNI,RNISKQDETM	KIRC
CMA1	c.242T>A	p.I81K	IRRNFVLTAAHCAGRSITVTLGAHN[p.I81K]KTEEEDTWQKLEVIKQFRHPKYNTST	TVTLGAHNK,ITVTLGAHNK,KTEEEDTWQK	CLL
CMAS	c.329G>A	p.R110Q	FQSVWVSTDHDEIENVAKQFGAQVH[p.R110Q]QRSSEVSKDSSTSLDAIIEFLNYHNE	HQRSSEVSK,QFGAQVHQR,KQFGAQVHQ,AQVHQRSSEV,KQFGAQVHQR	CRC
CMIP	c.688G>A	p.A230T	EIVSKLLSENTNLTTQEHENIIVAI[p.A230T]TPLLENNHPPPDLCEFFCKHCRERPR	IIVAITPLL,NIIVAITPL,HENIIVAIT,NIIVAITPLL	CLL
CMTM8	c.77G>C	p.S26T	MEEPQRARSHTVTTTASSFAENFST[p.S26T]TSSSFAYDREFLRTLPGFLIVAEIVL	STTSSSFAY,TSSSFAYDR,FSTTSSSFA,AENFSTTSS,NFSTTSSSF,FSTTSSSFAY,TTSSSFAYDR,ENFSTTSSSF,SSFAENFSTT,AENFSTTSSS	TGCT
CNBD1	c.1187T>C	p.L396P	RSIIGFVKLRSNKVKRSQKLVYMGK[p.L396P]PKEKESFGEISVLLQVPFTCTIITKK	KLVYMGKPK,LVYMGKPKEK,MGKPKEKESF	STAD
CNGA4	c.1529A>C	p.K510T	AEIALQEATESRLRGLDQQLDDLQT[p.K510T]TFARLLAELESSALKIAYRIERLEWQ	TFARLLAEL,QLDDLQTTF,LQTTFARLL,QLDDLQTTFA,TTFARLLAEL,QQLDDLQTTF,LQTTFARLLA	STAD
CNKSR2	c.746C>T	p.P249L	SEGLGMYIKSTYDGLHVITGTTENS[p.P249L]LADRCKKIHAGDEVIQVNHQTVVGWQ	SLADRCKKI,NSLADRCKK	TGCT
CNOT3	c.58G>A	p.E20K	MADKRKLQGEIDRCLKKVS[p.E20K]KGVEQFEDIWQKLHNAANANQKEKYE	CLKKVSKGV,KVSKGVEQF,KKVSKGVEQF	PRAD
CNOT6	c.744delT	p.S248fs	QEILSCNADIVSLQEVETEQYYSFF[p.S248fs]W*	TEQYYSFFW	STAD
CNRIP1	c.304C>T	p.R102W	EPDGDRVVYTGTYDTEGVTPTKSGE[p.R102W]WQPIQITMPFTDIGTFETVWQVKFYN	EWQPIQITM,TKSGEWQPI,GEWQPIQIT,WQPIQITMPF,GEWQPIQITM	CRC
CNTFR	c.754G>T	p.D252Y	QTPSTWPDPESFPLKFFLRYRPLIL[p.D252Y]YQWQHVELSDGTAHTITDAYAGKEYI	LILYQWQHV,YRPLILYQW,LYQWQHVEL,RYRPLILYQ,LRYRPLILY,YQWQHVELS,ILYQWQHVEL,PLILYQWQHV,FLRYRPLILY,RYRPLILYQW,YQWQHVELSD	LUAD
CNTN5	c.1136C>T	p.S379F	LEIPNVQLDDAGIYECRAENSRGKN[p.S379F]FFRGQLQVYTYPHWVEKLNDTQLDSG	NSRGKNFFR,FFRGQLQVY,AENSRGKNF,GKNFFRGQL,RGKNFFRGQL,KNFFRGQLQV,NFFRGQLQVY,ENSRGKNFFR,RAENSRGKNF,AENSRGKNFF	SKCM
CNTN5	c.533C>A	p.T178N	IDGTFHSNPSEAKDSGHYQCLATN[p.T178N]NVGSILSREATLQFAYLGNFSGRTRS	YQCLATNNV,LATNNVGSI,CLATNNVGSI,HYQCLATNNV,YQCLATNNVG,LATNNVGSIL	LUSC

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CNTN6	c.2420G>T	p.R807M	NNEGEGSLSTVTIVYSGEDEPQLAP[p.R807M]MGTSLQSFSASEMEVSWNAIAWNRNT	QLAPMGTSL,PMGTSLQSF,APMGTSLQSF,GEDEPQLAPM,PQLAPMGTSL	LUAD
CNTNAP1	c.3086G>T	p.S1029I	EPGTWMRYNLQSALRSAAREFSHML[p.S1029I]IRPVPGYEPGYIPGYDTPGYVPGYHG	FSHMLIRPV,MLIRPVPGY,REFSHMLIR,AAREFSHMLI,HMLIRPVPGY,EFSHMLIRPV,REFSHMLIRP	PRAD
CNTNAP2	c.1185C>A	p.F395L	EPYTVPVFFNATSYLEVPGRLNQDL[p.F395L]LSVSFQFRTWNPNGLLVFSHFADNLG	RLNQDLLSV,LLSVSFQFR,DLLSVSFQF,NQDLLSVSF,LLSVSFQFRT,DLLSVSFQFR,LNQDLLSVSF,QDLLSVSFQF	LUAD
CNTNAP4	c.1307A>C	p.Y436S	LFSELQLISGGILLFLSDGKLKSNL[p.Y436S]SQPGKLPSDITAGVELNDGQWHSVSL	KSNLSQPGK,KLKSNLSQPG,KSNLSQPGKL	KIRC
CNTNAP4	c.34A>T	p.I12F	MLLFYLLVVLS[p.I12F]FDSTKASALTNPNVALFLLADDCDDP	VLSFDSTKA,VVLSFDSTK,FYLLVVLSF,FDSTKASAL,LVVLSFDSTK,LFYLLVVLSF,LSFDSTKASA	CLL
CNTRL	c.553C>T	p.P185S	SKIEGIENMCNLQKLNLAGNEIEHI[p.P185S]SVWLGKKLKSLRVLNLKGNKISSLQD	HISVWLGKK,SVWLGKKLK,EIEHISVWL,NEIEHISVW,ISVWLGKKL,ISVWLGKKLK,NEIEHISVWL	CESC
CNTROB	c.2759_2760InsG	p.R920fs	PKTEKPPARKKSGHPAPSSMRSRGG[p.R920fs]SLEMSPPTLSPLCSLIVVILINAH*	TLSPLCSLI,SMRSRGGSL,MSPPTLSPL,RSRGGSLEM,SPLCSLIVV,SLEMSPPTL,LEMSPPTLS,TLSPLCSLIV,SLIVVILINA,EMSPPTLSPL,SSMRSRGGSL,SMRSRGGSLE,RSRGGSLEMS,SPLCSLIVVI,MRSRGGSLEM,GSLEMSPPTL,LEMSPPTLSP	STAD
COBLL1	c.2196A>C	p.K732N	DPLTVKDPICAHGNDDLLPPVDRID[p.K732N]NNSTASYLKNYPLYRQDYNPKPKPSN	IDNNSTASY,RIDNNSTASY,IDNNSTASYL	CRC
COG5	c.1850A>G	p.H617R	TKVVSSQSSFPLAAEQTIISALKAI[p.H617R]RALMENAVQPLLTSVGDAIEAIIITM	ALKAIRALM,AIRALMENA,IISALKAIR,SALKAIRAL,AIRALMENAV,SALKAIRALM,TIISALKAIR,ISALKAIRAL	TGCT
COL14A1	c.3245G>T	p.R1082I	STVGALNKIGTDGTQVAMVQFTDDP[p.R1082I]ITEFKLNAYKTKETLLDAIKHISYKG	FTDDPITEF,ITEFKLNAY,MVQFTDDPI,VQFTDDPIT,FTDDPITEFK,AMVQFTDDPI,ITEFKLNAYK,QFTDDPITEF	CRC
COL15A1	c.2123A>G	p.K708R	ARGPNGSVGEKGDPGNRGLPGPPGK[p.K708R]RGQAGPPGVMGPPGPPGPPGPPGPGC	RGQAGPPGVM	TGCT
COL18A1	c.2652delC	p.G884fs	DRGSRGEKGDPGKDGVGQPGLPGPP[p.G884fs]DPRDLWSTCRSRTDPS*	DLWSTCRSR	KIRP
COL19A1	c.1613C>A	p.P538Q	GPPGLIGSPGLKGQQGSAGSMGPRG[p.P538Q]QPGDVGLPGEHGIPGKQGIKGEKGDP	GPRGQPGDV	LUAD
COL4A6	c.1648C>A	p.L550I	GPAGAPGLVGPLGPSGPKGKKGEPI[p.L550I]ISTIQGMPGDRGDSGSQGFRGVIGEP	KGKKGEPII,KKGEPIISTI,EPIISTIQGM	CRC
COL5A2	c.1546G>T	p.G516W	QGPIGPPGEEGKRGPRGDPGTVGPP[p.G516W]WPVGERGAPGNRGFPGSDGLPGPKGA	GTVGPPWPV,DPGTVGPPW	LUAD
COL5A2	c.1834G>T	p.G612W	LGPLGAPGEDGRPGPPGSIGIRGQP[p.G612W]WSMGLPGPKGSSGDPGKPGEAGNAGV	WSMGLPGPK,SIGIRGQPW,RGQPWSMGL,QPWSMGLPG,GSIGIRGQPW,IGIRGQPWSM	LUAD
COL6A3	c.7133C>A	p.A2378D	GQKGDPGYPGPAGPKGNRGDSIDQC[p.A2378D]DLIQSIKDKCPCCYGPLECPVFPTEL	DSIDQCDLI	TGCT
COL6A3	c.8374G>A	p.D2792N	YFFVVLGIGRKVNIKEVYTFASEPN[p.D2792N]NVFFKLVDKSTELNEEPLMRFGRLLP	NVFFKLVDK,FASEPNNVF,ASEPNNVFF,EPNNVFFKL,YTFASEPNNV,ASEPNNVFFK,TFASEPNNVF,FASEPNNVFF,EPNNVFFKLV,SEPNNVFFKL	CRC
COL6A5	c.6671C>T	p.T2224M	QEDFLGGNGFIGQELNSGRESPFVK[p.T2224M]MEDNGSDYLVYLPSQMFEPQKLMINY	KMEDNGSDY,MEDNGSDYL,KMEDNGSDYL,SGRESPFVKM,VKMEDNGSDY,MEDNGSDYLV	GBM
COL9A1	c.632C>A	p.P211Q	GVERSSATLFVDCNRIESLPIKPRG[p.P211Q]QIDIDGFAVLGKLADNPQVSVPFELQ	QIDIDGFAV,GQIDIDGFA,LPIKPRGQI,GQIDIDGFAV	LUAD

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COL9A1	c.848delC	p.P283fs	RITPSQTTDERGPPGEQGPPGPPGP[p.P283fs]LEFQASMASTVTEVLRAPRAPRVLQVNRESQELQASLAHLALMD*	FQASMASTV,SMASTVTEV,ELQASLAHL,LQASLAHLA,VLRAPRAPR,ASLAHLALM,VTEVLRAPR,MASTVTEVL,ESQELQASL,GPLEFQASM,LEFQASMAS,RESQELQAS,QELQASLAH,QASLAHLAL,TEVLRAPRA,ASMASTVTEV,SMASTVTEVL,LQASLAHLAL,FQASMASTVT,VLRAPRAPRV,ELQASLAHLA,MASTVTEVLR,TVTEVLRAPR,EVLRAPRAPR,ESQELQASLA,APRAPRVLQV,LEFQASMAST,LRAPRAPRVL,LQVNRESQEL,RESQELQASL,SQELQASLAH,QELQASLAHL,QASLAHLALM	STAD
COPB1	c.1273C>T	p.R425C	NVIPVLMEFLSDNNEAAAADVLEFV[p.R425C]CEAIQRFDNLRMLIVEKMLEVFHAIK	EFVCEAIQR,DVLEFVCEA,FVCEAIQRF,EFVCEAIQRF,DVLEFVCEAI,CEAIQRFDNL	CRC
COQ2	c.196G>T	p.V66L	SFALARAAGAPHGGDLQPPACPEPR[p.V66L]WRQLSLSAAAVVDSAPRPLQPYLRLM	RWRQLSLSA,CPEPRWRQL,EPRWRQLSL,WRQLSLSAA,RWRQLSLSAA,WRQLSLSAAA,QPPACPEPRW	ACC
CORO2A	c.1576T>A	p.*526R	LTQREVQAKQLELEIKNLRMGSEQL[p.*526R]RAETSALLTLRDTTRLHGEV*	QLRAETSAL,TLRDTTRLH,ETSALLTLR,LLTLRDTTR,DTTRLHGEV,LRAETSALL,AETSALLTL,SEQLRAETS,QLRAETSALL,LLTLRDTTRL,NLRMGSEQLR,SEQLRAETSA,EQLRAETSAL,RAETSALLTL	CRC
COX15	c.256C>A	p.L86I	PSKAAERVVGRWLLVCSGTVAGAVI[p.L86I]IGGVTRLTESGLSMVDWHLIKEMKPP	VIIGGVTRL	CRC
COX6A1	c.23C>T	p.S8L	MAVVGVS[p.S8L]LVSRLLGRSRPQLGRPMSSGAHGEEG	MAVVGVSLV,SLVSRLLGR,AVVGVSLVSR,VSLVSRLLGR,LVSRLLGRSR	BLCA
CPAMD8	c.2352delC	p.P784fs	TDEAVPAFQPHTGSLVAVAPSRHPP[p.P784fs]EQRREKGLSSPKHGFGIVSTSVTHLVRGHSV*	IVSTSVTHL,STSVTHLVR,REKGLSSPK,VSTSVTHLV,SPKHGFGIV,GLSSPKHGF,IVSTSVTHLV,GIVSTSVTHL,VSTSVTHLVR,VTHLVRGHSV,HGFGIVSTSV,KGLSSPKHGF,FGIVSTSVTH	STAD
CPE	c.869C>A	p.P290Q	SAHEYSSSPDDAIFQSLARAYSSFN[p.P290Q]QAMSDPNRPPCRKNDDDSSFVDGTTN	RAYSSFNQA,AYSSFNQAM,RAYSSFNQAM	LUAD
CPNE8	c.381G>T	p.Q127H	SKSPNLSKHDFLGQVFCTLGEIVGS[p.Q127H]HGSRLEKPIVGIPGKKCGTIILTAEE	GSHGSRLEK,EIVGSHGSR,GEIVGSHGS,VGSHGSRLEK,EIVGSHGSRL	LUAD
CPS1	c.2564C>A	p.T855K	TPRLPMNKEWPSNLDLRKELSEPSS[p.T855K]KRIYAIAKAIDDNMSLDEIEKLTYID	SSKRIYAIA,SKRIYAIAK,ELSEPSSKR,SEPSSKRIY,LSEPSSKRIY,SSKRIYAIAK,EPSSKRIYAI,KRIYAIAKAI	LUSC
CPSF4	c.656C>A	p.P219Q	NPPLQRSSSLIQLTSQNSSPNQQRT[p.P219Q]QQVIGVMQSQNSSAGNRGPRPLEQVT	RTQQVIGVM,NQQRTQQVI,SPNQQRTQQV,QQRTQQVIGV,QRTQQVIGVM	LUAD
CR1L	c.237delA	p.L79fs	PIGTYLNYECRPGYSGRPFSIICLK[p.L79fs]TQSGQVLRTSANVNHVVILQIL*	CLKTQSGQV,QVLRTSANV,RTSANVNHV,KTQSGQVLR,TSANVNHVV,LKTQSGQVL,SANVNHVVI,ANVNHVVIL,GQVLRTSANV,RTSANVNHVV,TSANVNHVVI,NVNHVVILQI,CLKTQSGQVL,SANVNHVVIL	STAD
CR2	c.618delC	p.V206fs	ESGYLLVGEKIINCLSSGKWSAVPP[p.V206fs]HVKRHAVNL*	WSAVPPHVK,KWSAVPPHV,HVKRHAVNL,SAVPPHVKR,PPHVKRHAV,GKWSAVPPH,SGKWSAVPPH,KWSAVPPHVK,WSAVPPHVKR,VPPHVKRHAV,GKWSAVPPHV	STAD
CRB1	c.1883delT	p.L628fs	SICAFQNSFLGGLPVGMTSNGVALL[p.L628fs]TSIICHPHLRL*	SIICHPHLR,SIICHPHLRL,TSIICHPHLR,MTSNGVALLT,LTSIICHPHL	HNSC
CRB1	c.1888T>G	p.F630V	ICAFQNSFLGGLPVGMTSNGVALLN[p.F630V]VYNMPSTPSFVGCLQDIKIDWNHITL	NGVALLNVY,VALLNVYNM,LLNVYNMPST,VYNMPSTPSF,SNGVALLNVY,TSNGVALLNV	STAD
CRB2	c.3329C>T	p.T1110M	GWEGPRCEAHVDPCHSAPCARGRCH[p.T1110M]MHPDGRFECRCPPGFGGPRCRLPVPS	RGRCHMHPD,CHMHPDGRF,RGRCHMHPDG,APCARGRCHM,RCHMHPDGRF,HMHPDGRFEC	ACC
CREBBP	c.4303G>C	p.D1435H	FGMHVQEYGSDCPPPNTRRVYISYL[p.D1435H]HSIHFFRPRCLRTAVYHEILIGYLEY	YLHSIHFFR,HSIHFFRPR,VYISYLHSI,ISYLHSIHF,SYLHSIHFF,RVYISYLHS,YISYLHSIH,RVYISYLHSI,SYLHSIHFFR,YISYLHSIHF,ISYLHSIHFF	BLCA
CREBBP	c.4337G>A	p.R1446H	CPPPNTRRVYISYLDSIHFFRPRCL[p.R1446H]HTAVYHEILIGYLEYVKKLGYVTGHI	HFFRPRCLH,HTAVYHEIL,RPRCLHTAV,FFRPRCLHT,CLHTAVYHEI,FFRPRCLHTA,RPRCLHTAVY,HTAVYHEILI	DLBCL

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
CREBBP	c.6281C>T	p.P2094L	DLLRTLKSPSSPQQQQQVLNILKSN[p.P2094L]LQLMAAFIKQRTAKYVANQPGMQPQP	VLNILKSNL,ILKSNLQLM,NLQLMAAFI,LQLMAAFIK,KSNLQLMAA,SNLQLMAAF,LKSNLQLMA,ILKSNLQLMA,NLQLMAAFIK,KSNLQLMAAF,LKSNLQLMAA	UCEC
CRIPAK	c.142_143insCG	p.M48fs	PACSCAHVECPPAHTCRCGVPACSH[p.M48fs]TCPCGVPACSHVPMWSARLLTHVSMWSAHLLMCPCGVPTCSHVPMWSATCSHTCPCGVPACSRAHVECPPAHTCRCGVPACSHVPMRSARLLTRAHAECPPAHTCPCGVPACSHVPTWSARLLTRAHVECPPAHTCQRGVPA*	SMWSAHLLM,HLLMCPCGV,WSARLLTHV,HVSMWSAHL,RLLTHVSMW,LTHVSMWSA,HTCQRGVPA,MWSARLLTH,TWSARLLTR,VPTCSHVPM,VPACSRAHV,VPTWSARLL,ARLLTHVSM,THVSMWSAH,VSMWSAHLL,LMCPCGVPT,SHVPMWSAT,LLTHVSMWSA,SMWSAHLLMC,LLMCPCGVPT,HVSMWSAHLL,GVPACSRAHV,SARLLTHVSM,PTWSARLLTR,HVPTWSARLL,ARLLTHVSMW,LTHVSMWSAH,THVSMWSAHL,VSMWSAHLLM,VPTCSHVPMW,VPMWSATCSH	BLCA
CRIPAK	c.427T>C	p.C143R	SHVPMRSARLLTRAHAECPPAHTCP[p.C143R]RGVPACSHVPMRSARLLTRADVECPP	HTCPRGVPA,CPPAHTCPR,RGVPACSHV	ACC
CRIPAK	c.520T>C	p.C174R	SHVPMRSARLLTRADVECPPAHTCP[p.C174R]RGVPACSHVPTWSARLITRAHVECSP	HTCPRGVPA,CPPAHTCPR,RGVPACSHV	ACC
CRIPAK	c.538_568delTCACACGTGCCAACGTGGAGTGCCCGCCTGA	p.S180fs	LTRADVECPPAHTCPCGVPACSHVP[p.S180fs]MWSARLLTRADVECLPAHTCPCGVFACSHVPMRSARLLTRADAECPPAHTCPCGVPACSRADVECPPAHTCPCGVPACSRADVGCPPAHMCRCGVPACSHVPMWSARLLTRADVECPPAHVPIWSARLLTRAIVECPPAHTHADVECPPAHTCPCGVPACSHVPMWSARLLTHVPMWSARLLTRAHVECLPAHTRAHVECPPAHTKPWHGGSVGFLSCRPSQTLLPYILLMVAF*	FLSCRPSQT,TLLPYILLM,LLPYILLMV,CLPAHTCPC,HMCRCGVPA,WSARLLTHV,GSVGFLSCR,VFACSHVPM,RLLTHVPMW,PWHGGSVGF,PYILLMVAF,HTCPCGVFA,SARLLTRAI,LTRAHVECL,RAHVECLPA,MWSARLLTH,RPSQTLLPY,FACSHVPMR,IWSARLLTR,DVECPPAHV,HVPIWSARL,QTLLPYILL,VPACSRADV,VPIWSARLL,LPAHTRAHV,AHTCPCGVF,RAIVECPPA,ARLLTHVPM,AHVECLPAH,LSCRPSQTL,SQTLLPYIL,LPYILLMVA,CPPAHVPIW,CPPAHTKPW,LLTRAHVECL,CLPAHTRAHV,FLSCRPSQTL,TLLPYILLMV,LLPYILLMVA,LLTRADVECL,HVECPPAHTK,GVFACSHVPM,SARLLTRADA,SARLLTRAIV,SARLLTHVPM,HTKPWHGGSV,VFACSHVPMR,PAHVPIWSAR,PIWSARLLTR,HVECLPAHTR,HVPIWSARLL,WSARLLTRAI,KPWHGGSVGF,RPSQTLLPYI,LPYILLMVAF,SRADVGCPPA,ADVGCPPAHM,AHMCRCGVPA,VECPPAHVPI,AHVPIWSARL,RAIVECPPAH,ARLLTHVPMW,RAHVECLPAH,LSCRPSQTLL,CRPSQTLLPY,SQTLLPYILL,VECLPAHTRA,VECPPAHTHA,LPAHTCPCGV,CPPAHTHADV	LUAD
CRIPAK	c.568A>C	p.I190L	ECPPAHTCPCGVPACSHVPTWSARL[p.I190L]LTRAHVECSPAHTCRCGVPACSHVPM	TWSARLLTR,VPTWSARLL,PTWSARLLTR,HVPTWSARLL	ACC
CRISPLD1	c.664C>T	p.R222W	PKAVYLVCNYSPKGNWWGHAPYKHG[p.R222W]WPCSACPPSFGGGCRENLCYKEGSDR	APYKHGWPC,YKHGWPCSA,WPCSACPPS,WPCSACPPSF,YKHGWPCSAC	BRCA
CROCC	c.1063G>C	p.A355P	RTSRAVQEAGLGLSTGLRLAESRAE[p.A355P]PALEKQALLQAQLEEQLRDKVLREKD	EPALEKQAL,AESRAEPAL,RLAESRAEPA,ESRAEPALEK,AEPALEKQAL	KIRP
CROT	c.1740G>T	p.Q580H	DPLFSKSGGGGNFVLSTSLVGYLRV[p.Q580H]HGVVVPMVHNGYGFFYHIRDDRFVVA	YLRVHGVVV,GYLRVHGVV,RVHGVVVPM,RVHGVVVPMV,LVGYLRVHGV,GYLRVHGVVV,LRVHGVVVPM	LUAD
CROT	c.96delA	p.L32fs	TEERTFQYQDSLPSLPVPSLEESLK[p.L32fs]NTLNQSPEHATR*	LEESLKNTL	STAD
CRTC3	c.1088C>T	p.S363L	NKTVLSSSLNNHPQTSVPNASALHP[p.S363L]LLRLFSLSNPSLSTTNLSGPSRRRQP	ASALHPLLR,ALHPLLRLF,NASALHPLL,HPLLRLFSL,SALHPLLRLF,NASALHPLLR,VPNASALHPL	LUAD
CRYGB	c.427A>G	p.R143G	HLTEIHSLNVLEGSWILYEMPNYRG[p.R143G]GQYLLRPGEYRRFLDWGAPNAKVGSL	NYRGGQYLL,MPNYRGGQY,YEMPNYRGG,EMPNYRGGQY,GQYLLRPGEY,NYRGGQYLLR,MPNYRGGQYL	TGCT
CRYGD	c.476delG	p.G159fs	YEMPNYRGRQYLLRPGDYRRYHDWG[p.G159fs]VQMPKSAL*	RYHDWGVQM,GVQMPKSAL,RRYHDWGVQM,WGVQMPKSAL	STAD
CRYM	c.943T>A	p.*315K	FKSLGMAVEDTVAAKLIYDSWSSGK[p.*315K]KNKGT*	SWSSGKKNK	CLL

基因	cDNA變化	蛋白質變化	突變背景序列	三肽	實例性疾病
CSDE1	c.658C>T	p.R220C	NVQLETGDKINFVIDNNKHTGAVSA[p.R220C]CNIMLLKKKQARCQGVVCAMKEAFGF	SACNIMLLK,GAVSACNIM,AVSACNIMLL,VSACNIMLLK,SACNIMLLKK,HTGAVSACNI	UCEC
CSF2RB	c.892G>A	p.G298S	SFGLFYKPSPDAGEEECSPVLREGL[p.G298S]SSLHTRHHCQIPVPDPATHGQYIVSV	VLREGLSSL,EGLSSLHTR,REGLSSLHT	GBM
CSF3R	c.1404delC	p.P468fs	SLWVGWEPPNPWPQGYVIEWGLGPP[p.P468fs]ARAIATRPGGWNRMGEPRGFC*	ATRPGGWNR,RAIATRPGG,EWGLGPPAR,IEWGLGPPA,ATRPGGWNRM,IATRPGGWNR,RAIATRPGGW,IEWGLGPPAR	STAD
CSGALNACT2	c.1086G>T	p.L362F	VSLNEEFNRGRGLNVGARAWDKGEV[p.L362F]FMFFCDVDIYFSAEFLNSCRLNAEPG	FMFFCDVDI,EVFMFFCDV,RAWDKGEVF,GEVFMFFCD,AWDKGEVFMF,VFMFFCDVDI,RAWDKGEVFM,FMFFCDVDIY,ARAWDKGEVF,GEVFMFFCDV	ACC,KIRP,TGCT
CSHL1	c.350G>A	p.R117Q	SSNMEETQQKSNLELLHISLLLIES[p.R117Q]QLEPVRFLRSTFTNNLVYDTSDSDDY	SLLLIESQL,LIESQLEPV,SQLEPVRFL,QLEPVRFLR,LLIESQLEPV,SQLEPVRFLR,ISLLLIESQL,IESQLEPVRF	CESC
CSMD2	c.5564C>A	p.P1855Q	PTCVVPCGGNLTERRGTILSPGFPE[p.P1855Q]QYLNSLNCVWKIVVPEGAGIQIQVVS	QYLNSLNCV,FPEQYLNSL,GFPEQYLNSL,QYLNSLNCVW,ILSPGFPEQY,EQYLNSLNCV	LUAD
CSMD3	c.2071C>A	p.Q691K	DPGTPLYGIREGDGFSNRDVLRFEC[p.Q691K]KFGFELIGEKSIVCQENNQWSANIPI	LRFECKFGF,FECKFGFEL,RFECKFGFEL,VLRFECKFGF,RDVLRFECKF,FECKFGFELI	LUSC
CSMD3	c.2854C>T	p.H952Y	AEPGHSIKITFERFQTELNYDVLEV[p.H952Y]YDGPNLLSPLLGSYNGTQVPQFLFSS	LNYDVLEVY,EVYDGPNLL,LEVYDGPNL,ELNYDVLEVY,EVYDGPNLLS,LEVYDGPNLL,YDGPNLLSPL	CESC
CSMD3	c.3281C>A	p.T1094K	GDVRGPSGTILSPGYPEFYPNSLNC[p.T1094K]KWTVDVTHGKGVQFNFHTFHLEDHHD	NSLNCKWTV,YPNSLNCKW,SLNCKWTVDV,FYPNSLNCKW,KWTVDVTHGK,EFYPNSLNCK	LUSC
CSMD3	c.511G>A	p.E171K	STKSVFSLRLTSDFAVSAHGFKVYY[p.E171K]KELQSSSCGNPGVPPKGVLYGTRFDV	AHGFKVYYK,SAHGFKVYYK,HGFKVYYKEL	GBM
CSMD3	c.522G>T	p.Q174H	SVFSLRLTSDFAVSAHGFKVYYEEL[p.Q174H]HSSSCGNPGVPPKGVLYGTRFDVGDK	YEELHSSSC,HSSSCGNPGV	LUAD
CSMD3	c.7149_7150insT	p.F2383fs	LESVYSTSNQILIKFHSDFTTSGFF[p.F2383fs]CAQLSRLSTKGVPTSTTCAQC*	FTTSGFFCA,AQLSRLSTK,GFFCAQLSR,LSRLSTKGV,QLSRLSTKGV,SGFFCAQLSR,CAQLSRLSTK,TTSGFFCAQL,AQLSRLSTKG	LIHC
CSMD3	c.8179C>A	p.P2727T	LEHGRWRIVNGSHYEYKTKVVFSCD[p.P2727T]TGYHGLGPASIECLPNGTWSWRNERP	VVFSCDTGY,VVFSCDTGYH,KTKVVFSCDT,KVVFSCDTGY,FSCDTGYHGL,DTGYHGLGPA	LUAD
CSMD3	c.8429C>A	p.T2810N	CDLGFMLVGSAVRECLSSGLWSESE[p.T2810N]NRCLAGHCGIPELIVNGQVIGENYGY	SESENRCLA,SENRCLAGH	LUAD
CSPG5	c.355G>A	p.D119N	AVTGTAWLEADSPGLGGVTAEAGSG[p.D119N]NAQALPATLQAPHEVLGQSIMPPAIP	VTAEAGSGNA,AEAGSGNAQA	BLCA
CT47B1	c.702_728delGAAGCTCACAGAGGAGGCCACAGAGGA	p.234_243EKLTEEATEE>E	DLAEMAREPAEEAADEKPPEEAAEE[p.234_243EKLTEEATEE>E]PAAEEPTSEEAVAPEEVTKSQPEKWDEEAQDAAGEEEKEQEKEKDVENKVKN	EEAAEEPAA,AEEPAAEEPT	BRCA
CTAGE15P	c.1091C>T	p.A364V	IIQLSEVDKTKEELTEHIKNLQTQQ[p.A364V]VSLQSENIYFESENQKLQQKLKIMTE	VSLQSENIY,NLQTQQVSL,HIKNLQTQQV,QVSLQSENIY,KNLQTQQVSL,QQVSLQSENI,VSLQSENIYF	KIRP
CTCF	c.604_605insAA	p.K202fs	EQGELPPQEDPSWQKDPDYQPPAKK[p.K202fs]KQRKPKRANCVIQRRAKM*	RANCVIQRR,KPKRANCVI,KQRKPKRANC,RANCVIQRRA	STAD
CTCF	c.604delA	p.K202fs	EQGELPPQEDPSWQKDPDYQPPAKK[p.K202fs]QRKPKRANCVIQRRAKM*	RANCVIQRR,KPKRANCVI,KQRKPKRANC,RANCVIQRRA	STAD
CTCFL	c.1267G>A	p.E423K	YECHICHTRFTQSGTMKIHILQKHG[p.E423K]KNVPKYQCPHCATIIARKSDLRVHMR	ILQKHGKNV,KHGKNVPKY,KIHILQKHGK,LQKHGKNVPK,QKHGKNVPKY	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
CTDNEP1	c.376G>A	p.E126K	KHPVRFFVHKRPHVDFFLEVVSQWY[p.E126K]KLVVFTASMEIYGSAVADKLDNSRSI	KLVVFTASM,VVSQWYKLV,SQWYKLVVF,WYKLVVFTA,EVVSQWYKL,YKLVVFTAS,FLEVVSQWYK,VSQWYKLVVF,EVVSQWYKLV,YKLVVFTASM,LEVVSQWYKL,SQWYKLVVFT	CRC
CTNNA3	c.2567_2568insAA	p.K856fs	IIRIQSPAGPRHPVVMWRMKAPAKK[p.K856fs]NP*	RMKAPAKKNP	STAD
CTNNB1	c.1004A>T	p.K335I	ESKLIILASGGPQALVNIMRTYTYE[p.K335I]ILLWTTSRVLKVLSVCSSNKPAIVEA	IMRTYTYEI,YTYEILLWT,ILLWTTSRV,TYTYEILLW,TYEILLWTT,RTYTYEILL,EILLWTTSR,MRTYTYEIL,YEILLWTTS,NIMRTYTYEI,YTYEILLWTT,ILLWTTSRVL,IMRTYTYEIL,RTYTYEILLW,EILLWTTSRV,MRTYTYEILL,YEILLWTTSR	LIHC
CTNNB1	c.100G>A	p.G34R	ELDMAMEPDRKAAVSHWQQQSYLDS[p.G34R]RIHSGATTTAPSLSGKGNPEEEDVDT	QQSYLDSRI,RIHSGATTT,YLDSRIHSGA,RIHSGATTTA,QQQSYLDSRI,QQSYLDSRIH	UCEC
CTNNB1	c.101G>T	p.G34V	ELDMAMEPDRKAAVSHWQQQSYLDS[p.G34V]VIHSGATTTAPSLSGKGNPEEEDVDT	QQQSYLDSV,YLDSVIHSG,QQSYLDSVI,WQQQSYLDSV,YLDSVIHSGA,VIHSGATTTA,QQQSYLDSVI,QQSYLDSVIH	LIHC
CTNNB1	c.107A>C	p.H36P	DMAMEPDRKAAVSHWQQQSYLDSGI[p.H36P]PSGATTTAPSLSGKGNPEEEDVDTSQ	YLDSGIPSG,IPSGATTTA,YLDSGIPSGA	LIHC
CTNNB1	c.109T>G	p.S37A	MAMEPDRKAAVSHWQQQSYLDSGIH[p.S37A]AGATTTAPSLSGKGNPEEEDVDTSQV	YLDSGIHAG,IHAGATTTA,YLDSGIHAGA,GIHAGATTTA,AGATTTAPSL	UCEC
CTNNB1	c.110C>G	p.S37C	MAMEPDRKAAVSHWQQQSYLDSGIH[p.S37C]CGATTTAPSLSGKGNPEEEDVDTSQV	YLDSGIHCGA,GIHCGATTTA	UCEC
CTNNB1	c.110C>T	p.S37F	MAMEPDRKAAVSHWQQQSYLDSGIH[p.S37F]FGATTTAPSLSGKGNPEEEDVDTSQV	YLDSGIHFG,SYLDSGIHF,IHFGATTTA,YLDSGIHFGA,GIHFGATTTA,QSYLDSGIHF,IHFGATTTAP,FGATTTAPSL	LUAD,UCEC
CTNNB1	c.1161T>A	p.N387K	GMQALGLHLTDPSQRLVQNCLWTLR[p.N387K]KLSDAATKQEGMEGLLGTLVQLLGSD	VQNCLWTLRK	LIHC
CTNNB1	c.121A>G	p.T41A	PDRKAAVSHWQQQSYLDSGIHSGAT[p.T41A]ATAPSLSGKGNPEEEDVDTSQVLYEW	ATAPSLSGK,GATATAPSL,GIHSGATATA,TATAPSLSGK,SGATATAPSL	PRAD
CTNNB1	c.122C>T	p.T41I	PDRKAAVSHWQQQSYLDSGIHSGAT[p.T41I]ITAPSLSGKGNPEEEDVDTSQVLYEW	ITAPSLSGK,SGIHSGATI,TITAPSLSGK,SGATITAPSL	UCEC
CTNNB1	c.133T>C	p.S45P	AAVSHWQQQSYLDSGIHSGATTTAP[p.S45P]PLSGKGNPEEEDVDTSQVLYEWEQGF	TTAPPLSGK,GATTTAPPL,TTTAPPLSGK,SGATTTAPPL	ACC,LIHC
CTNNB1	c.94G>A	p.D32N	LMELDMAMEPDRKAAVSHWQQQSYL[p.D32N]NSGIHSGATTTAPSLSGKGNPEEEDV	YLNSGIHSG,QQSYLNSGI,WQQQSYLNS,QQQSYLNSG,YLNSGIHSGA,QQQSYLNSGI,WQQQSYLNSG,QQSYLNSGIH	LIHC,UCEC
CTNNB1	c.94G>T	p.D32Y	LMELDMAMEPDRKAAVSHWQQQSYL[p.D32Y]YSGIHSGATTTAPSLSGKGNPEEEDV	YLYSGIHSG,QQSYLYSGI,HWQQQSYLY,WQQQSYLYS,QQQSYLYSG,QSYLYSGIH,YLYSGIHSGA,QQQSYLYSGI,SHWQQQSYLY,WQQQSYLYSG,QQSYLYSGIH	UCEC
CTNNB1	c.95A>G	p.D32G	LMELDMAMEPDRKAAVSHWQQQSYL[p.D32G]GSGIHSGATTTAPSLSGKGNPEEEDV	YLGSGIHSG,WQQQSYLGS,QQQSYLGSG,QQSYLGSGI,QSYLGSGIH,YLGSGIHSGA,WQQQSYLGSG,QQQSYLGSGI,QQSYLGSGIH	CESC,LIHC
CTNNB1	c.95A>T	p.D32V	LMELDMAMEPDRKAAVSHWQQQSYL[p.D32V]VSGIHSGATTTAPSLSGKGNPEEEDV	QQSYLVSGI,YLVSGIHSG,LVSGIHSGA,HWQQQSYLV,WQQQSYLVS,QQQSYLVSG,QSYLVSGIH,YLVSGIHSGA,QQQSYLVSGI,SHWQQQSYLV,WQQQSYLVSG,QQSYLVSGIH	LIHC
CTNNB1	c.97T>C	p.S33P	MELDMAMEPDRKAAVSHWQQQSYLD[p.S33P]PGIHSGATTTAPSLSGKGNPEEEDVD	YLDPGIHSG,WQQQSYLDP,QQQSYLDPG,QQSYLDPGI,YLDPGIHSGA,WQQQSYLDPG,QQQSYLDPGI,QQSYLDPGIH	LIHC
CTNNB1	c.98C>A	p.S33Y	MELDMAMEPDRKAAVSHWQQQSYLD[p.S33Y]YGIHSGATTTAPSLSGKGNPEEEDVD	YLDYGIHSG,WQQQSYLDY,QQSYLDYGI,YLDYGIHSGA,HWQQQSYLDY,QQQSYLDYGI,QQSYLDYGIH	UCEC
CTNNB1	c.98C>G	p.S33C	MELDMAMEPDRKAAVSHWQQQSYLD[p.S33C]CGIHSGATTTAPSLSGKGNPEEEDVD	YLDCGIHSG,WQQQSYLDC,QQSYLDCGI,YLDCGIHSGA,QQQSYLDCGI,QQSYLDCGIH	LIHC,UCEC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
CTNNB1	c.98C>T	p.S33F	MELDMAMEPDRKAAVSHWQQQSYLD[p.S33F]FGIHSGATTTAPSLSGKGNPEEEDVD	YLDFGIHSG,WQQQSYLDF,QQSYLDFGI,QSYLDFGIH,YLDFGIHSGA,HWQQQSYLDF,QQQSYLDFGI,QQSYLDFGIH	UCEC
CTNND1	c.1341delA	p.I447fs	VHLGACGALKNISFGRDQDNKIAIK[p.I447fs]TVMVCLPLCDCFERLVIWTLLKLLPEPCGIFHPMTQSKWRLWTMHCMP*	KIAIKTVMV,KLLPEPCGI,AIKTVMVCL,LVIWTLLKL,RLVIWTLLK,KTVMVCLPL,IFHPMTQSK,QSKWRLWTM,KWRLWTMHC,EPCGIFHPM,NKIAIKTVM,FERLVIWTL,LLPEPCGIF,SKWRLWTMH,WRLWTMHCM,LPEPCGIFH,RLVIWTLLKL,LVIWTLLKLL,GIFHPMTQSK,CFERLVIWTL,KLLPEPCGIF,IFHPMTQSKW,KWRLWTMHCM,HPMTQSKWRL,TQSKWRLWTM,IAIKTVMVCL,IKTVMVCLPL,FERLVIWTLL,LPLCDCFERL,PEPCGIFHPM	STAD
CTSC	c.315delT	p.F105fs	NSGHFTIIYNQGFEIVLNDYKWFAF[p.F105fs]LSIKKRAAR*	FLSIKKRAA,KWFAFLSIK,WFAFLSIKK,LSIKKRAAR,FAFLSIKKR,YKWFAFLSI,NDYKWFAFL,KWFAFLSIKK,DYKWFAFLSI,WFAFLSIKKR,FLSIKKRAAR	STAD
CTSD	c.267_268insC	p.P89fs	GPIPEVLKNYMDAQYYGEIGIGTPP[p.P89fs]PVLHSRLRHGLLQPVGPLHPLQTAGHRLLDPPQVQQRQVQHLREEWYLV*	GLLQPVGPL,HLREEWYLV,HSRLRHGLL,RLRHGLLQP,QQRQVQHLR,VQHLREEWY,QPVGPLHPL,IGIGTPPPV,LRHGLLQPV,LQTAGHRLL,VQQRQVQHL,RQVQHLREE,RLRHGLLQPV,VLHSRLRHGL,HSRLRHGLLQ,QVQHLREEWY,EIGIGTPPPV,TPPPVLHSRL,HPLQTAGHRL,IGIGTPPPVL,LQPVGPLHPL,RQVQHLREEW,VQHLREEWYL,GEIGIGTPPP	STAD
CTTNBP2	c.1259C>T	p.S420L	TSSTPPLPSNAAPPTAQTPGIAPQN[p.S420L]LQAPPMHSLHSPCANTSLHPGLNPRI	LQAPPMHSL,PQNLQAPPM,NLQAPPMHSL,QTPGIAPQNL,APQNLQAPPM,LQAPPMHSLH	UCEC
CTTNBP2	c.490C>T	p.R164C	LEMEKLQLQALEQEHKKLAARLEEE[p.R164C]CGKNKQVVLMLVKECKQLSGKVIEEA	CGKNKQVVL,KLAARLEEEC,AARLEEECGK	CRC
CUBN	c.1786G>T	p.G596C	EHLRNGRGFTVRWETQQPECGGILT[p.G596C]CPYGSIKSPGYPGNYPPGRDCVWIVV	ILTCPYGSI,LTCPYGSIK,CGGILTCPY,ILTCPYGSIK	LUAD
CUBN	c.8448C>G	p.I2816M	GGGFYATWNTQTLGCGGIFHSDNGT[p.I2816M]MRSPHWPQNFPENSRCSWTAITHKSK	TMRSPHWPQ,IFHSDNGTM,TMRSPHWPQN,IFHSDNGTMR,GIFHSDNGTM,MRSPHWPQNF	KIRP
CUL1	c.1453G>A	p.E485K	DVFQKFYAKMLAKRLVHQNSASDDA[p.E485K]KASMISKLKQACGFEYTSKLQRMFQD	KASMISKLK,DAKASMISK,AKASMISKL,SASDDAKASM	BLCA
CUL7	c.1113G>C	p.L371F	QAQPSFRRSRRFRPRSEFASGNTYA[p.L371F]FYVRDTLQPGMRVRMLDDYEEISAGD	ASGNTYAFY,FASGNTYAF,YAFYVRDTL,FASGNTYAFY,EFASGNTYAF,TYAFYVRDTL,SGNTYAFYVR	LUAD
CUL9	c.5178T>G	p.D1726E	SPRCWPVSPLCYLYHPRKCLPTEFC[p.D1726E]EALDRFSSFYSQSQNHPVLDMGPHRR	CLPTEFCEA,LPTEFCEAL,EALDRFSSF,CEALDRFSS,CLPTEFCEAL,EALDRFSSFY,TEFCEALDRF,CEALDRFSSF	KIRC
CUX1	c.1316_1317insC	p.A439fs	LSGSARRKGKDQPESRRPGSLPAPP[p.A439fs]SFSVAPQPGGAGFQY*	LPAPPSFSV,APQPGGAGF,GSLPAPPSF,QPGGAGFQY,SLPAPPSFSV,FSVAPQPGGA,LPAPPSFSVA	STAD
CWC25	c.1090A>G	p.K364E	EELERKRQEMMENAKWREEERLNIL[p.K364E]ERHAKDEEREQRLEKLDSRDGKFIHR	RLNILERHAK	KIRC
CXCL9	c.366G>C	p.K122N	KKQKNGKKHQKKKVLKVRKSQRSRQ[p.K122N]NKTT*	KSQRSRQNK	LUAD
CXCR4	c.1033G>C	p.E345Q	VSRGSSLKILSKGKRGGHSSVSTES[p.E345Q]QSSSFHSS*	STESQSSSF,SQSSSFHSS,VSTESQSSSF	LUAD
CXXC1	c.468G>C	p.Q156H	MLARGSASPHKSSPQPLVATPSQHH[p.Q156H]HQQQQQIKRSARMCGECEACRRTEDC	HHHQQQQQI	TGCT
CXorf51B	c.127G>A	p.V43I	QTPSTSSTKGRKKGKTPRQRRSRSG[p.V43I]IKGLKTTRKAKRPLRGSSSQKAGETN	RQRRSRSGI,QRRSRSGIK,RSRSGIKGL,RSRSGIKGLK,RQRRSRSGIK,GIKGLKTTRK,RRSRSGIKGL	KIRC
CXorf59	c.593G>T	p.R198M	LLHLSGKMPPGINSSQSLPVDNHEK[p.R198M]MVIQLHLQHSSLLDFLNAQGGCISHV	LPVDNHEKM,HEKMVIQLH,HEKMVIQLHL,LPVDNHEKMV	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
CYP11B1	c.1492C>G	p.R498G	LVRVFLYSLGRNPALFPRPERYNPQ[p.R498G]GWLDIRGSGRNFYHVPFGFGMRQCLG	RYNPQGWLDI	LUAD
CYP19A1	c.1216T>C	p.F406L	DVIDGYPVKKGTNIILNIGRMHRLE[p.F406L]LFPKPNEFTLENFAKNVPYRYFQPFG	IGRMHRLEL,MHRLELFPK,ELFPKPNEF,GRMHRLELF,RMHRLELFPK,LFPKPNEFTL,NIGRMHRLEL,IGRMHRLELF,LELFPKPNEF	TGCT
CYP19A1	c.338G>T	p.S113I	WISGEETLIISKSSSMFHIMKHNHY[p.S113I]ISRFGSKLGLQCIGMHEKGIIFNNNP	HIMKHNHYI,YISRFGSKL,HYISRFGSK,ISRFGSKLG,KHNHYISRF,HYISRFGSKL,IMKHNHYISR,NHYISRFGSK,ISRFGSKLGL,MKHNHYISRF,FHIMKHNHYI	THCA
CYP1A2	c.1447G>A	p.V483M	CIGEVLAKWEIFLFLAILLQQLEFS[p.V483M]MPPGVKVDLTPIYGLTMKHARCEHVQ	LLQQLEFSM,FSMPPGVKV,MPPGVKVDL,QQLEFSMPP,LEFSMPPGV,ILLQQLEFSM,QLEFSMPPGV,SMPPGVKVDL,LQQLEFSMPP,QQLEFSMPPG	BRCA
CYP27A1	c.335C>A	p.P112Q	LYKAKYGPMWMSYLGPQMHVNLASA[p.P112Q]QLLEQVMRQEGKYPVRNDMELWKEHR	ASAQLLEQV,HVNLASAQL,VNLASAQLL,SAQLLEQVM,LASAQLLEQV,HVNLASAQLL,MHVNLASAQL,ASAQLLEQVM	LUAD
CYP2B6	c.1331C>A	p.A444E	ALKKTEAFIPFSLGKRICLGEGIAR[p.A444E]EELFLFFTTILQNFSMASPVAPEDID	IAREELFLF,AREELFLFF,EELFLFFTT,GEGIAREEL,REELFLFFT,GIAREELFLF,IAREELFLFF,EELFLFFTTI,GEGIAREELF,REELFLFFTT	LUAD
CYP2D6	c.1055A>G	p.H352R	VQRRVQQEIDDVIGQVRRPEMGDQA[p.H352R]RMPYTTAVIHEVQRFGDIVPLGVTHM	MGDQARMPY,RMPYTTAVI,QARMPYTTA,ARMPYTTAV,QARMPYTTAV,EMGDQARMPY,RPEMGDQARM,ARMPYTTAVI,RMPYTTAVIH	GBM
CYP4A11	c.553G>T	p.V185F	GLMADSVRVMLDKWEELLGQDSPLE[p.V185F]FFQHVSLMTLDTIMKCAFSHQGSIQV	LGQDSPLEF,GQDSPLEFF,LEFFQHVSL,EFFQHVSLM,SPLEFFQHV,FFQHVSLMTL,DSPLEFFQHV,LLGQDSPLEF,LEFFQHVSLM,LGQDSPLEFF	OV
CYP4B1	c.1302G>T	p.E434D	HIYALHRNSAVWPDPEVFDSLRFST[p.E434D]DNASKRHPFAFMPFSAGPRNCIGQQF	SLRFSTDNA,RFSTDNASK,TDNASKRHPF	CRC
CYP7B1	c.995A>C	p.K332T	YLLRHPEAMAAVRDEIDRLLQSTGQ[p.K332T]TKGSGFPIHLTREQLDSLICLESSIF	QTKGSGFPI,RLLQSTGQTK,GQTKGSGFPI,TKGSGFPIHL	STAD
DAB2IP	c.481G>A	p.E161K	ILGQDYCFEVTTSSGSKCFSCRSAA[p.E161K]KRDKWMENLRRAVHPNKDNSRRVEHI	CFSCRSAAK,FSCRSAAKR,RSAAKRDKW,KCFSCRSAAK,SCRSAAKRDK,CFSCRSAAKR,AKRDKWMENL	BRCA
DACH2	c.1615C>T	p.R539C	TMQKRLKKEKKTKRKLQEALEFESK[p.R539C]CREQVEQALKQATTSDSGLRMLKDTG	FESKCREQV,EALEFESKCR	CRC
DACH2	c.1616G>T	p.R539L	TMQKRLKKEKKTKRKLQEALEFESK[p.R539L]LREQVEQALKQATTSDSGLRMLKDTG	KLREQVEQA,EALEFESKL,FESKLREQV,KLREQVEQAL,EALEFESKLR,QEALEFESKL	LUAD
DBC1	c.646G>A	p.V216I	AIKVTETRTGPLGCNSYDNLDSVSS[p.V216I]ILLQSTESKLHLQGLQIIFPQYLQEK	NLDSVSSIL,ILLQSTESK,NLDSVSSILL,ILLQSTESKL,SILLQSTESK,YDNLDSVSSI	CRC
DBF4B	c.761C>A	p.S254Y	PFLKIEDESRKFRPFHHQFKSFPEI[p.S254Y]YFLGPKDASPFEAPTTLGSMHHTRES	KSFPEIYFL,SFPEIYFLG,QFKSFPEIY,FKSFPEIYF,QFKSFPEIYF,HQFKSFPEIY,FKSFPEIYFL	CRC
DCAF12L2	c.737G>A	p.R246H	RMDPDMFNGSIAWHSEVGLPVYAHI[p.R246H]HPRDVEAIPRASTNPSNRKVRALAFS	PVYAHIHPR,HIHPRDVEA,HIHPRDVEAI,VYAHIHPRDV,LPVYAHIHPR	GBM
DCC	c.1337G>A	p.R446H	AIPSSSVLPSAPRDVVPVLVSSRFV[p.R446H]HLSWRPPAEAKGNIQTFTVFFSREGD	LVSSRFVHL,SSRFVHLSW,VLVSSRFVH,VHLSWRPPA,VLVSSRFVHL,FVHLSWRPPA,HLSWRPPAEA,SSRFVHLSWR,VSSRFVHLSW	LUAD
DCHS1	c.703delC	p.R235fs	LDRENRSHYMLQLEAYDGGSPPRRA[p.R235fs]RPCWT*	SPPRRARPC	STAD
DCHS2	c.6447C>A	p.F2149L	TRENTYVEYSIISGNSQNNFHVETK[p.F2149L]LFHSEYPYKQVGYLVLLHSLDREASA	KLFHSEYPY,LFHSEYPYK,NFHVETKLF,ETKLFHSEY,KLFHSEYPYK,NNFHVETKLF,VETKLFHSEY,TKLFHSEYPY	CRC
DCLK2	c.1646C>A	p.S549Y	HGLSIVHRDIKPENLLVCEYPDGTK[p.S549Y]YLKLGDFGLATVVEGPLYTVCGTPTY	YLKLGDFGL,CEYPDGTKY,TKYLKLGDF,YLKLGDFGLA,KYLKLGDFGL,YPDGTKYLKL,CEYPDGTKYL	CRC
DCLRE1B	c.82T>A	p.F28I	GVLIPHTPIAVDFWSLRRAGTARLF[p.F28I]ILSHMHSDHTVGLSSTWARPLYCSPI	RLFILSHMH,RAGTARLFI,ARLFILSHM,ILSHMHSDHT,GTARLFILSH,RAGTARLFIL,TARLFILSHM,RRAGTARLFI	TGCT

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DCT	c.1595G>A	p.R532Q	LVVMGTLVALVGLFVLLAFLQYRRL[p.R532Q]QKGYTPLMETHLSSKRYTEEA*	RLQKGYTPL,FLQYRRLQK,LQKGYTPLM,QYRRLQKGY,LQYRRLQKG,RLQKGYTPLM,AFLQYRRLQK,LQYRRLQKGY,RRLQKGYTPL	UCEC
DCUN1D4	c.824T>C	p.L275P	EKDQRSLDINTAKCMLGLLLGKIWP[p.L275P]PFPVFHQFLEQSKYKVINKDQWCNVL	LLLGKIWPP,LLGKIWPPF,KIWPPFPVF,PFPVFHQFL,GKIWPPFPV,PPFPVFHQF,LLLGKIWPPF,LGKIWPPFPV,KIWPPFPVFH,GKIWPPFPVF,WPPFPVFHQF	THCA
DDC	c.1297delA	p.I433fs	LVCFRLKGSNKVNEALLQRINSAKK[p.I433fs]STWFHVTSGTSLSCALPSVLARWNLPMCSGPGNTSKSWRPTCCEQRGSRSEASCRNQKLKRDISENWNKKQINIILPSWNSAVCGFPCLSPKLSRGL*	SLSCALPSV,VLARWNLPM,ILPSWNSAV,CGFPCLSPK,CALPSVLAR,CSGPGNTSK,ASCRNQKLK,ALPSVLARW,SWNSAVCGF,SAKKSTWFH,GSRSEASCR,INSAKKSTW,AKKSTWFHV,KKSTWFHVT,FHVTSGTSL,SGTSLSCAL,LSCALPSVL,LKRDISENW,KQINIILPS,SAVCGFPCL,LPSWNSAVC,SLSCALPSVL,VLARWNLPMC,IILPSWNSAV,ILPSWNSAVC,CLSPKLSRGL,RSEASCRNQK,CALPSVLARW,KQINIILPSW,SAKKSTWFHV,SVLARWNLPM,SWRPTCCEQR,STWFHVTSGT,TSLSCALPSV,NIILPSWNSA,NSAVCGFPCL,LPSVLARWNL,WNKKQINIIL,RINSAKKSTW,INSAKKSTWF,WFHVTSGTSL,SEASCRNQKL,KLKRDISENW,CGFPCLSPKL,CEQRGSRSEA	STAD
DDI1	c.824G>A	p.R275Q	VNGHPLKAFVDSGAQMTIMSQACAE[p.R275Q]QCNIMRLVDRRWAGVAKGVGTQRIIG	AEQCNIMRL,SQACAFQCNI,AEQCNIMRLV	CRC
DDX11	c.1126G>A	p.A376T	PYYGSRLAIPAAQLVVLPYQMLLHA[p.A376T]TTRQAAGIRLQDQVVIIDEAHNLIDT	LLHATTRQA,TTRQAAGIR,QMLLHATTR,YQMLLHATT,LHATTRQAA,MLLHATTRQA,LLHATTRQAA,TTRQAAGIRL,YQMLLHATTR,LPYQMLLHAT	TGCT
DDX11	c.622delA	p.K208fs	AERLEQLESGEEELVLAEYESDEEK[p.K208fs]RWRAEWMRMRMTWRKNT*	MRMRMTWRK,RWRAEWMRM,EWMRMRMTW,RAEWMRMRM,WMRMRMTWR,RMRMTWRKN,EEKRWRAEW,AEWMRMRMT,WMRMRMTWRK,RWRAEWMRMR,RMRMTWRKNT,EWMRMRMTWR,KRWRAEWMRM,WRAEWMRMRM,AEWMRMRMTW,DEEKRWRAEW	TGCT
DDX11L2	c.382T>C	p.*128Q	CLFLSLEPPPPRDHISHCLLSAQFH[p.*128Q]QK*	LLSAQFHQK,CLLSAQFHQK	UCS
DDX17	c.488delG	p.G163fs	HPEVARLTPYEVDELRRKKEITVRG[p.G163fs]EMFVLNPCLPSIMLTSHNM*	VLNPCLPSI,SIMLTSHNM,ITVRGEMFV,KEITVRGEM,GEMFVLNPC,EMFVLNPCL,NPCLPSIML,LPSIMLTSH,FVLNPCLPSI,VLNPCLPSIM,EITVRGEMFV,KKEITVRGEM,KEITVRGEMF,GEMFVLNPCL	STAD
DDX39B	c.447_448insT	p.F149fs	LAFQISKEYERFSKYMPNVKVAVFF[p.F149fs]WWSVYQEG*	VAVFFWWSV,AVFFWWSVY,FWWSVYQEG,VKVAVFFWW,KVAVFFWWSV,VAVFFWWSVY	KIRC
DDX56	c.986G>T	p.R329L	FNQGFYDCVIATDAEVLGAPVKGKR[p.R329L]LGRGPKGDKASDPEAGVARGIDFHHV	LGRGPKGDK,KGKRLGRGPK,RLGRGPKGDK	LUAD
DEFA1	c.270G>T	p.W90C	DCYCRIPACIAGERRYGTCIYQGRL[p.W90C]CAFCC*	IYQGRLCAF,IYQGRLCAFC,CIYQGRLCAF	LUAD
DENND2A	c.1496G>T	p.R499L	GRKKRKIPKLVLRINAIYEVRRGKK[p.R499L]LVKRLSQSMESNSGKVTDENSESDSD	RGKKLVKRL,LVKRLSQSM,YEVRRGKKL,KLVKRLSQSM,EVRRGKKLVK,YEVRRGKKLV	LUAD
DENND2A	c.2063G>A	p.R688Q	EVYCIVSRLGCFSLFSRILDEVEKR[p.R688Q]QGISPALVQPLMRSVMEAPFPALGKT	KRQGISPAL,RQGISPALV,EKRQGISPAL,VEKRQGISPA	LUAD
DENND4A	c.1070C>A	p.P357H	LYRYSISGPHVLPIEKHISHFMHKV[p.P357H]HFPSPQRPRILVQLSPHDNLILSQPV	FMHKVHFPS,KVHFPSPQR,HFPSPQRPR,ISHFMHKVH,SHFMHKVHF,KVHFPSPQRP,ISHFMHKVHF,FMHKVHFPSP	CRC
DENND4C	c.3242G>A	p.R1081Q	ESEKSSPAVSRSKTFTGRFKQQTPS[p.R1081Q]QTHKERSTSLSALVRSSPHGSLGSVV	RFKQQTPSQ,KQQTPSQTH,RFKQQTPSQT,KQQTPSQTHK,FKQQTPSQTH	CRC
DENND5B	c.3068G>A	p.G1023E	GELGDTGVMQIPKNLLEMTFECQNL[p.G1023E]EKLTTVQIGHDNSGLLAKWLVDCVMV	FECQNLEKL,LEKLTTVQI,CQNLEKLTTV,MTFECQNLEK	HNSC
DGCR8	c.1552G>A	p.E518K	SVQDAPTKKEFVINPNGKSEVCILH[p.E518K]KYMQRVLKVRPVYNFFECENPSEPFG	ILHKYMQRV,KSEVCILHK,CILHKYMQR,KYMQRVLKV,HKYMQRVLK,SEVCILHKY,LHKYMQRVL,KSEVCILHKY,CILHKYMQRV,ILHKYMQRVL,LHKYMQRVLK,KYMQRVLKVR,SEVCILHKYM,HKYMQRVLKV	THCA

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
DGKB	c.38C>T	p.S13L	MTNQEKWAHLSP[p.S13L]LEFSQLQK YAEYSTKKLKDVLEEFHG	EKWAHLSPL,WAHLSPLEF,LEFSQLQKY,HLSPLEFSQL,KW AHLSPLEF,QEKWAHLSPL,LEFSQLQKYA	BRCA
DHPS	c.147C>A	p.F49L	LPPESTQVRGYDFNRGVNYRALLEA[p.F 49L]LGTTGFQATNFGRAVQQVNAMIE KKL	ALLEALGTT,ALGTTGFQA,NYRALLEAL,LEALGTTGF,EALGT TGFQA,LLEALGTTGF,VNYRALLEAL	CESC
DHRS 4	c.653T>C	p.I218T	LGLNKTLAIELAPRNIRVNCLAPGL[p.I2 18T]TKTSFSRMLWMDKEKEESMKETL RIR	CLAPGLTKT,LTKTSFSRM,GLTKTSFSR,APGLTKTSF,TKTSFS RML,GLTKTSFSRM,LTKTSFSRML,LAPGLTKTSF,TKTSFSR MLW	LIHC
DHTK D1	c.1229G>A	p.R410 Q	DIGKLVGCAIIHVNGDSPEEVVRAT[p.R 410Q]QLAFEYQRQFRKDVIIDLLCYRQ WGH	TQLAFEYQR,VVRATQLAF,RATQLAFEY,EVVRATQLA,EEV VRATQL,ATQLAFEYQR,VVRATQLAFE,VRATQLAFEY,QLA FEYQRQF,EVVRATQLAF,EEVVRATQLA	CRC
DHX9	c.119T>G	p.V40G	RKMTPSYEIRAVGNKNRQKFMCEVQ[p .V40G]GEGYNYTGMGNSTNKKDAQS NAARDF	GEGYNYTGM,FMCEVQGEGY,CEVQGEGYNY	LUSC
DIAPH 2	c.361G>A	p.E121 K	ERSLNLSEKEVLDLFEKMMEDMNLN[p. E121K]KEKKAPLRNKDFTTKREMVVQY ISAT	MMEDMNLNK,LNKEKKAPL,KMMEDMNLNK,KEKKAPLR NK,NLNKEKKAPL	UCEC
DICER 1	c.5113G>A	p.E170 5K	KAYLLQAFTHASYHYNTITDCYQRL[p.E 1705K]KFLGDAILDYLITKHLYEDPRQH SPG	RLKFLGDAI,ITDCYQRLK,LKFLGDAIL,ITDCYQRLKF,RLKFLG DAIL,TITDCYQRLK,KFLGDAILDY,YQRLKFLGDA	CLL
DIRAS 1	c.235G>T	p.G79C	VCTLQITDTTGSHQFPAMQRLSISK[p.G 79C]CHAFILVFSVTSKQSLEELGPIYKLI	SISKCHAFI,RLSISKCHA,ISKCHAFIL,LSISKCHAF,MQRLSISK C,KCHAFILVF,SISKCHAFIL,ISKCHAFILV,LSISKCHAFI,RLSIS KCHAF,MQRLSISKCH,SKCHAFILVF	KIRC
DIS3	c.2339G>A	p.R780 K	CSGMDNDFHHYGLASPIYTHFTSPI[p.R 780K]KRYADVIVHRLLAVAIGADCTYPE LT	YTHFTSPIK,HFTSPIKRY,FTSPIKRYA,SPIKRYADV,IKRYADV IV,KRYADVIVH,YTHFTSPIKR,IYTHFTSPIK,SPIKRYADVI,TH FTSPIKRY,IKRYADVIVH	MM
DISP1	c.2194_219 5GG>TT	p.G732 L	EKVLPCIVIKFRYLWLFWFLALTVG[p.G 732L]LAYIVCINPKMKLPSLELSEFQVFR SS	FLALTVGLA,ALTVGLAYI,LTVGLAYIV,WFLALTVGL,LALTV GLAY,FLALTVGLAY,ALTVGLAYIV,LAYIVCINPK,FWFLALTV GL,LALTVGLAYI	SKCM
DISP1	c.2287C>T	p.R763 C	INPKMKLPSLELSEFQVFRSSHPFE[p.R7 63C]CYDAEYKKLFMFERVHHGEELHM PIT	RSSHPFECY,HPFECYDAE,CYDAEYKKLF,HPFECYDAEY,FRS SHPFECY	CRC
DISP2	c.3062T>C	p.F102 1S	VAGTVLLTVGLLVLLEWQLNTAEAL[p.F 1021S]SLSASVGLSVDFTVNYCISYHLCP HP	NTAEALSLS,EALSLSASV,LNTAEALSL,AEALSLSAS,LSLSAS VGL,ALSLSASVGL,SLSASVGLSV,QLNTAEALSL,NTAEALSL SA,WQLNTAEALS,AEALSLSASV	KIRC
DKK2	c.689G>A	p.R230 H	KPVLHQGEVCTKQRKKGSHGLEIFQ[p. R230H]HCDCAKGLSCKVWKDATYSSK ARLHV	EIFQHCDCA,FQHCDCAKGL,LEIFQHCDCA	CRC
DLC1	c.1049C>T	p.A350 V	LATQEPTDNQVRLRKRKEIREDRDR[p. A350V]VRLDSMVLLIMKLDQLDQDIEN ALST	RVRLDSMVL,RDRVRLDSM,VRLDSMVLL,REDRDRVRL,RV RLDSMVLL,EIREDRDRVR,KEIREDRDRV	CRC
DLC1	c.2222G>C	p.S741 T	ISALNGNRINVPMVRKRSVSNSTQT[p. S741T]TSSSSQSETSSAVSTPSPVTRTRS LS	RSVSNSTQTT	BLCA,PR AD,TGCT ,THCA
DLC1	c.666G>T	p.E222 D	ISLSEIKDAPKVNAVDTLNVKDIAP[p.E2 22D]DKQLLNSAVIAQQRRKPDPPKDE NER	NVKDIAPDK	CRC
DLEU7	c.248C>T	p.A83V	RARPGPGREERGGGVGTRSRRTAAR[p. A83V]VNSPEEEVVRGAEGGAELLPFPR DRG	RSRRTAARV,RTAARVNSP,RSRRTAARVN,RTAARVNSPE	ACC
DLG2	c.1871C>T	p.S624 L	KRRVERKERARLKTVKFNAKPGVID[p.S 624L]LKGSFNDKRKKSFIFSRKFPFYKNK E	GVIDLKGSF,NAKPGVIDLK,DLKGSFNDKR	UCEC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
DLGAP3	c.1130delG	p.G377fs	GLLGPETKAKARTYHYLQVPQDDWG[p.G377fs]VTPPVARMGRSPAAGCGAAATSKPWGMRRAETQTAAPRHLPKQSPDASPPVAPPAWTRPGSTAVSHPGSTPGAPSLATAVPSPLDSSAMS*	WTRPGSTAV,TAAPRHLPK,ATSKPWGMR,VARMGRSPA,TSKPWGMRR,PVAPPAWTR,QVPQDDWGV,QSPDASPPV,STPGAPSLA,SPAAGCGAA,KPWGMRRAE,VPSPLDSSA,ARMGRSPAA,RMGRSPAAG,GAAATSKPW,MRRAETQTA,RRAETQTAA,TQTAAPRHL,KQSPDASPP,GSTPGAPSL,LATAVPSPL,SPPVAPPAW,LQVPQDDWGV,KQSPDASPPV,SLATAVPSPL,QTAAPRHLPK,ATSKPWGMRR,VARMGRSPAA,TSKPWGMRRA,GMRRAETQTA,RAETQTAAPR,VSHPGSTPGA,DWGVTPPVAR,VTPPVARMGR,DASPPVAPPA,SPAAGCGAAA,KPWGMRRAET,VPSPLDSSAM,WGVTPPVARM,CGAAATSKPW,MRRAETQTAA	STAD
DLL3	c.952G>C	p.D318H	PRSFECTCPRGFYGLRCEVSGVTCA[p.D318H]HGPCFNGGLCVGGADPDSAYICHCPP	VTCAHGPCF,CEVSGVTCAH,GVTCAHGPCF	BLCA
DMBT1	c.4562G>T	p.R1521L	SRASTAGSESTLALRLVNGGDRCRG[p.R1521L]LVEVLYQGSWGTVCDDYWDTNDANVV	GLVEVLYQGS,RCRGLVEVLY	LUAD
DMD	c.5316G>C	p.K1772N	DHCRKLVEPQISELNHRFAAISHRI[p.K1772N]NTGKASIPLKELEQFNSDIQKLLEPL	ISHRINTGK,RINTGKASI,NTGKASIPL,AISHRINTGK,NTGKASIPLK,HRINTGKASI	BRCA
DMD	c.9584G>A	p.R3195H	NVPLCVDMCLNWLLNVYDTGRTGRI[p.R3195H]HVLSFKTGIISLCKAHLEDKYRYLFK	TGRTGRIHV,HVLSFKTGI,TGRIHVLSF,TGRIHVLSFK,RTGRIHVLSF,RIHVLSFKTG,IHVLSFKTGI	CRC
DMPK	c.131G>A	p.R44H	AGVGPGLPGAGAPARPSPGRPPGAG[p.R44H]HLRTGPGQVRGRLLAVGPKSRVFQSV	HLRTGPGQV,HLRTGPGQVR	CESC
DMRT1	c.133T>A	p.S45T	PGVPPQGRAGGFGKASGALVGAASG[p.S45T]TSAGGSSRGGGSGSGASDLGAGSKKS	ALVGAASGT,GTSAGGSSR	ACC
DMRT2	c.317C>G	p.T106S	RGGPQPRPPLAPQASPAGTGPRERC[p.T106S]SPAGGGAEPRKLSRTPKCARCRNHGV	GPRERCSPA,GPRERCSPAG	KIRP
DMXL2	c.7236C>A	p.D2412E	GGGVKLVVKPRRQSENISAPPVLSE[p.D2412E]EIDKHRRRFNMRMLVPGRPVKDATPP	EEIDKHRRRF	MM
DNAH10	c.5558G>T	p.C1853F	GAPAGPAGTGKTETTKDLAKALGLL[p.C1853F]FVVTNCGEGMDYRAVGKIFSGLAQCG	KALGLLFVV,LAKALGLLF,AKALGLLFV,LAKALGLLFV,FVVTNCGEGM,DLAKALGLLF,AKALGLLFVV	THCA
DNAH10	c.5663G>A	p.R1888Q	DYRAVGKIFSGLAQCGAWGCFDEFN[p.R1888Q]QIDASVLSVISSQIQTIRNALIHQLT	QIDASVLSV,EFNQIDASV,DEFNQIDAS,NQIDASVLSV,DEFNQIDASV	UCEC
DNAH14	c.4099C>T	p.R1367C	QDIGPPAVKMLISAEGEGLVLPKKI[p.R1367C]CVRSAVEQWLVNVEKSMFDVLKKERY	KKICVRSAV,CVRSAVEQW,CVRSAVEQWL,LVLPKKICVR,LPKKICVRSA	UCEC
DNAH3	c.10099G>C	p.E3367Q	LNLRIKYIIDHFTLSIYNNVCRSLF[p.E3367Q]QKDKLLFSLLLTIGIMKQKKEITEEV	SLFQKDKLL,NVCRSLFQK,LFQKDKLLF,QKDKLLFSL,FQKDKLLFSL,SLFQKDKLLF	CESC
DNAH5	c.11465G>T	p.R3822L	QKLEISAETEVQINSAREEYRPVAT[p.R3822L]LGSILYFLITEMRLVNEMYQTSLRQF	VATLGSILY,TLGSILYFL,ATLGSILYF,RPVATLGSI,EEYRPVATL,PVATLGSILY,ATLGSILYFL,TLGSILYFLI,RPVATLGSIL,REEYRPVATL,VATLGSILYF	LUAD
DNAH5	c.2225G>A	p.R742Q	LFRETECMAQMGLEVSPLATSLFQK[p.R742Q]QDRYKRNFSNMKMMLAEYQRVKSKIP	LFQKQDRYK,SLFQKQDRY,KQDRYKRNF,SLFQKQDRYK,TSLFQKQDRY,LFQKQDRYKR,QKQDRYKRNF	SKCM
DNAH5	c.2945G>A	p.R982H	ELLSHFNHQNMDALLKVTRNTLEAI[p.R982H]HKRIHSSHTINFRDSNSASNMKQNSL	NTLEAIHKR,AIHKRIHSSH,NTLEAIHKRI,HKRIHSSHTI	CRC
DNAH5	c.5389C>G	p.Q1797E	TIELDKPVMAEGNVEVWLNSLLEES[p.Q1797E]ESSLHLVIRQAAANIQETGFQLTEFL	ESESSLHLV,LLEESESSL,ESSLHLVIR,EESESSLHL,SESSLHLVI,SLLEESESSL,LEESESSLHL,EESESSLHLV	HNSC
DNAH5	c.671G>A	p.R224Q	FLSSLEGFVNVLSGAQESLKEKVNL[p.R224Q]QKCDILELKTLKEPTDYLTLANNPET	LQKCDILEL,NLQKCDILEL,SLKEKVNLQK,LQKCDILELK	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
DNAH5	c.9590G>A	p.R3197Q	HVTPKSYLSFIQGYKFIYGEKHVEV[p.R3197Q]QTLANRMNTGLEKLKEASESVAALSK	EKHVEVQTL,HVEVQTLANR,GEKHVEVQTL,VEVQTLANRM	OV
DNAH5	c.9706G>A	p.D3236N	KEASESVAALSKELEAKEKELQVAN[p.D3236N]NKADMVLKEVTMKAQAAEKVKAEVQK	ANNKADMVLK,QVANNKADMV,LQVANNKADM,KELQVANNKA	SKCM
DNAH7	c.8882G>A	p.R2961Q	LCKGRDIPCSDDCSLMGTLGEAVTI[p.R2961Q]QTWNIAGLPSDSFSIDNGIIIMNARR	IQTWNIAGL,GEAVTIQTW,TIQTWNIAGL,EAVTIQTWNI	UCEC
DNAH9	c.4639G>A	p.D1547N	LESIFTGSEDIRAQLPQDSKRFEGI[p.D1547N]NIDFKELAYDAQKIPNVVQTTNKPGL	NIDFKELAY,RFEGINIDF,SKRFEGINI,RFEGINIDFK,INIDFKELAY,KRFEGINIDF	CRC
DNAH9	c.8979C>G	p.S2993R	KFPAIVNCTAIHWFHEWPQQALESV[p.S2993R]RLRFLQNTEGIEPTVKQSISKFMAFV	SVRLRFLQN,RLRFLQNTE,QALESVRLR,QQALESVRL,ALESVRLRF,LESVRLRFL,SVRLRFLQNT,RLRFLQNTEG,QALESVRLRF	LUAD
DNAI2	c.691G>T	p.V231L	PNKPELALKPSSPLVTLEFNPKDSH[p.V231L]LLLGGCYNGQIACWDTRKGSLVAELS	NPKDSHLLL,SHLLLGGCY,LEFNPKDSHL	LUAD
DNAJC1	c.578delA	p.K193fs	AVVWSIYLEKQLDELLSRKKREKKK[p.K193fs]RLAARVWMYQNSVLQKKMKDC*	RVWMYQNSV,RLAARVWMY,MYQNSVLQK,VWMYQNSVL,REKKKRLAA,KKRLAARVW,KRLAARVWM,WMYQNSVLQ,WMYQNSVLQK,KKRLAARVWM,RVWMYQNSVL,MYQNSVLQKK,KRLAARVWMY,YQNSVLQKKM,KKKRLAARVW,ARVWMYQNSV	STAD
DNAJC10	c.239T>A	p.I80K	FKKLALKLHPDKNPNNPNAHGDFLK[p.I80K]KNRAYEVLKDEDLRKKYDKYGEKGLE	NAHGDFLKK,KNRAYEVLK,LKKNRAYEV,KKNRAYEVL,FLKKNRAYEV,GDFLKKNRAY,LKKNRAYEVL	MM
DNAJC12	c.404G>A	p.R135K	DLMLEESDKTHTTKMENEECNEQRE[p.R135K]KKKEELASTAEKTEQKEPKPLEKSVS	EQREKKKEEL,KKKEELASTA	MM
DNAJC13	c.3742G>A	p.E1248K	TPRLQSNTRALYQYCPIPIINYPQL[p.E1248K]KNELFCNIYYLKQLCDTLRFPDWPIK	PIINYPQLK,KNELFCNIY,YPQLKNELF,LKNELFCNI,QLKNELFCNI,NYPQLKNELF,KNELFCNIYY,INYPQLKNEL,LKNELFCNIY	UCEC
DNAJC24	c.181G>A	p.E61K	LMYHPDKQSTDVPAGTVEECVQKFI[p.E61K]KIDQAWKILGNEETKREYDLQRCEDD	KFIKIDQAW,FIKIDQAWK,IKIDQAWKI,FIKIDQAWKI,KFIKIDQAWK,QKFIKIDQAW,IKIDQAWKIL	CRC
DNASE1L1	c.634G>A	p.D212N	CASLTKKRLDKLELRTEPGFHWVIA[p.D212N]NGEDTTVRASTHCTYDRVVLHGERCR	VIANGEDTTV	CESC
DNM2	c.1134G>C	p.E378D	TLELSGGARINRIFHERFPFELVKM[p.E378D]DFDEKDLRREISYAIKNIHGVRTGLF	LVKMDFDEK,FPFELVKMDF	LIHC
DNM2	c.2371_2372insC	p.P791fs	QRRPVSSIHPPGRPPAVRGPTPGPP[p.P791fs]PDSCSRGGSSLLLGAPNPIPAWTPERVCQQ*	LLLGAPNPI,CSRGGSSLL,SRGGSSLLL,NPIPAWTPE,IPAWTPERV,SLLLGAPNPI,LLGAPNPIPA,CSRGGSSLLL,NPIPAWTPER,LGAPNPIPAW	STAD
DNMBP	c.232A>C	p.T78P	SSFVEIVTIPSLKEGERLFVCICEF[p.T78P]PSQELDNLPLHRGDLVILDGIPTAGW	FPSQELDNL	KIRC
DNMT1	c.1294G>A	p.E432K	LTCFSVYCKHGHLCPIDTGLIEKNI[p.E432K]KLFFSGSAKPIYDDDPSLEGGVNGKN	GLIEKNIKL,KLFFSGSAK,IEKNIKLFF,IKLFFSGSA,NIKLFFSGSA,GLIEKNIKLF	CRC
DNMT1	c.151G>A	p.E51K	RRLKDLERDSLTEKECVKEKLNLLH[p.E51K]KFLQTEIKNQLCDLETKLRKEELSEE	KLNLLHKFL,KEKLNLLHK,EKLNLLHKF,LLHKFLQTEI,KEKLNLLHKF	UCEC
DNMT1	c.2984G>A	p.R995Q	PEHYRKYSDYIKGSNLDAPEPYRIG[p.R995Q]QIKEIFCPKKSNGRPNETDIKIRVNK	QIKEIFCPK,RIGQIKEIF,GQIKEIFCPK,QIKEIFCPKK,APEPYRIGQI,YRIGQIKEIF	TGCT
DNMT1	c.4591G>C	p.E1531Q	RHNHWAGLYGRLEWDGFFSTTVTNP[p.E1531Q]QPMGKQGRVLHPEQHRVVSVRECARS	VTNPQPMGK,TTVTNPQPM,QPMGKQGRV,TVTNPQPMGK,QPMGKQGRVL,STTVTNPQPM	CRC
DNMT3A	c.2207G>A	p.R736H	NDLSIVNPARKGLYEGTGRLFFEFY[p.R736H]HLLHDARPKEGDDRPFFWLFENVVAM	HLLHDARPK,FYHLLHDAR,FEFYHLLHD,EFYHLLHDAR,FEFYHLLHDA	LAML

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
DNMT3A	c.2644C>T	p.R882C	DILWCTEMERVFGFPVHYTDVSNMS[p.R882C]CLARQRLLGRSWSVPVIRHLFAPLKE	VSNMSCLAR,NMSCLARQR,DVSNMSCLA,YTDVSNMSCL,NMSCLARQRL,CLARQRLLGR,DVSNMSCLAR,SNMSCLARQR	LAML
DNMT3A	c.2645G>A	p.R882H	DILWCTEMERVFGFPVHYTDVSNMS[p.R882H]HLARQRLLGRSWSVPVIRHLFAPLKE	YTDVSNMSH,VSNMSHLAR,MSHLARQRL,NMSHLARQR,DVSNMSHLA,YTDVSNMSHL,HLARQRLLGR,MSHLARQRLL,DVSNMSHLAR,SNMSHLARQR,NMSHLARQRL	LAML
DNMT3B	c.274C>T	p.R92W	TQDLTGDGDGEDGDGSDTPVMPKLF[p.R92W]WETRTRSESPAVRTRNNNSVSSRERH	VMPKLFWET,KLFWETRTR,MPKLFWETR,TPVMPKLFW,VMPKLFWETR	CRC
DOCK1	c.2590G>A	p.E864K	SKMFTEFILNVPMGLLTIQKLYCLI[p.E864K]KIVHSDLFTQHDCREILLPMMTDQLK	KLYCLIKIV,IQKLYCLIK,IKIVHSDLF,CLIKIVHSDL,TIQKLYCLIK,LIKIVHSDLF,IQKLYCLIKI	CRC
DOCK10	c.5489C>T	p.A1830V	NENILVEQLYMCVEFLWKSERYELI[p.A1830V]VDVNKPIIAVFEKQRDFKKLSDLYYD	LIVDVNKPI,ELIVDVNKPI,WKSERYELIV,SERYELIVDV	CRC
DOCK11	c.505C>G	p.Q169E	FEIDEDCEKDEDSSSLCSQKGGVIK[p.Q169E]EGWLHKANVNSTITVTMKVFKRRYFY	VIKEGWLHKA,GVIKEGWLHK,KEGWLHKANV	TGCT
DOCK3	c.3547C>T	p.R1183C	ELFSLLTQLFGPYPSLLEKVEQETW[p.R1183C]CETGISFVTSVTRLMERLLDYRDCMK	TWCETGISF,QETWCETGI,VEQETWCET,CETGISFVT,ETWCETGISF,CETGISFVTS	CRC
DOCK5	c.529G>A	p.E177K	IDHGNRMLGLDLVVRDDNGNILDPD[p.E177K]KTSTIALFKAHEVASKRIEEKIQEEK	KTSTIALFK,ILDPDKTSTI,KTSTIALFKA,DPDKTSTIAL	CRC
DOCK8	c.3332delT	p.L1111fs	TLISMRLEFLRILCSHEHYLNLNLF[p.L1111fs]L*	HYLNLNLFL	KICH
DOCK8	c.531_532insG	p.A177fs	HKTLPKQTFESETLECSEPAAQAGP[p.A177fs]PPLKRAVRRVWERPRHCL*	AQAGPPPLK,RAVRRVWER,GPPPLKRAV,AAQAGPPPL,LKRAVRRVW,AAQAGPPPLK,AVRRVWERPR,RVWERPRHCL	KIRC
DOK5	c.820C>T	p.R274W	KMSERAASLSTMVPLPRSAYWQHIT[p.R274W]WQHSTGQLYRLQDVSSPLKLHRTETF	SAYWQHITW,YWQHITWQH,WQHSTGQLY,WQHITWQHS,RSAYWQHITW,YWQHITWQHS,TWQHSTGQLY,WQHITWQHST,ITWQHSTGQL	CRC
DOK7	c.1382G>A	p.G461D	GQTSAGCPSGWLGTRRRGLVMEAPQ[p.G461D]DSEATLPGPAPGEPWEAGGPHAGPPP	APQDSEATL,MEAPQDSEA,MEAPQDSEAT	ACC
DOPEY2	c.3586G>A	p.E1196K	KAGAKLSLVRVDSDKTQASESFSSD[p.E1196K]KEADLELQALTTSRLLKQQRERQEAV	ASESFSSDK,KEADLELQA,QASESFSSDK,KEADLELQAL,SESFSSDKEA	BLCA
DOPEY2	c.6143A>C	p.Y2048S	FEQKAMLLKRQAFAVFSGELDQYHL[p.Y2048S]SLPLIQERLTDNLRVGQTSIVAAQMF	SLPLIQERL,QYHLSLPLI,LSLPLIQER,DQYHLSLPL,GELDQYHLS,HLSLPLIQER,GELDQYHLSL,LDQYHLSLPL,DQYHLSLPLI,LSLPLIQERL	KIRC
DPCR1	c.2302_2304delTTG	p.L768del	NRERTANENTTPSPAQPTENGDRTP[p.L768del]ANEKTTPSLAEPTENGKRTPFANEKTTS	TENGDRTPA	KIRC
DPEP1	c.31G>T	p.V11L	MWSGWWLWPL[p.V11L]LAVCTADFFRDEAERIMRDSPVIDGH	WLWPLLAVC,GWWLWPLLA,WWLWPLLAV,LLAVCTADF,SGWWLWPLL,LAVCTADFF,WPLLAVCTA,WLWPLLAVCT,WSGWWLWPLL,GWWLWPLLAV,LLAVCTADFFR,LLAVCTADFF	BRCA
DPP10	c.547G>A	p.V183I	TASYVIYNIHTREVWELNPPEVEDS[p.V183I]ILQYAAWGVQGQQLIYIFENNIYYQP	EVEDSILQY,ILQYAAWGV,VEDSILQYA,NPPEVEDSI,SILQYAAWGV,EVEDSILQYA,PEVEDSILQY,VEDSILQYAA	GBM
DPP6	c.2271G>T	p.L757F	TFTCGSALSPITDFKLYASAFSERY[p.L757F]FGLHGLDNRAYEMTKVAHRVSALEEQ	FSERYFGLH,AFSERYFGL,ASAFSERYF,ERYFGLHGL,SAFSERYFGL,YASAFSERYF,SERYFGLHGL	LUAD
DPP8	c.493G>A	p.G165R	QATLDYGMYSREEELLRERKRIGTV[p.G165R]RIASYDYHQGSGTFLFQAGSGIYHVK	RKRIGTVRI,IGTVRIASY,TVRIASYDY,KRIGTVRIA,GTVRIASYDY,RERKRIGTVR,RIGTVRIASY,TVRIASYDYH,RKRIGTVRIA	CRC
DPY19L1	c.1134C>A	p.F378L	ILKYLTSKIFGIADDAHIGNLLTSK[p.F378L]LFSYKDFDTLLYTCAAEFDFMEKETP	LTSKLFSYK,LLTSKLFSY,GNLLTSKLF,SKLFSYKDF,KLFSYKDFDT,LLTSKLFSYK,NLLTSKLFSY,IGNLLTSKLF	CRC
DPY19L1	c.745G>T	p.V249L	MLLVTHILRATKLYRGSLIALCISN[p.V249L]LFFMLPWQFAQFVLLTQIASLFAVYV	LIALCISNL,CISNLFFML,IALCISNLF,LFFMLPWQF,ALCISNLFF,LCISNLFFM,SNLFFMLPW,SLIALCISNL,ALCISNLFFM,IALCISNLFF,NLFFMLPWQF,LIALCISNLF,ISNLFFMLPW	KIRP

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
DPY19L2	c.628A>G	p.M210V	INAIKRFHLYPEVIIASWYCTFMGI[p.M210V]VNLFGLETKTCWNVTRIEPLNEVQSC	CTFMGIVNL,CTFMGIVNLF,SWYCTFMGIV	PRAD
DQX1	c.1514G>A	p.R505H	ASCEFDCVDEMLTLAAMLTAAPGFT[p.R505H]HPPLSAEEAALRRALEHTDGDHSSLI	APGFTHPPL,MLTAAPGFTH	GBM
DRD5	c.825C>A	p.S275R	RIAQVQIRRISSLERAAEHAQSCRS[p.S275R]RAACAPDTSLRASIKKETKVLKTLSV	HAQSCRSRA,RSRAACAPD,AQSCRSRAA,RSRAACAPDT,RAACAPDTSL,AQSCRSRAAC	GBM
DSG4	c.383G>T	p.R128L	NPRTGEINITSVVDREITPLFLIYC[p.R128L]LALNSRGEDLERPLELRVKVMDINDN	FLIYCLALN,IYCLALNSR,TPLFLIYCL,FLIYCLALNS,ITPLFLIYCL,LIYCLALNSR,TPLFLIYCLA	LUAD
DSP	c.478C>G	p.R160G	CDAYQKRLLQLQEQMRALYKAISVP[p.R160G]GVRRASSKGGGGYTCQSGSGWDEFTK	AISVPGVRR,KAISVPGVR,GVRRASSKG,YKAISVPGV,KAISVPGVRR,LYKAISVPGV	HNSC
DST	c.13228G>T	p.A4410S	TICGKSVERQNKLEEALLFSGQFTD[p.A4410S]SLQALIDWLYRVEPQLAEDQPVHGDI	FTDSLQALI,SLQALIDWL,FSGQFTDSL,GQFTDSLQA,FTDSLQALID,SLQALIDWLY,GQFTDSLQAL,QFTDSLQALI	LUAD
DST	c.5300C>A	p.S1767Y	ITLTRSLSVQDGLDEMLDWMGNVES[p.S1767Y]YLKEQGQVPLNSTALQDIISKNIMLE	WMGNVESYL,MGNVESYLK,YLKEQGQVPL,WMGNVESYLK,DWMGNVESYL,ESYLKEQGQV,LDWMGNVESY	UCEC
DSTN	c.301_302insT	p.F101fs	KDCRYALYDASFETKESRKEELMFF[p.F101fs]FVGTRTSTSEK*	LMFFFVGTR,GTRTSTSEK,ELMFFFVGT,RKEELMFFF,EELMFFFVG,KEELMFFFV,LMFFFVGTRT,ELMFFFVGTR,SRKEELMFFF,FFFVGTRTST,EELMFFFVGT,KEELMFFFVG	STAD
DUOX2	c.2640C>A	p.F880L	SPEDKSRLMFTMYDLDENGFLSKDE[p.F880L]LFTMMRSFIEISNNCLSKAQLAEVVE	FLSKDELFT,GFLSKDELF,LFTMMRSFI,ELFTMMRSF,LSKDELFTM,SKDELFTMM,DELFTMMRS,FLSKDELFTM,ELFTMMRSFI,NGFLSKDELF,LSKDELFTMM,DELFTMMRSF	CRC
DVL2	c.1801delG	p.A601fs	YGGGSASSQHSEGSRSSGSTRSDGG[p.A601fs]QGARGGPRSGPPSPSPAVAVSLSPPAEGAAFGGVGKQVGLAMGALLHPEAQLGVPLISEPTQGSIPMDRPLAWPSPTTP*	ALLHPEAQL,SLSPPAEGA,GAAFGGVGK,GPPSPSPAV,SPPAEGAAF,EPTQGSIPM,IPMDRPLAW,RPLAWPSPT,VGKQVGLAM,KQVGLAMGA,PEAQLGVPL,AQLGVPLIS,GSIPMDRPL,LAWPSPTTP,AEGAAFGGV,AMGALLHPEA,LLHPEAQLGV,AVAVSLSPPA,SLSPPAEGAA,KQVGLAMGAL,LISEPTQGSI,STRSDGGQGA,RSGPPSPSPA,SPSPAVAVSL,HPEAQLGVPL,RPLAWPSPTT,LSPPAEGAAF,GVGKQVGLAM,SEPTQGSIPM,PEAQLGVPLI,AEGAAFGGVG	CRC
DVL2	c.197T>G	p.V66G	GDFKSVLQRPAGAKYFFKSMDQDFG[p.V66G]GVKEEISDDNARLPCFNGRVVSWLVS	SMDQDFGGV,KSMDQDFGGV,SMDQDFGGVK	GBM
DYNC2H1	c.2649G>T	p.E883D	KEWIVIGQVDMEALVEKHLFTVHDW[p.E883D]DKNFKALKIKGKEVERLPSAVKVDCL	HLFTVHDWDK,TVHDWDKNFK,HDWDKNFKAL	UCEC
DYRK1B	c.1633delC	p.Q545fs	DVPHKTHQAPASASSLPGTGAQLPP[p.Q545fs]SPDTLVVPHHQPHHHPRS*	HHQPHHHPR,LVVPHHQPH,SPDTLVVPH,LPPSPDTLV,QLPPSPDTLV,AQLPPSPDTL,LPPSPDTLVV	STAD
DYRK4	c.1402delA	p.K468fs	TASRRQTFFDSKGFPKNITNNRGKK[p.K468fs]DTQIPRTSRWC*	TQIPRTSRW,DTQIPRTSR,RGKKDTQIPR	STAD
DZIP3	c.964A>C	p.M322L	NLKYPGENDQSFSGKKCLKEGCTGD[p.M322L]LVRMLQCDVPGIVKILFEVVRKDEYI	KEGCTGDLV,CLKEGCTGDL	LUAD
E2F7	c.272T>G	p.I91S	PITPVKFVDRQQAEPWTPTANLKML[p.I91S]SSAASPDIRDREKKKGLFRPIENKDD	NLKMLSSAA,LKMLSSAAS,KMLSSAASP,MLSSAASPDI,LKMLSSAASP	TGCT
EAF2	c.327delA	p.V109fs	CILIINHDTGECRLEKLSSNITVKK[p.V109fs]QELKEAVKFSIVKNNSNNKCGIQPGLPIL*	ITVKKQELK,IVKNNSNNK,KQELKEAVK,KKQELKEAV,QELKEAVKF,KEAVKFSIV,CGIQPGLPI,SIVKNNSNNK,ELKEAVKFSI,KQELKEAVKF,CGIQPGLPIL	STAD
EBAG9	c.559G>A	p.E187K	EEDAAWQAEEVLRQQKLADREKRAA[p.E187K]KQQRKKMEKEAQRLMKKEQNKIGVKL	RAAKQQRKK,KQQRKKMEK,RAAKQQRKKM	CRC
EBF1	c.1058A>G	p.D353G	SYKSKQFCKGTPGRFIYTALNEPTI[p.D353G]GYGFQRLQKVIPRHPGDPERLPKEVI	ALNEPTIGY,PTIGYGFQR,NEPTIGYGF,IGYGFQRLQK,GYGFQRLQKV,TALNEPTIGY,LNEPTIGYGF	TGCT

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
EBPL	c.565C>G	p.L189V	YCWLYLFFFNGVWVLIPGLLLWQSW[p.L189V]VELKKMHQKETSSVKKFQ*	GLLLWQSWV,LLWQSWVEL,WQSWVELKK,LLLWQSWVEL,LLWQSWVELK,WQSWVELKKM	KICH,KIRP,TGCT
EBPL	c.587A>C	p.Q196P	FFNGVWVLIPGLLLWQSWLELKKMH[p.Q196P]PKETSSVKKFQ*	KMHPKETSS,KMHPKETSSV	KICH
ECE2	c.760G>A	p.D254N	DRGVSPCEDFYQFSCGGWIRRNPLP[p.D254N]NGRSRWNTFNSLWDQNQAILKHLLEN	NGRSRWNTF,NPLPNGRSRW	CESC
ECI2	c.164A>G	p.K55R	HMNRTAMRASQKDFENSMNQVKLLK[p.K55R]RDPGNEVKLKLYALYKQATEGPCNMP	LLKRDPGNEV,SMNQVKLLKR	TGCT
ECM1	c.796G>A	p.E266K	EIGYSRCCHCRSHTNRLECAKLVWE[p.E266K]KAMSRFCEAEFSVKTRPHWCCTRQGE	KAMSRFCEA,VWEKAMSRF,LVWEKAMSR,AKLVWEKAM,WEKAMSRFC,KLVWEKAMSR,LVWEKAMSRF,CAKLVWEKAM	BLCA
EDA	c.174G>C	p.L58F	RAGEGNSCLLFLGFFGLSLALHLLT[p.L58F]FCCYLELRSELRRERGAESRLGGSGT	HLLTFCCYL,LTFCCYLEL,SLALHLLTF,TFCCYLELR,LHLLTFCCY,LLTFCCYLEL,SLALHLLTFC,LTFCCYLELR,LSLALHLLTF,ALHLLTFCCY	HNSC
EDNRB	c.1349T>G	p.L450R	SRILKLTLYNQNDPNRCELLSFLLV[p.L450R]WDYIGINMASLNSCINPIALYLVSKR	LSFLLVWDY,LLVWDYIGI,SFLLVWDYI,WDYIGINMA,FLLVWDYIGI,LLSFLLVWDY,CELLSFLLVW,LVWDYIGINM	CRC
EEA1	c.1709delA	p.N570fs	EREDLYAKIQAGEGETAVLNQLQEK[p.N570fs]TIHYRSK*	QLQEKTIHY,QLQEKTIHYR,NQLQEKTIHY	STAD
EEF1A1	c.1294_1295AC>TT	p.T432L	GKPMCVESFSDYPPLGRFAVRDMRQ[p.T432L]LVAVGVIKAVDKKAAGAGKVTKSAQKA	QLVAVGVIK,AVRDMRQLV,FAVRDMRQL,RDMRQLVAV,RQLVAVGVI,QLVAVGVIKA,LVAVGVIKAV,AVRDMRQLVA,RQLVAVGVIK,FAVRDMRQLV	LIHC
EEF1A2	c.1253A>C	p.Y418S	SLKSGDAAIVEMVPGKPMCVESFSQ[p.Y418S]SPPLGRFAVRDMRQTVAVGVIKNVEK	ESFSQSPPL,SPPLGRFAV,SQSPPLGRF,SFSQSPPLGR,VESFSQSPPL,FSQSPPLGRF,SQSPPLGRFA	BLCA,TGCT
EEF1B2	c.127A>G	p.S43G	YLADKSYIEGYVPSQADVAVFEAVS[p.S43G]GPPPADLCHALRWYNHIKSYEKEKAS	EAVSGPPPA,FEAVSGPPP,FEAVSGPPPA	KIRP,PRAD,SKCM
EEF2K	c.2017G>A	p.E673K	TDCDEGGEYDGMQDEPRYMMLAREA[p.E673K]KMLFTGGYGLEKDPQRSGDLYTQAAE	MMLAREAKM,MLAREAKML,YMMLAREAK,AKMLFTGGY,LAREAKMLF,REAKMLFTG,YMMLAREAKM,MMLAREAKML,KMLFTGGYGL,MLAREAKMLF,RYMMLAREAK,EAKMLFTGGY,REAKMLFTGG	BLCA
EFCAB4B	c.793G>C	p.E265Q	MEQQIKSEKEQFLLKDTERFQARSQ[p.E265Q]QLEQKLLCKEQELEQLTQKQKRLEGQ	RFQARSQQL,RSQQLEQKL,SQQLEQKLL,QARSQQLEQK,ERFQARSQQL,FQARSQQLEQ,RSQQLEQKLL	LUAD
EFCAB6	c.1136G>A	p.R379K	NWKQFLTSFHEPQGLQVSSKGPLTK[p.R379K]KNSINSRNESHKENIITKLFRHTEDH	SSKGPLTKK,GPLTKKNSI,VSSKGPLTKK,LTKKNSINSR	BLCA,GBM,PRAD
EFCAB6	c.3004G>A	p.E1002K	DQSKTNYISICKMQEVLEECGCSLT[p.E1002K]KGELTHLLNSWGVSRHDNAINYLDFL	SLTKGELTHL	HNSC
EGFR	c.1786C>T	p.P596S	CTGRGPDNCIQCAHYIDGPHCVKTC[p.P596S]SAGVMGENNTLVWKYADAGHVCHLCH	CVKTCSAGV,VKTCSAGVM,CVKTCSAGVM	GBM
EGFR	c.1787C>T	p.P596L	CTGRGPDNCIQCAHYIDGPHCVKTC[p.P596L]LAGVMGENNTLVWKYADAGHVCHLCH	CVKTCLAGV,GPHCVKTCL,VKTCLAGVM	GBM
EGFR	c.1793G>C	p.G598A	GRGPDNCIQCAHYIDGPHCVKTCPA[p.G598A]AVMGENNTLVWKYADAGHVCHLCHPN	CVKTCPAAV,VKTCPAAVM,AVMGENNTL,AVMGENNTLV,CVKTCPAAVM,AAVMGENNTL	GBM
EGFR	c.1793G>T	p.G598V	GRGPDNCIQCAHYIDGPHCVKTCPA[p.G598V]VVMGENNTLVWKYADAGHVCHLCHPN	CVKTCPAVV,VKTCPAVVM,VVMGENNTLV,CVKTCPAVVM	GBM
EGFR	c.185T>G	p.L62R	KLTQLGTFEDHFLSLQRMFNNCEVV[p.L62R]RGNLEITYVQRNYDLSFLKTIQEVAG	MFNNCEVVR,EVVRGNLEI,VRGNLEITY,RMFNNCEVVR,VVRGNLEITY,CEVVRGNLEI	GBM
EGFR	c.2125G>A	p.E709K	QERELVEPLTPSGEAPNQALLRILK[p.E709K]KTEFKKIKVLGSGAFGTVYKGLWIPE	RILKKTEFK,ILKKTEFKK,QALLRILKK,LRILKKTEF,RILKKTEFKK,NQALLRILKK,LLRILKKTEF	GBM

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
EGFR	c.2156G>C	p.G719A	PSGEAPNQALLRILKETEFKKIKVL[p.G719A]ASGAFGTVYKGLWIPEGEKVKIPVAI	ASGAFGTVY,VLASGAFGT,LASGAFGTV,KIKVLASGA,KVLASGAFG,IKVLASGAF,KKIKVLASG,VLASGAFGTV,ASGAFGTVYK,KIKVLASGAF,LASGAFGTVY,KKIKVLASGA,TEFKKIKVLA	LUAD
EGFR	c.2235_2249delGGAATTAAGAGAAGC	p.ELREA746del	GAFGTVYKGLWIPEGEKVKIPVAIK[p.ELREA746del]TSPKANKEILDEAYVMASVDNPHVCRLLGICLTSTVQLIT	AIKTSPKANK,KVKIPVAIKT,KTSPKANKEI	LUAD
EGFR	c.2303G>T	p.S768I	AIKELREATSPKANKEILDEAYVMA[p.S768I]IVDNPHVCRLLGICLTSTVQLITQLM	MAIVDNPHV,VMAIVDNPH,DEAYVMAIV,LDEAYVMAI,ILDEAYVMAI,VMAIVDNPHV,AIVDNPHVCR,YVMAIVDNPH,DEAYVMAIVD	LUAD
EGFR	c.2512C>A	p.L838M	YLLNWCVQIAKGMNYLEDRRLVHRD[p.L838M]MAARNVLVKTPQHVKITDFGLAKLLG	RLVHRDMAA,DMAARNVLV,MAARNVLVK,LVHRDMAAR,RDMAARNVL,RLVHRDMAAR,DMAARNVLVK,HRDMAARNVL,RDMAARNVLV	KIRC
EGFR	c.2573T>G	p.L858R	LVHRDLAARNVLVKTPQHVKITDFG[p.L858R]RAKLLGAEEKEYHAEGGKVPIKWMAL	KITDFGRAK,HVKITDFGR,FGRAKLLGA,HVKITDFGRA,RAKLLGAEEK	LUAD
EGFR	c.2582T>A	p.L861Q	RDLAARNVLVKTPQHVKITDFGLAK[p.L861Q]QLGAEEKEYHAEGGKVPIKWMALESI	LAKQLGAEEK,KQLGAEEKEY	LUSC
EGFR	c.323G>A	p.R108K	QEVAGYVLIALNTVERIPLENLQII[p.R108K]KGNMYYENSYALAVLSNYDANKTGLK	QIIKGNMYY,LQIIKGNMY,LQIIKGNMYY,KGNMYYENSY	GBM
EGFR	c.754C>T	p.R252C	SPSDCCHNQCAAGCTGPRESDCLVC[p.R252C]CKFRDEATCKDTCPPLMLYNPTTYQM	RESDCLVCC	GBM
EGFR	c.865G>A	p.A289T	CPPLMLYNPTTYQMDVNPEGKYSFG[p.A289T]TTCVKKCPRNYVVTDHGSCVRACGAD	YSFGTTCVK,TTCVKKCPR,GKYSFGTTC,YSFGTTCVKK,KYSFGTTCVK,GTTCVKKCPR,GKYSFGTTCV	GBM
EGFR	c.866C>A	p.A289D	CPPLMLYNPTTYQMDVNPEGKYSFG[p.A289D]DTCVKKCPRNYVVTDHGSCVRACGAD	YSFGDTCVK,DTCVKKCPR,GKYSFGDTC,YSFGDTCVKK,KYSFGDTCVK,GKYSFGDTCV	GBM
EGFR	c.866C>T	p.A289V	CPPLMLYNPTTYQMDVNPEGKYSFG[p.A289V]VTCVKKCPRNYVVTDHGSCVRACGAD	YSFGVTCVK,KYSFGVTCV,VTCVKKCPR,GKYSFGVTC,YSFGVTCVKK,KYSFGVTCVK,GVTCVKKCPR,GKYSFGVTCV	GBM
EGFR	c.910C>T	p.H304Y	VNPEGKYSFGATCVKKCPRNYVVTD[p.H304Y]YGSCVRACGADSYEMEEDGVRKCKKC	VVTDYGSCV,YVVTDYGSCV,VVTDYGSCVR,CPRNYVVTDY	GBM
EGR1	c.27G>C	p.Q9H	MAAAKAEM[p.Q9H]HLMSPLQISDPFGSFPHSPTMDNYPK	AAKAEMHLM,AEMHLMSPL,MHLMSPLQI,MAAAKAEMHL,AAAKAEMHLM,KAEMHLMSPL,EMHLMSPLQI,AEMHLMSPLQ	MM
EGR1	c.994delC	p.P332fs	TSYQSQLIKPSRMRKYPNRPSKTPP[p.P332fs]TNALTLAQWSPVIAASPAPTSSPATSASTQARSPSSAASACATSAAATTSPPTSAPTQAKSPSPATSVEESLPGAMNARGIPRSTCGRRTRKQTKVLWPLRPPPLSLPTRPRLLPLTRPRLLPLIHPRPPPHTHPLCPPPSPLPAPRPTHPLCTVASPPRRWPPRTPLFPLLSRPRSAASLPQLSPTPSAPPQGFRT*	LTLAQWSPV,TLAQWSPVI,AQWSPVIAA,KQTKVLWPL,VIAASPAPT,AMNARGIPR,RLLPLTRPR,RLLPLIHPR,ATSASTQAR,STCGRRTRK,CTVASPPRR,LWPLRPPPL,STQARSPSS,QARSPSSAA,RSPSSAASA,ASACATSAA,KSPSPATSV,RSTCGRRTR,RTRKQTKVL,QTKVLWPLR,PTRPRLLPL,RPRLLPLTR,LTRPRLLPL,LIHPRPPPH,SLPGAMNAR,ESLPGAMNA,SPVIAASPA,SPAPTSSPA,RPPPLSLPT,LPLTRPRLL,RPRLLPLIH,HPRPPPHTH,RPPPHTHPL,SPLPAPRPT,APRPTHPLC,RPTHPLCTV,SLPTRPRLL,SKTPPTNAL,TQARSPSSA,TQAKSPSPA,VEESLPGAM,LSLPTRPRL,CPPPSPLPA,ALTLAQWSPV,TLAQWSPVIA,VLWPLRPPPL,RLLPLTRPRL,GAMNARGIPR,RSTCGRRTRK,KTPPTNALTL,STQARSPSSA,ASACATSAAA,RGIPRSTCGR,CGRRTRKQTK,RTRKQTKVLW,KQTKVLWPLR,KVLWPLRPPP,LTRPRLLPLI,HTHPLCPPPS,ESLPGAMNAR,WSPVIAASPA,TTSPPTSAPT,RPSKTPPTNA,SPAPTSSPAT,APTSSPATSA,SPATSASTQA,SPATSVEESL,LPGAMNARGI,WPLRPPPLSL,LPTRPRLLPL,HPLCPPPSPL,LPAPRPTHPL,APRPTHPLCT,RPTHPLCTVA,LTLAQWSPVI,AQWSPVIAAS,TQARSPSSAA,TQAKSPSPAT,AKSPSPATSV,RKQTKVLWPL,LSLPTRPRLL,EESLPGAMNA	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
EGR2	c.1105G>A	p.E369K	SKTPVHERPYPCPAEGCDRRFSRSD[p.E369K]KLTRHIRIHTGHKPFQCRICMRNFSR	RRFSRSDKL	CLL
EGR2	c.1169G>A	p.R390H	SRSDELTRHIRIHTGHKPFQCRICM[p.R390H]HNFSRSDHLTTHIRTHTGEKPFACDY	RICMHNFSR,HNFSRSDHL,FQCRICMHNF,CMHNFSRSDH,MHNFSRSDHL	CRC
EGR2	c.1189C>A	p.H397N	RHIRIHTGHKPFQCRICMRNFSRSD[p.H397N]NLTTHIRTHTGEKPFACDYCGRKFAR	RNFSRSDNL,RSDNLTTHI,MRNFSRSDNL,FSRSDNLTTH,SRSDNLTTHI	CLL
EHD3	c.130G>A	p.E44K	QTVSEGLKKLYKSKLLPLEEHYRFH[p.E44K]KFHSPALEDADFDNKPMVLLVGQYST	HYRFHKFHS,RFHKFHSPA,FHKFHSPAL,EEHYRFHKF,YRFHKFHSP,RFHKFHSPAL,YRFHKFHSPA,LEEHYRFHKF,EEHYRFHKFH	CRC
EHHADH	c.2112G>T	p.Q704H	LQKYYRQNPDIPQLEPSDYLKKLAS[p.Q704H]HGNPPLKEWQSLAGSPSSKL*	ASHGNPPLK,LASHGNPPL,KLASHGNPPL,LASHGNPPLK	LUAD
EIF1AX	c.26G>A	p.G9D	MPKNKGKG[p.G9D]DKNRRRGKNENESEKRELVFKEDGQE	KGDKNRRRGK	THCA
EIF2C1	c.416G>A	p.R139Q	EVTIPGEGKDRIFKVSIKWLAIVSW[p.R139Q]QMLHEALVSGQIPVPLESVQALDVAM	WLAIVSWQM,WQMLHEALV,AIVSWQMLH,SWQMLHEAL,LAIVSWQML,WLAIVSWQML,IVSWQMLHEA,KWLAIVSWQM,SWQMLHEALV,VSWQMLHEAL,WQMLHEALVS	CRC
EIF3J	c.23C>G	p.A8G	MAAAAAA[p.A8G]GGDSDSWDADAFSVEDPVRKVGGGGT	AAAGGDSDSW	TGCT
EIF4G3	c.23G>A	p.R8H	MNSQPQT[p.R8H]HSPFFQRPQIQPPRATIPNSSPSIRP	QTHSPFFQR,SQPQTHSPF,QPQTHSPFF,SQPQTHSPFF,NSQPQTHSPF	CLL
ELAVL2	c.789G>T	p.L263F	RLDNLLNMAYGVKRFSPMTIDGMTS[p.L263F]FAGINIPGHPGTGWCIFVYNLAPDAD	MTIDGMTSF,TIDGMTSFA,DGMTSFAGI,MTSFAGINI,MTIDGMTSFA,GMTSFAGINI,PMTIDGMTSF	LUAD
ELF3	c.915delC	p.F305fs	DILIHPELNEGLMKWENRHEGVFKF[p.F305fs]CAPRLWPNYGAKRKRTAT*	GVFKFCAPR,RLWPNYGAK,VFKFCAPRL,CAPRLWPNY,YGAKRKRTA,FKFCAPRLW,HEGVFKFCA,RLWPNYGAKR,VFKFCAPRLW,FCAPRLWPNY,EGVFKFCAPR,APRLWPNYGA,GVFKFCAPRL	CRC
ELF4	c.1244C>T	p.S415L	KLTKAVSASSVPSNIHLGVAPVGSG[p.S415L]LALTLQTIPLTTVLTNGPPASTTAPT	GLALTLQTI,GVAPVGSGL,APVGSGLAL,VGSGLALTL,GVAPVGSGLA,LGVAPVGSGL,SGLALTLQTI,LALTLQTIPL	HNSC
ELMOD2	c.422C>T	p.T141M	RKRPYDSDNLQHEELLMKLWNLLMP[p.T141M]MKKLNARISKQWAEIGFQGDDPKTDF	KLWNLLMPM,LWNLLMPMK,MPMKKLNAR,LLMPMKKLNA,KLWNLLMPMK,LWNLLMPMKK,MKKLNARISK,LMPMKKLNAR,MPMKKLNARI,MKLWNLLMPM	CRC
EME1	c.1708G>C	p.D570H	IGPELSRRIYLQMTTLQPHLSLDSA[p.D570H]H*	QPHLSLDSAH	LUSC
EMILIN1	c.79C>G	p.R27G	APRTLWSCYLCCLLTAAAGAASYPP[p.R27G]GGFSLYTGSSGALSPGGPQAQIAPRP	SYPPGGFSL,YPPGGFSLY,AASYPPGGF,SYPPGGFSLY,ASYPPGGFSL,GAASYPPGGF	BLCA
EML6	c.2414A>G	p.K805R	FSADGKCLVSVGLDDFHSIVFWDWK[p.K805R]RGEKIATTRGHKDKIFVVKCNPHHVD	SIVFWDWKR,WDWKRGEKI,HSIVFWDWKR,VFWDWKRGEK	TGCT
EMR1	c.1478G>A	p.R493H	EESESTETTGVAFVSFVGMESVLNE[p.R493H]HFFKDHQAPLTTSEIKLKMNSRVVGG	SVLNEHFFK,MESVLNEHF,ESVLNEHFFK,HFFKDHQAPL,GMESVLNEHF,MESVLNEHFF,NEHFFKDHQA	LUAD
EMR1	c.1892G>A	p.R631Q	SHVGIIISLVCLVLAIATFLLCRSI[p.R631Q]QNHNTYLHLHLCVCLLLAKTLFLAGI	SIQNHNTYL,RSIQNHNTY,IQNHNTYLH,QNHNTYLHL,RSIQNHNTYL,IQNHNTYLHL,CRSIQNHNTY	UCEC
EMR2	c.224C>T	p.S75L	GFSSFSEIITTPMETCDDINECATL[p.S75L]LKVSCGKFSDCWNTEGSYDCVCSPGY	TLLKVSCGK,DINECATLL,LLKVSCGKF,NECATLLKV,ATLLKVSCGK,DINECATLLK,TLLKVSCGKF	CRC
ENAH	c.1541G>T	p.R514L	TPEPTRKPWERTNTMNGSKSPVISR[p.R514L]LDSPRKNQIVFDNRSYDSLHRPKSTP	VISRLDSPR,ISRLDSPRK,SKSPVISRL,VISRLDSPRK,GSKSPVISRL,PVISRLDSPR	LUAD
ENAM	c.1118G>A	p.R373H	PFYRNQQVQRGPRWNFFAWERKQVA[p.R373H]HPGNPVYHKAYPPTSRGNYPNYAGNP	QVAHPGNPV,VAHPGNPVY,KQVAHPGNPV,QVAHPGNPVY,FAWERKQVAH	CRC
ENOX2	c.1066C>T	p.R356W	QFEQIVAVYHSASKQKAWDHFTKAQ[p.R356W]WKNISVWCKQAEEIRNIHNDELMGIR	AQWKNISVW,KAQWKNISV,HFTKAQWKNI,QWKNISVWCK,KAQWKNiSVW,AQWKNISVWC	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ENPEP	c.866T>G	p.F289C	EESVDDKWTRTTFEKSVPMSTYLVC[p.F289C]CAVHQFDSVKRISNSGKPLTIYVQPE	STYLVCCAV,MSTYLVCCA,CAVHQFDSV,LVCCAVHQF,YLVCCAVHQF,MSTYLVCCAV,CAVHQFDSVK	KIRC
ENPP1	c.2213G>A	p.G738E	YQDFRIPLSPVHKCSFYKNNTKVSY[p.G738E]EFLSPPQLNKNSSGIYSEALLTTNIV	NTKVSYEFL,YEFLSPPQL,SYEFLSPPQL,EFLSPPQLNK,KNNTKVSYEF,YEFLSPPQLN	LUAD
ENTPD2	c.611delG	p.G204fs	NFIKYGWVGRWFRPRKGTLGAMDLG[p.G204fs]VPLPRSLLRQPVQLRTEPARSSCISTASTTESTPTASSAMAVTRSSRGCWPAPSRPTASTPAGRGAFPPKCCSGMCTSHHAPWPSGPRTSTAVPGSACQGAVTPTSAEIWFLGSSASPPAPSPDALSMGSSSPQWLGTLWPSLPSSTLWTFCGLRWGCPWPPCSSWRQPQ*	TLGAMDLGV,SLLRQPVQL,WLGTLWPSL,TLWPSLPSS,STLWTFCGL,AVTPTSAEI,ASSAMAVTR,TLWTFCGLR,LWTFCGLRW,RSLLRQPVQ,LLRQPVQLR,AMAVTRSSR,RSSRGCWPA,SSRGCWPAP,RGCWPAPSR,AGRGAFPPK,HAPWPSGPR,STTESTPTA,ESTPTASSA,STPTASSAM,EIWFLGSSA,WPAPSRPTA,APSRPTAST,RPTASTPAG,FPPKCCSGM,WPSGPRTST,APSPDALSM,WPSLPSSTL,LPSSTLWTF,GAMDLGVPL,LGVPLPRSL,ARSSCISTA,MCTSHHAPW,SMGSSSPQW,CGLRWGCPW,TPTSAEIWF,SPQWLGTLW,CPWPPCSSW,AEIWFLGSS,GTLGAMDLGV,FLGSSASPPA,SMGSSSPQWL,TLWPSLPSST,AMDLGVPLPR,SAMAVTRSSR,STLWTFCGLR,QWLGTLWPSL,LWPSLPSSTL,SLPSSTLWTF,RSLLRQPVQL,RTEPARSSCI,RSSCISTAST,SSRGCWPAPS,RTSTAVPGSA,SLLRQPVQLR,TASSAMAVTR,HHAPWPSGPR,STPTASSAMA,TSAEIWFLGS,SSTLWTFCGL,WTFCGLRWGC,LPRSLLRQPV,QPVQLRTEPA,TPTASSAMAV,WPAPSRPTAS,WPSGPRTSTA,VPGSACQGAV,SPPAPSPDAL,ASTPAGRGAF,ESTPTASSAM,LSMGSSSPQW,LGAMDLGVPL,GMCTSHHAPW,CQGAVTPTSA,AEIWFLGSSA,SSSPQWLGTL,TPTSAEIWFL,WPSLPSSTLW,TESTPTASSA,LPSSTLWTFC	STAD
ENTPD7	c.979G>A	p.E327K	HTEHVYRVYVTTFLGFGGNFARQRY[p.E327K]KDLVLNETLNKNRLLGQKTGLSPDNP	GNFARQRYK,RQRYKDLVL,FARQRYKDL,KDLVLNETL,GGNFARQRYK,RQRYKDLVLN,FARQRYKDLV,YKDLVLNETL	CRC
EOMES	c.995delG	p.G332fs	LNPTAHYNVFVEVVLADPNHWRFQG[p.G332fs]ANG*	HWRFQGANG	STAD
EP300	c.3491G>A	p.C1164Y	YKYCSKLSEVFEQEIDPVMQSLGYC[p.C1164Y]YGRKLEFSPQTLCCYGKQLCTIPRDA	SLGYCYGRK,YCYGRKLEF,VMQSLGYCY,QSLGYCYGR,LGYCYGRKL,QSLGYCYGRK,GYCYGRKLEF,PVMQSLGYCY,MQSLGYCYGR	HNSC
EP300	c.4195G>A	p.D1399N	FGMHVQEYGSDCPPPNQRRVYISYL[p.D1399N]NSVHFFRPKCLRTAVYHEILIGYLEY	YLNSVHFFR,NSVHFFRPK,VYISYLNSV,ISYLNSVHF,SYLNSVHFF,RVYISYLNS,YISYLNSVH,RVYISYLNSV,SYLNSVHFFR,YISYLNSVHF,ISYLNSVHFF,LNSVHFFRPK	CESC,HNSC,LUSC
EPB41L3	c.2686G>T	p.A896S	SYSAGDSGDAAAQPAFTGIKGKEGS[p.A896S]SLTEGAKEEGGEEVAKAVLEQEETAA	GSSLTEGAK,IKGKEGSSL,KEGSSLTEGA	LUAD
EPG5	c.1105G>A	p.D369N	KVFSYHRYQRVEMNENALVELKKLF[p.D369N]NAKSEHLHQTLALHSYTSVLSRLQVE	KLFNAKSEH,ELKKLFNAK,VELKKLFNA,KLFNAKSEHL	CRC
EPG5	c.6866G>T	p.R2289L	MALSSLFMEVLMMMNNATIPTAEFL[p.R2289L]LGSIRTWIGQKMHGLVVLPLLTAACQ	LLGSIRTWI,TIPTAEFLL,FLLGSIRTW,FLLGSIRTWI,EFLLGSIRTW,ATIPTAEFLL,AEFLLGSIRT	LUAD
EPHA1	c.332G>T	p.G111V	IYRGEEASRVHVELQFTVRDCKSFP[p.G111V]VGAGPLGCKETFNLLYMESDQDVGIQ	FPVGAGPLG,TVRDCKSFPV,KSFPVGAGPL,FPVGAGPLGC	LUAD
EPHA1	c.550G>A	p.A184T	LVSGSVKLNVERCSLGRLTRRGLYL[p.A184T]TFHNPGACVALVSVRVFYQRCPETLN	YLTFHNPGA,LTRRGLYLT,TRRGLYLTF,LTFHNPGACV,LTRRGLYLTF	GBM
EPHA10	c.2604delC	p.P868fs	ERPYWDMSGQDVIKAVEDGFRLPPP[p.P868fs]GTVLTFCTD*	RLPPPGTVL,GFRLPPPGTV,LPPPGTVLTF,FRLPPPGTVL	STAD
EPHA2	c.1379delC	p.P460fs	NQTEPPKVRLEGRSTTSLSVSWSIP[p.P460fs]RRSRAECGSTRSLTARRETPTATMCAAPRVSP*	ATMCAAPRV,LSVSWSIPR,SVSWSIPRR,GSTRSLTAR,RSRAECGST,STRSLTARR,RSLTARRET,TARRETPTA,SWSIPRRSR,TATMCAAPR,ETPTATMCA,IPRRSRAEC,TPTATMCAA,AECGSTRSL,RRETPTATM,RETPTATMC,SLSVSWSIPR,LSVSWSIPRR,SWSIPRRSRA,RSRAECGSTR,VSWSIPRRSR,PTATMCAAPR,ETPTATMCAA,TATMCAAPRV,RAECGSTRSL,ARRETPTATM,RETPTATMCA,AECGSTRSLT	STAD

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
EPHA3	c.2405C>G	p.T802R	AAYTTRGGKIPIRWTSPEAIAYRKF[p.T802R]RSASDVWSYGIVLWEVMSYGERPYWE	RSASDVWSY,KFRSASDVW,IAYRKFRSA,AYRKFRSAS,EAIAYRKFR,RKFRSASDV,AIAYRKFRSA,KFRSASDVWS,IAYRKFRSAS,RKFRSASDVW,FRSASDVWSY	HNSC
EPHA6	c.2854G>C	p.D952H	TTGGKIPIRWTAPEAIAYRKFSSAS[p.D952H]HAWSYGIVMWEVMSYGERPYWEMSNQ	SSASHAWSY,KFSSASHAW,ASHAWSYGI,HAWSYGIVM,YRKFSSASH,RKFSSASHA,FSSASHAWSY,AYRKFSSASH,ASHAWSYGIV,SASHAWSYGI,RKFSSASHAW,SHAWSYGIVM,HAWSYGIVMW	HNSC
EPHB2	c.1175G>A	p.R392H	SGRGACTRCGDNVQYAPRQLGLTEP[p.R392H]HIYISDLLAHTQYTFEIQAVNGVTDQ	GLTEPHIYI,RQLGLTEPH,LGLTEPHIY,RQLGLTEPHI,QLGLTEPHIY,HIYISDLLAH,TEPHIYISDL	CRC
EPHB6	c.1010G>A	p.R337H	KACQACPRGLYKSSAGNAPCSPCPA[p.R337H]HSHAPNPAAPVCPCLEGFYRASSDPP	HSHAPNPAA	LUAD
EPHB6	c.160delG	p.G54fs	ALEEVLLDTTGETSEIGWLTYPPGG[p.G54fs]GTR*	LTYPPGGGTR	STAD
EPHX1	c.394delC	p.P132fs	ILNRYPHFKTKIEGLDIHFIHVKPP[p.P132fs]SCPQAIPRSPC*	KPPSCPQAI,HVKPPSCPQA,CPQAIPRSPC	STAD
EPHX4	c.845G>A	p.R282Q	TTEDLEAYIYVFSQPGALSGPINHY[p.R282Q]QNIFSCLPLKHHMVTTPTLLLWGEND	HYQNIFSCL,GPINHYQNI,YQNIFSCLP,QNIFSCLPL,YQNIFSCLPL,QNIFSCLPLK,GPINHYQNIF,NHYQNIFSCL	UCEC
EPPK1	c.6044delG	p.G2015fs	FQAMQKQLIEKAEALRLLEVQVATG[p.G2015fs]VSSTHSTTTGSHWKQPTDGAVCTRTSMRSFPTRST*	STTTGSHWK,AVCTRTSMR,TSMRSFPTR,CTRTSMRSF,RTSMRSFPT,SMRSFPTRS,LEVQVATGV,VQVATGVSS,HSTTTGSHW,WKQPTDGAV,GAVCTRTSM,LLEVQVATGV,RTSMRSFPTR,HSTTTGSHWK,STHSTTTGSH,CTRTSMRSFP,SMRSFPTRST,VQVATGVSST,VCTRTSMRSF	STAD
EPPK1	c.7132G>C	p.D2378H	HSHRVPVDVAYRRGYFDEEMNRVLA[p.D2378H]HPSDDTKGFFDPNTHENLTYLQLLQR	EEMNRVLAH,HPSDDTKGF,VLAHPSDDTK,HPSDDTKGFF,DEEMNRVLAH	ACC
EPRS	c.3451G>T	p.V1151L	MYPAYAKWVQSHRDLPIKLNQWCNV[p.V1151L]LRWEFKHPQPFLRTREFLWQEGHSAF	KLNQWCNVL,CNVLRWEFK,NQWCNVLRW,LNQWCNVLR,WCNVLRWEF,KLNQWCNVLR,QWCNVLRWEF,IKLNQWCNVL	LUAD
EPRS	c.4003C>A	p.L1335I	GITNALSEEDKEALIAKCNDYRRRL[p.L1335I]ISVNIRVRADLRDNYSPGWKFNHWEL	RLISVNIRV,RRRLISVNI,DYRRRLISV,RRRLISVNIR,RLISVNIRVR,NDYRRRLISV,YRRRLISVNI	TGCT
ERBB2	c.2264T>C	p.L755S	AFGTVYKGIWIPDGENVKIPVAIKV[p.L755S]SRENTSPKANKEILDEAYVMAGVGSP	VSRENTSPK,IPVAIKVSR,KVSRENTSPK,VSRENTSPKA	BRCA
ERBB2	c.2305G>T	p.D769Y	ENVKIPVAIKVLRENTSPKANKEIL[p.D769Y]YEAYVMAGVGSPYVSRLLGICLTSTV	ILYEAYVMA,YEAYVMAGV,NKEILYEAY,KEILYEAYV,EILYEAYVM,ILYEAYVMAG,ANKEILYEAY,EILYEAYVMA,KEILYEAYVM,SPKANKEILY,YEAYVMAGVG	BRCA
ERBB2	c.2310_2311insGCATACGTGATG	p.774_775insAYVM	AIKVLRENTSPKANKEILDEAYVMA[p.774_775insAYVM]YVMAGVGSPYVSRLLGICLTSTVQLVTQLMPYGCLLD	VMAYVMAGV,YVMAYVMAG,DEAYVMAYV,EAYVMAYVM,LDEAYVMAY,MAYVMAGVG,ILDEAYVMAY,YVMAYVMAGV,EAYVMAYVMA,DEAYVMAYVM	LUAD
ERBB2	c.2326_2327insTCT	p.776_776G>VC	AIKVLRENTSPKANKEILDEAYVMA[p.776_776G>VC]VCVGSPYVSRLLGICLTSTVQLVTQLMP	AVCVGSPYV,MAVCVGSPY,EAYVMAVCV,YVMAVCVGS,DEAYVMAVC,ILDEAYVMAV,MAVCVGSPYV,VMAVCVGSPY,DEAYVMAVCV	LUAD
ERBB2	c.2524G>A	p.V842I	LGSQDLLNWCMQIAKGMSYLEDVRL[p.V842I]IHRDLAARNVLVKSPNHVKITDFGLA	RLIHRDLAA,SYLEDVRLI,LIHRDLAAR,RLIHRDLAAR,YLEDVRLIHR,MSYLEDVRLI	CRC
ERBB2	c.2748G>A	p.M916I	LESILRRRFTHQSDVWSYGVTVWEL[p.M916I]ITFGAKPYDGIPAREIPDLLEKGERL	YGVTVWELI,VTVWELITF,LITFGAKPY,WELITFGAK,TVWELITFGA,SYGVTVWELI,ELITFGAKPY,GVTVWELITF,WELITFGAKP	HNSC
ERBB2	c.929C>A	p.S310Y	PEGRYTFGASCVTACPYNYLSTDVG[p.S310Y]YCTLVCPLHNQEVTAEDGTQRCEKCS	YLSTDVGYC,STDVGYCTLV,YLSTDVGYCT,YNYLSTDVGY,LSTDVGYCTL,VGYCTLVCPL	LUAD
ERBB2	c.929C>T	p.S310F	PEGRYTFGASCVTACPYNYLSTDVG[p.S310F]FCTLVCPLHNQEVTAEDGTQRCEKCS	STDVGFCTL,YLSTDVGFC,NYLSTDVGF,STDVGFCTLV,YLSTDVGFCT,YNYLSTDVGF,LSTDVGFCTL,VGFCTLVCPL	BLCA,BRCA,CESC,STAD
ERBB3	c.273G>A	p.M91I	VLTGHNADLSFLQWIREVTGYVLVA[p.M91I]INEFSTLPLPNLRVVRGTQVYDGKFA	YVLVAINEF,VAINEFSTL,INEFSTLPL,AINEFSTLPL,GYVLVAINEF,EVTGYVLVAI	BLCA

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ERBB3	c.310G>A	p.V104M	WIREVTGYVLVAMNEFSTLPLPNLR[p.V104M]MVRGTQVYDGKFAIFVMLNYNTNSSH	RMVRGTQVY,LPLPNLRMV,LRMVRGTQV,TLPLPNLRMV,NLRMVRGTQV,LRMVRGTQVY	CESC,CRC,STAD
ERBB3	c.310G>T	p.V104L	WIREVTGYVLVAMNEFSTLPLPNLR[p.V104L]LVRGTQVYDGKFAIFVMLNYNTNSSH	RLVRGTQVY,LPLPNLRLV,TLPLPNLRLV,NLRLVRGTQV,LRLVRGTQVY	BLCA
ERBB3	c.889G>T	p.D297Y	LEPNPHTKYQYGGVCVASCPHNFVV[p.D297Y]YQTSCVRACPPDKMEVDKNGLKMCEP	FVVYQTSCV,VVYQTSCVR,YQTSCVRAC,ASCPHNFVVY,FVVYQTSCVR	BLCA
ERC1	c.2075A>G	p.K692R	DLSEKEASLLDLKEHASSLASSGLK[p.K692R]RDSRLKTLEIALEQKKEECLKMESQL	GLKRDSRLK,SLASSGLKR,SSLASSGLKR,SGLKRDSRLK,LKRDSRLKTL	TGCT
ERCC2	c.41A>G	p.Y14C	MKLNVDGLLVYFP[p.Y14C]CDYIYPEQFSYMRELKRTLDAKGHGV	LVYFPCDYI,VYFPCDYIY,LLVYFPCDY,CDYIYPEQF,FPCDYIYPE,LLVYFPCDYI,LVYFPCDYIY,GLLVYFPCDY	BLCA
ERCC2	c.713A>G	p.N238S	LDPKIADLVSKELARKAVVVFDEAH[p.N238S]SIDNVCIDSMSVNLTRRTLDRCQGNL	VVFDEAHSI,EAHSIDNVCI	BLCA
ERCC2	c.934G>A	p.D312N	RLVEGLREASAARETDAHLANPVLP[p.D312N]NEVLQEAVPGSIRTAEHFLGFLRRLL	NPVLPNEVL,LPNEVLQEA,VLPNEVLQEA,LANPVLPNEV,LPNEVLQEAV	ACC
ERCC6	c.2338G>A	p.V780I	SLPDKNEQVLFCRLTDEQHKVYQNF[p.V780I]IDSKEVYRILNGEMQIFSGLIALRKI	FIDSKEVYR,NFIDSKEVY,YQNFIDSKEV,FIDSKEVYRI,KVYQNFIDSK,NFIDSKEVYR,QNFIDSKEVY	CRC
ERCC6L	c.1514G>A	p.R505Q	LVFSQSRQILNIIERLLKNRHFKTL[p.R505Q]QIDGTVTHLLEREKRINLFQQNKDYS	KTLQIDGTV,LQIDGTVTH,LQIDGTVTHL,KNRHFKTLQI	CRC
ERCC6L2	c.1333C>A	p.L445I	LGDTSILDDLFKSHGNSPTQLPKKV[p.L445I]ISGPMEKAKQRPKDFWDILNEQNDES	KVISGPMEK,VISGPMEKAK,SPTQLPKKVI,LPKKVISGPM	UCEC
ERN2	c.884C>A	p.T295K	TQDLGVPVMGVYTWHQDGLRQLPHL[p.T295K]KLARDTLHFLALRWGHIRLPASGPRD	GLRQLPHLK,KLARDTLHF,RQLPHLKLA,QLPHLKLAR,HLKLARDTL,KLARDTLHFL,RQLPHLKLAR,LKLARDTLHF	LUAD
ERRFI1	c.1261G>A	p.A421T	LLPERPPYLDKYEKFFREAEETNGG[p.A421T]TQIQPLPADCGISSATEKPDSKTKMD	AEETNGGTQI	CRC
ESCO1	c.899G>A	p.R300Q	TLPKSPQPSVPEQSDNELEQAGKSK[p.R300Q]QGSILQLCEEIAGEIESDNVEVKKES	KSKQGSILQ,GKSKQGSIL,SKQGSILQL,KSKQGSILQL	CRC
ESF1	c.295delA	p.T99fs	LSDSDSNLSGEDSKALSQKKIKKKK[p.T99fs]PRLKKKSIQKI*	RLKKKSIQK,KIKKKKPRL,KKKKPRLKK,KKKPRLKKK,KPRLKKKSI,LKKKSIQKI,RLKKKSIQKI,KIKKKKPRLK,KKKKPRLKKK	STAD
ESPN	c.1286_1348delCACCCCCACCACCCCCACCCAGCTTCCCCCCGCCACCCCCGCCCCCCAGGCACCCAACTGCCCC	p.PPPPPPSFPPPPPPP GTQLPP430delI	QSYMDMLNPELGLPRGTIGKPTPPP[p.PPPPPPSFPPPPPPPPGTQLPP430del]GYPAPKPPVGPQAADIYMQTKNKLRHVETEALKKELSSCDGHDGLRRQDSSRKPRAFSKQPSTGDYYRQLGRCPGETLAARPGMAHSE	IGKPTPPPGY,KPTPPPGYPA	PAAD
ESPNP	c.1880G>A	p.R627Q	EEEQRWKEEEEARLASMPAWRWDLL[p.R627Q]QKKLEEE	AWRWDLLQK,AWRWDLLQKK,WRWDLLQKKL	GBM
ESPNP	c.191_198delACGCGCGC	p.H64fs	PLYLACQEGHLEVTQYLVQECGADP[p.H64fs]RPRRHDPTARRGADGPQPGHRVVGELHRREPVGAGQRRRHRHALRGEPRPQQGAQLAAAARRGDLG*	GQRRRHRHA,RRRHRHALR,RPRRHDPTA,GPQPGHRVV,QRRRHRHAL,RPQQGAQLA,AAAARRGDL,QQGAQLAAA,GELHRREPV,GQRRRHRHAL,LVQECGADPR,QPGHRVVGEL,EPRPQQGAQL,RPQQGAQLAA,LAAAARRGDL,QQGAQLAAAA	PAAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ESPNP	c.888_950delACCCCCACCCAGCTTCCCCCGCCACCCCCGCCCCCAGGCACCCAACTGCCCCCACCCCCACC	p.296_317PPPPSFPPPPPPPTQLPPPPP>P	QSYMDMLNPELGLPWGTIGKPIPPP[p.296_317PPPPSFPPPPPPPTQLPPPPP>P]SYPSPKPPVGPQAADIYMQTKNKLRHVETEALKKEPSSCDGHDGLRRQDSSRKPRAFSKQPSTGDYYRQLGRCPGETLVARPGMAHRE	IGKPIPPPSY	PAAD
ESRRA	c.655G>A	p.D219N	VNALVSHLLVVEPEKLYAMPDPAGP[p.D219N]NGHLPAVATLCDLFDREIVVTISWAK	GPNGHLPAV,MPDPAGPNGH	HNSC
ESYT1	c.2446C>T	p.R816W	LQVNSLIQTQKSAELAAALLSIYME[p.R816W]WAEDLPLRKGTKHLSPYATLTVGDSS	LLSIYMEWA,ALLSIYMEW,IYMEWAEDL,EWAEDLPLR,MEWAEDLPL,ALLSIYMEWA,YMEWAEDLPL,AALLSIYMEW	BRCA
ESYT3	c.1721C>T	p.S574F	QILPYADLTLEQRFQLDHSGLDSLI[p.S574F]FMRLVLRFLQVEERELGSPYTGPEAL	SLIFMRLVL,FMRLVLRFL,LIFMRLVLR,IFMRLVLRF,DSLIFMRLV,HSGLDSLIF,SGLDSLIFM,GLDSLIFMRL,SLIFMRLVLR,IFMRLVLRFL,SGLDSLIFMR,LIFMRLVLRF,HSGLDSLIFM	LUSC
ETFDH	c.841A>T	p.I281F	LYKKFDLRANCEPQTYGIGLKELWV[p.I281F]FDEKNWKPGRVDHTVGWPLDRHTYGG	WVFDEKNWK,IGLKELWVF	CLL
ETV6	c.1105C>T	p.R369W	YVYQLLSDSRYENFIRWEDKESKIF[p.R369W]WIVDPNGLARLWGNHKNRTNMTYEKM	WIVDPNGLA,KESKIFWIV,IFWIVDPNGL	CRC
EXOC1	c.1762C>T	p.R588C	QHNCGTPLPVSSEKDMIRQMMIKIF[p.R588C]CCIEPELNNLIALGDKIDSFNSLYML	MMIKIFCCI,RQMMIKIFC,QMMIKIFCCI,KIFCCIEPEL,RQMMIKIFCC	UCEC
EXOSC2	c.32G>C	p.R11P	MAMEMRLPVA[p.R11P]PKPLSERLGRDTKKHLVVPGDTITTD	EMRLPVAPK,APKPLSERL,MEMRLPVAP,MEMRLPVAPK,MRLPVAPKPL	KIRP
EXOSC8	c.480delA	p.L160fs	CDLICLDYDGNILDACTFALLAALK[p.L160fs]MYSCLKLL*	KMYSCLKLL,ALKMYSCLK,ALLAALKMY,FALLAALKM,AALKMYSCL,LKMYSCLKL,LLAALKMYSC,ALKMYSCLKL,AALKMYSCLK,LAALKMYSCL,FALLAALKMY,LKMYSCLKLL	STAD
EZH2	c.1529A>G	p.K510R	VDTPPRKKKRKHRLWAAHCRKIQLK[p.K510R]RDGSSNHVYNYQPCDHPRQPCDSSCP	RDGSSNHVY,LKRDGSSNH,KRDGSSNHVY	TGCT
EZH2	c.1922A>T	p.Y641F	LAPSDVAGWGIFIKDPVQKNEFISE[p.Y641F]FCGEIISQDEADRRGKVYDKYMCSFL	FISEFCGEI,QKNEFISEF,SEFCGEIIS,FISEFCGEII,VQKNEFISEF	DLBCL
F10	c.349G>A	p.E117K	TSPCQNQGKCKDGLGEYTCTCLEGF[p.E117K]KGKNCELFTRKLCSLDNGDCDQFCHE	KGKNCELFT,FKGKNCELF,YTCTCLEGFK,CTCLEGFKGK,GFKGKNCELF,KGKNCELFTR	UCEC
F5	c.1277A>T	p.Q426L	DESFTKHTVNPNMKEDGILGPIIRA[p.Q426L]LVRDTLKIVFKNMASRPYSIYPHGVT	ILGPIIRAL,ALVRDTLKI,LVRDTLKIV,RALVRDTLK,IRALVRDTL,ILGPIIRALV,ALVRDTLKIV,IIRALVRDTL,RALVRDTLKI,LVRDTLKIVF	LIHC
F5	c.3995T>C	p.L1332P	LSQTNLSPALGQMPISPDLSHTTLS[p.L1332P]PDFSQTNLSPELSQTNLSPALGQMPL	TLSPDFSQT,SPDFSQTNL,SHTTLSPDF,LSHTTLSPDF	CLL
F8	c.6806C>A	p.S2269Y	NPKEWLQVDFQKTMKVTGVTTQGVK[p.S2269Y]YLLTSMYVKEFLISSSQDGHQWTLFF	YLLTSMYVK,KYLLTSMYV,GVKYLLTSM,GVTTQGVKY,VKYLLTSMY,TTQGVKYLL,KYLLTSMYVK,GVKYLLTSMY,QGVKYLLTSM,VKYLLTSMYV	CRC
FAM104B	c.223G>C	p.D75H	SSSRINIPERASGPEGNLNQIVTEP[p.D75H]HANFPQFLHEGLSKPVYVINWFMSFG	HANFPQFLH,EPHANFPQF,IVTEPHANF,EPHANFPQFL,QIVTEPHANF,TEPHANFPQF	TGCT
FAM105A	c.376C>A	p.H126N	AREWKGETPRNKLMRKAYEELFWRH[p.H126N]NIKCVRQVRRDNYDALRSVLFQIFSQ	ELFWRHNIK,NIKCVRQVR,EELFWRHNI,FWRHNIKCVR,HNIKCVRQVR,NIKCVRQVRR,YEELFWRHNI	KIRC
FAM109A	c.466_474delGGGGGTGGC	p.GGG156del	LSRASFDYLRLVVRELEQQLAAVRG[p.GGG156del]MALPQPQPQSLPLPPSLPSALAPVPSLPSAPAPV	QLAAVRGMA,LAAVRGMAL,QQLAAVRGM,QLAAVRGMAL,EQQLAAVRGM,QQLAAVRGMA	ACC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
FAM111B	c.807delA	p.S269fs	KIYGKQSMVDEVSGKVLEMDISKKK[p.S269fs]HYNRKISIKKLNRMKVPLMKLITRV*	KLNRMKVPL,PLMKLITRV,RMKVPLMKL,ISKKKHYNR,SKKKHYNRK,KHYNRKISI,HYNRKISIK,YNRKISIKK,KISIKKLNR,SIKKLNRMK,LNRMKVPLM,ISIKKLNRM,MKVPLMKLI,KLNRMKVPLM,RMKVPLMKLI,ISIKKLNRMK,ISKKKHYNRK,KHYNRKISIK,HYNRKISIKK,KISIKKLNRM,SIKKLNRMKV,LNRMKVPLMK,KVPLMKLITR,DISKKKHYNR,KKHYNRKISI,KKLNRMKVPL,VPLMKLITRV	PRAD
FAM116A	c.1322delT	p.L441fs	IKQLQKGVQQKRPSEAQSVILRRYF[p.L441fs]WN*	SVILRRYFW	STAD
FAM120B	c.1400C>A	p.P467H	DSEPRQEVPMYTGSEPRQEVPMYTG[p.P467H]HESRQEVPMYTGPESRQEVLIRTDPE	HESRQEVPM,VPMYTGHES,RQEVPMYTGH,HESRQEVPMY	LUAD
FAM126B	c.1145G>A	p.R382H	LSSQPIGTKPSSSSQRGSLRKVATG[p.R382H]HSAKDKETASAIKSSESPRDSVVRKQ	KVATGHSAK,ATGHSAKDK,RKVATGHSA	GBM
FAM127C	c.156C>A	p.F52L	IPFPETFDGDTDRLPEFIVQTSSYM[p.F52L]LVDENTFSNDALKVTFLITRLTGPAL	VQTSSYMLV,MLVDENTFS,YMLVDENTF,FIVQTSSYML,IVQTSSYMLV,SYMLVDENTF	LUAD
FAM135B	c.1933A>C	p.S645R	KGIDQEGKMVLLSLKLTPSEPCDPL[p.S645R]RSTLREPLDIRSSLKDSHTEEQEELS	LRSTLREPL,EPCDPLRSTL	STAD
FAM135B	c.1942C>A	p.L648M	DQEGKMVLLSLKLTPSEPCDPLSST[p.L648M]MREPLDIRSSLKDSHTEEQEELSVLS	TMREPLDIR,LSSTMREPL,STMREPLDIR,EPCDPLSSTM	LUSC
FAM135B	c.2651G>A	p.R884H	GHCLPDGRTENTPGVETKGLNLKIP[p.R884H]HVIALENPRTRSLHRALEETPKGMPK	GLNLKIPHV,HVIALENPR,LKIPHVIAL,GLNLKIPHVI,NLKIPHVIAL,KGLNLKIPHV	CRC
FAM135B	c.720G>C	p.W240C	GYCKPTSSEGSFYITSENCMQHAHK[p.W240C]CHRDLCLLLLHAYRGLRLHFLVIMRD	MQHAHKCHR,CMQHAHKCHR	LUAD
FAM135B	c.855G>T	p.Q285H	LVIMRDIPELPHTELEALAVEETLS[p.Q285H]HLCSELQMLNNPEKIAEQISKDLAWL	TLSHLCSEL,HLCSELQML,SHLCSELQM,ETLSHLCSEL,LAVEETLSHL,LSHLCSELQM	LUSC
FAM151A	c.351delC	p.P117fs	LEADVNVEGLGTANETGVPIMAHPP[p.P117fs]LSTVTTHWSSGWTLCWALPKRASNWTSRTSRQWAPPWTSCGS*	IMAHPPLST,MAHPPLSTV,WTLCWALPK,TSRTSRQWA,RTSRQWAPP,TLCWALPKR,SNWTSRTSR,VPIMAHPPL,THWSSGWTL,SGWTLCWAL,TSRQWAPPW,RQWAPPWTS,WSSGWTLCW,IMAHPPLSTV,GWTLCWALPK,WTLCWALPKR,ASNWTSRTSR,HWSSGWTLCW,RTSRQWAPPW,TTHWSSGWTL,WSSGWTLCWA,MAHPPLSTVT,SSGWTLCWAL,WALPKRASNW,RQWAPPWTSC,PPLSTVTTHW	STAD
FAM155A	c.284A>G	p.Q95R	KEHQQQQRQQQQQQQQQRQRQQQQQQ[p.Q95R]RRRQQEPSWPALLASMGESSPAAQAH	RQRQQQQQR,RRRQQEPSW,RQRQQQQQRR	TGCT
FAM155B	c.472G>A	p.E158K	VCGGVPEPTGLDAACTKLQSLQRLF[p.E158K]KPTTPAPPLRPPDSLSRAPAEFPSAK	RLFKPTTPA,LQSLQRLFK,KPTTPAPPL,LQRLFKPTT,KLQSLQRLFK,LQRLFKPTTP,RLFKPTTPAP,FKPTTPAPPL	UCEC
FAM169B	c.495G>T	p.K165N	NDRPRQPAPGDGSKERMCGEELEDT[p.K165N]NDDPECGVEEEDAGLAGQPPGKLTRS	DTNDDPECGV	CRC
FAM170A	c.166G>A	p.E56K	DALQPGSTRVAKGWSQGVGEVTSTS[p.E56K]KYCSCVSSSRKLIHSGIQRIHRDSPQ	STSKYCSCV,GEVTSTSKY,SKYCSCVSS,GVGEVTSTSK,VGEVTSTSKY,TSTSKYCSCV,SKYCSCVSSS	CRC
FAM171B	c.1375G>A	p.D459N	SYSPQKKEPSKAETEERVSMVKTRD[p.D459N]NFKIYNEDVSFLSVNQNNYSRNPTQS	MVKTRDNFK,KTRDNFKIY,SMVKTRDNF,SMVKTRDNFK,MVKTRDNFKI,KTRDNFKIYN,VSMVKTRDNF,VKTRDNFKIY	CRC
FAM179A	c.2491G>A	p.A831T	QVFDAFTPRLQDSNKKVNQWALESF[p.A831T]TKMIPLLRESLHPMLLSIITVADNL	FTKMIPLLR,SFTKMIPLL,ESFTKMIPL,WALESFTKM,NQWALESFTK,SFTKMIPLLR,ESFTKMIPLL,WALESFTKMI,LESFTKMIPL	BRCA
FAM181A	c.326G>A	p.R109H	KAALDKSAPCRRSVDHRKYLQKQLK[p.R109H]HFSQKYSRLPRGLPGRAAEPYLKRGS	KQLKHFSQK,YLQKQLKHF,KHFSQKYSR,QLKHFSQKY,KYLQKQLKHF,KQLKHFSQKY,RKYLQKQLKH,KHFSQKYSRL	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
FAM184B	c.2350C>T	p.R784W	RALGRQQASSQCPGDSKDHIIATEE[p.R784W]WGGPGQAGSPPGAAGQGSGEGCGLWE	EEWGGPGQA,EEWGGPGQAG,TEEWGGPGQA	ACC
FAM186A	c.4667_4702delTCCCTCCGCAGGCTCAGGAATTGGAGATCCCTCTCA	p.IPPQAQELEIPL1556del	LIPPQAQELGIPLTPQQVQALGIPL[p.IPPQAQELEIPL1556del]TPQQAQALGIPLTPQQAQELGIPLTPQQAQALGISLT	VQALGIPLT,VQALGIPLTP	KIRC
FAM188B2	c.152G>A	p.C51Y	PRKAKIRHPVASFFHLFFRVSAIIV[p.C51Y]YLLCELLSSSFITCMVTIILLLSCDF	IIVYLLCEL,YLLCELLSS,AIIVYLLCEL,IIVYLLCELL,YLLCELLSSS	ACC,KIRP,TGCT
FAM1 93A	c.1284_1285insC	p.D428fs	NYRRRCACDDCSLSHILTCGIMDPP[p.D428fs]RH*	LTCGIMDPPR	STAD
FAM193A	c.1284delC	p.D428fs	NYRRRCACDDCSLSHILTCGIMDPP[p.D428fs]SLMTSTFTSSHFKWILLLTILLRGARPVCHLQARGPAPALPSQFSSTPGSSSQTVARHQLFVVMMKMLHHCQPNLLIFIH*	SLMTSTFTS,WILLLTILL,ILLRGARPV,VMMKMLHHC,MLHHCQPNL,GIMDPPSLM,FTSSHFKWI,LLTILLRGA,LQARGPAPA,ALPSQFSST,TVARHQLFV,STFTSSHFK,HQLFVVMMK,MTSTFTSSH,GSSSQTVAR,TFTSSHFKW,SHFKWILLL,KWILLLTIL,QTVARHQLF,HCQPNLLIF,CQPNLLIFI,SSHFKWILL,VARHQLFVV,LTILLRGAR,QARGPAPAL,TSTFTSSHF,LMTSTFTSS,FKWILLLTI,RGARPVCHL,SQFSSTPGS,SQTVARHQL,ARHQLFVVM,RHQLFVVMM,QLFVVMMKM,MKMLHHCQP,KMLHHCQPN,TPGSSSQTV,PPSLMTSTF,LLLTILLRGA,TVARHQLFVV,KMLHHCQPNL,MLHHCQPNLL,SLMTSTFTSS,HLQARGPAPA,LQARGPAPAL,QLFVVMMKML,TSTFTSSHFK,TFTSSHFKWI,HFKWILLLTI,KWILLLTILL,SQTVARHQLF,SSHFKWILLL,GARPVCHLQA,VARHQLFVVM,RHQLFVVMMK,MTSTFTSSHF,WILLLTILLR,LLTILLRGAR,FTSSHFKWIL,STPGSSSQTV,QTVARHQLFV,GPAPALPSQF,LMTSTFTSSH,HQLFVVMMKM,CGIMDPPSLM,STFTSSHFKW,FKWILLLTIL,SQFSSTPGSS,ARHQLFVVMM,MKMLHHCQPN,HHCQPNLLIF,LPSQFSSTPG	STAD
FAM194B	c.404_421delAGGAGGAAGAGTATCTGG	p.EEEEYL135del	IEEEEYLGKEGYLEEEEYLGKEEHL[p.EEEEYL135del]GKEGYLEKEDYIEEVDYLGKKAYLEEEEYLGKKSYLEEEKALE	LGKEEHLGK,EEHLGKEGY,HLGKEGYLEK,KEEHLGKEGY,EEHLGKEGYL	KIRC
FAM194B	c.415T>C	p.Y139H	EYLGKEGYLEEEEYLGKEEHLEEEE[p.Y139H]HLGKEGYLEKEDYIEEVDYLGKKAYL	EEHLGKEGY,HLGKEGYLEK,EEEHLGKEGY,EEHLEEEEHL,EEHLGKEGYL	TGCT
FAM210B	c.336G>T	p.L112F	QQLKKIFQEYGTVGVSLHIGISLIS[p.L112F]FGIFYMVVSSGVDMPAILLKLGFKES	GISLISFGI,LISFGIFYM,ISFGIFYMV,SLISFGIFY,ISLISFGIF,SFGIFYMVV,HIGISLISF,ISLISFGIFY,SLISFGIFYM,LISFGIFYMV,ISFGIFYMVV,LHIGISLISF,GISLISFGIF	LUAD
FAM214B	c.124delG	p.A42fs	GPSQPPVRQGALQGGLLMGYSPAGG[p.A42fs]RHPPGSTRYPSFPLRLVPLSLIGP*	RYPSFPLRL,SFPLRLVPL,STRYPSFPL,RHPPGSTRY,MGYSPAGGR,YPSFPLRLV,SPAGGRHPP,RLVPLSLIG,FPLRLVPLS,STRYPSFPLR,RYPSFPLRLV,GGRHPPGSTR,LMGYSPAGGR,SPAGGRHPPG,FPLRLVPLSL,MGYSPAGGRH,GRHPPGSTRY,GSTRYPSFPL,TRYPSFPLRL	STAD
FAM216A	c.106C>T	p.P36S	RGLGAAEMPGQGPGSDWTERSSSAE[p.P36S]SPAVAGTEGGGGGSAGYSCYQNSKGS	RSSSAESPA,AESPAVAGT,RSSSAESPAV	KIRP
FAM21B	c.3691C>T	p.P1231S	DMDDIFSSGIQAKTTKPKSRSAQAA[p.P1231S]SEPRFEHKVSNIFDDPLNAFGGQ*	ASEPRFEHK,KSRSAQAAS,SAQAASEPR,AQAASEPRF,SEPRFEHKV,RSAQAASEPR,AASEPRFEHK,KSRSAQAASE,SAQAASEPRF	TGCT
FAM222F	c.2070_2071delTT	p.P690fs	PGGRGPQGALQSPSAQKRGLSPSPS[p.P690fs]CQQVQEATSLWKPIPC*	VQEATSLWK,EATSLWKPI,SPSPSCQQV,QQVQEATSL,QVQEATSLWK,CQQVQEATSL,QQVQEATSLW,QEATSLWKPI	KIRC
FAM222F	c.2071_2073delTCT	p.S691del	SPGGRGPQGALQSPSAQKRGLSPSP[p.S691del]PASKSKKRPLFGSPSPAEKTPHPGPGLR	LSPSPPASK,RGLSPSPPA,GLSPSPPASK	KIRC,PRAD
FAM32A	c.26A>G	p.K9R	MEAYEQVQ[p.K9R]RGPLKLKGVAELGVTKRKKKKKDKDK	VQRGPLKLK,YEQVQRGPL,QVQRGPLKLK,EQVQRGPLKL	TGCT

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
FAM40B	c.2218C>T	p.R740C	LQTKYLGRQWRKSNMKTMSAIYQKV[p.R740C]CHRMNDDWAYGNDIDARPWDFQAEEC	AIYQKVCHR,IYQKVCHRM,AIYQKVCHRM,CHRMNDDWAY,SAIYQKVCHR	STAD
FAM46B	c.1247_1248AC>GT	p.H416R	RPPGTDGVVPATVNYYVTPVQPLLA[p.H416R]RAYPTWLPCN*	LLARAYPTW,LARAYPTWL,RAYPTWLPC,VQPLLARAY,LLARAYPTWL,PVQPLLARAY	TGCT
FAM47A	c.1114G>T	p.G372W	GSSLRSEPSETGVSRLRLAPPKTRR[p.G372W]WSSLHAEPSKTGVSHLSPEPPKTEVS	KTRRWSSLH,WSSLHAEPSK,KTRRWSSLHA,PPKTRRWSSL,RLAPPKTRRW	LUSC
FAM47A	c.2069G>T	p.R690L	EDKFFSQEKYWGRKFHTPSNSYTAQ[p.R690L]LVKMKYGAWYLKPKLWKKLRSDEPLI	NSYTAQLVK,YTAQLVKMK,SYTAQLVKM,YTAQLVKMKY,SNSYTAQLVK,LVKMKYGAWY,TPSNSYTAQL,NSYTAQLVKM,QLVKMKYGAW	LUAD
FAM47B	c.1701G>T	p.L567F	QRGRIRYGPWYFEPKLGKKLRSDEP[p.L567F]FIDPKPVLEKPDEPDILDGLYGPIAF	KLRSDEPFI,KKLRSDEPF,EPFIDPKPV,RSDEPFIDPK,FIDPKPVLEK,EPFIDPKPVL,GKKLRSDEPF,KKLRSDEPFI	LUAD
FAM47B	c.489G>T	p.W163C	GKDMPPDLLLQVLKQLDPERKLEDA[p.W163C]CARCEAREKTTEVPTESGKYPCGESC	CARCEAREK,DACARCEAR,LEDACARCEA	LUAD
FAM47C	c.1162C>T	p.P388S	VSPLRQLPPEAGVSHLCPEPPKTRV[p.P388S]SPLRPETPKNGVSPLFPEPPKTRISN	KTRVSPLRP,RVSPLRPET,PPKTRVSPL,KTRVSPLRPE,EPPKTRVSPL	KIRC
FAM48B1	c.1495A>G	p.I499V	ISSGNSFPPQQAGSPLKRPFSAAAA[p.I499V]VAAAAAAAAAAAAAAAAAAPAPALAA	FSAAAAVAA,SAAAAVAAA,RPFSAAAAV,FSAAAAVAAA,SAAAAVAAAA,RPFSAAAAVA	TGCT
FAM48B1	c.1546G>C	p.A516P	RPFSAAAAIAAAAAAAAAAAAAAAA[p.A516P]PAPAPALAAAAAPALAAAAPALAAA	AAAPAPAPAL,APAPAPALAA	TGCT
FAM50A	c.950A>G	p.H317R	SDATVEKDESHAGKVVLRSWYEKNK[p.H317R]RIFPASRWEPYDPEKKWDKYTIR*	KNKRIFPAS,KRIFPASRW,SWYEKNKRIF,KNKRIFPASR,YEKNKRIFPA,NKRIFPASRW	CLL
FAM58BP	c.208G>A	p.A70T	LGMQSIPIATACTIYPKFFCETILD[p.A70T]TFDPYLIAMSSIYLAGKVEEQPLWAH	ILDTFDPYL,TILDTFDPY,DTFDPYLIA,ETILDTFDPY,TILDTFDPYL,ILDTFDPYLI,FFCETILDTF,DTFDPYLIAM	BRCA
FAM5B	c.1204C>T	p.R402C	AGLKVLFKKTHRILRRLFNLCKRCH[p.R402C]CQPRFRLPKERSLSYWWNRIQSLLYC	CQPRFRLPK,RCHCQPRFR,KRCHCQPRF,RCHCQPRFRL,HCQPRFRLPK,CKRCHCQPRF	CRC
FAM5C	c.1274C>G	p.S425W	WLTRIQSFLYCNENGLLGSFSEETH[p.S425W]WCTCPNDQVVCTAFLPCTVGDASACL	GSFSEETHW	TGCT
FAM5C	c.1369C>G	p.R457G	QVVCTAFLPCTVGDASACLTCAPDN[p.R457G]GTRCGTCNTGYMLSQGLCKPEVAEST	GTRCGTCNT,GTRCGTCNTG,LTCAPDNGTR	LUAD
FAM70B	c.56C>T	p.S19L	MQPPVPGPLGLLDPAEGL[p.S19L]LRRKKTSLWFVGSLLLVSVLIVTVGL	LLDPAEGLL,LLRRKKTSL,GLLDPAEGLL,GLLRRKKTSL,LLRRKKTSLW,LRRKKTSLWF	STAD
FAM70B	c.829C>A	p.P277T	GFRLTPEPVPTCSSYPLPLQPCSRF[p.P277T]TVAPSSALASSEDLQPPSPSSSGSGL	LQPCSRFTV,FTVAPSSAL,TVAPSSALA,CSRFTVAPS,RFTVAPSSA,QPCSRFTVA,FTVAPSSALA,CSRFTVAPSS,LQPCSRFTVA,SRFTVAPSSA,RFTVAPSSAL	LUAD
FAM71B	c.1333C>G	p.H445D	PSAEVWNENKERREKKDRHPSRKSS[p.H445D]DHRKAGESHRRRAGDKNQKASSHRSA	PSRKSSDHRK	CESC
FAM71B	c.1747C>A	p.L583M	VDIVAKMVEKQNIEAKVEKAQGGQE[p.L583M]MEMISGTMTSEKTEMIVFETKSI*	EKAQGGQEM,AQGGQEMEM,QEMEMISGT,EMEMISGTM,MEMISGTMT,QEMEMISGTM,VEKAQGGQEM,KAQGGQEMEM,MEMISGTMTS	LUAD
FAM73A	c.68G>T	p.G23V	MSDCCSAPGISWEAGVGRPAVP[p.G23V]VLELQIRRGAMSEETVSESQFSLKTA	RPAVPVLEL,VGRPAVPVL	CESC
FAM75A6	c.161C>T	p.P54L	FLTLVFALGFFFLLLPYLSYFHCDD[p.P54L]LPSPSPGKRKCPVGRRRRPRGRMKNH	LSYFHCDDL,YLSYFHCDDL	LUAD
FAM75A6	c.910C>A	p.R304S	ASSRWQETARTSCAFNSSVQQDPLS[p.R304S]SHPPETCQMEAGSLFLLSSDGQNVVG	VQQDPLSSH,SSHPPETCQM	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
FAM75D1	c.3793C>A	p.R1265S	NSQGISSGDMGTSQVVHVHLEDSGI[p.R1265S]SVAQKQEPRVPTCVLQKCQVTNFPPA	HLEDSGISV,SVAQKQEPR,LEDSGISVA,HLEDSGISVA,SVAQKQEPRV	LUAD
FAM75D5	c.665T>C	p.L222P	PPQPVSPLDSKFPIDHSLPQQLPSP[p.L222P]PFPPHHIQRAEPSLQPEASLSLNTVF	PQQLPSPPF,LPSPPFPPH,LPQQLPSPPF,QQLPSPPFPP	THCA
FAM78A	c.575G>T	p.W192L	TWAVPVSESNVAKLTNIYRDQSFTT[p.W192L]LLVATNTSTNDMIILQTLHWRMQLSI	LLVATNTST,YRDQSFTTL,RDQSFTTLL,QSFTTLLVA,IYRDQSFTTL,YRDQSFTTLL,DQSFTTLLVA	KIRC
FAM83B	c.617G>A	p.R206Q	DESNFNHFLNMTEKQGCSVQRLRNI[p.R206Q]QVRTVKGQDYLSKTGAKFHGKMEQKF	VQRLRNIQV,RLRNIQVRT,RNIQVRTVK,RLRNIQVRTV,VQRLRNIQVR,QVRTVKGQDY	UCEC
FAM86A	c.421G>A	p.A141T	SGGSVTLSESTAIISYGTTGLVTWD[p.A141T]TALYLAEWAIENPAVFTNRTVLELGS	LVTWDTALY,GLVTWDTAL,VTWDTALYL,VTWDTALYLA,GLVTWDTALY,LVTWDTALYL,DTALYLAEWA,TALYLAEWAI	TGCT
FAM86C2P	c.359G>A	p.C120Y	RASCSPLSYAGLGSDGKWNLVMTRN[p.C120Y]YFPTKSTWRWQC*	MTRNYFPTK,NYFPTKSTW,YFPTKSTWR,NLVMTRNYF,WNLVMTRNY,VMTRNYFPTK,YFPTKSTWRW,MTRNYFPTKS,KWNLVMTRNY,NYFPTKSTWR,LVMTRNYFPT,WNLVMTRNYF,RNYFPTKSTW	TGCT
FARP1	c.1148C>T	p.S383L	KVQFERKHSKIHSIRSLASQPTELN[p.S383L]LEVLEQSQQTSLTFGEGAESPGGQS	QPTELNLEV,SQPTELNLEV,LASQPTELNL,QPTELNLEVL	UCEC
FARP1	c.896G>T	p.R299L	KRFLIKLRPDANSAYQDTLEFLMAS[p.R299L]LDFCKSFWKICVEHHAFFRLFEEPKP	FLMASLDFC,TLEFLMASL,LMASLDFCK,EFLMASLDF,ASLDFCKSF,FLMASLDFCK,SLDFCKSFWK,DTLEFLMASL,MASLDFCKSF,LEFLMASLDF,ASLDFCKSFW,LDFCKSFWKI	LUAD
FAS	c.781G>A	p.E261K	IAGVMTLSQVKGFVRKNGVNEAKID[p.E261K]KIKNDNVQDTAEQKVQLLRNWHQLHG	GVNEAKIDK	CESC
FASTKD1	c.9_10insA	p.K3fs	MKK[p.K3fs]NTCFPRVIGYKYASSKSYLSILLESVSISTHQL*	YLSILLESV,IGYKYASSK,KYASSKSYL,SYLSILLES,CFPRVIGYK,ASSKSYLSI,SSKSYLSIL,YKYASSKSY,SVSISTHQL,TCFPRVIGY,FPRVIGYKY,KKNTCFPRV,SKSYLSILL,LESVSISTH,ILLESVSIST,VIGYKYASSK,TCFPRVIGYK,CFPRVIGYKY,SYLSILLESV,SSKSYLSILL,NTCFPRVIGY,GYKYASSKSY,ESVSISTHQL,FPRVIGYKYA,YASSKSYLSI,MKKNTCFPRV,KKNTCFPRVI,YKYASSKSYL,ASSKSYLSIL,LSILLESVSI	STAD
FASTKD3	c.1873C>G	p.Q625E	RFCSNSKHLLGKEAIKQRHLQLLGY[p.Q625E]EVVQIPYHEIGMLKSRRELVEYLQRK	HLQLLGYEV,LQLLGYEVV,LLGYEVVQI,GYEVVQIPY,YEVVQIPYH,HLQLLGYEVV,QLLGYEVVQI,LGYEVVQIPY,EVVQIPYHEI,RHLQLLGYEV	BLCA
FAT1	c.13076G>T	p.R4359L	TKVVDLDPCLSKKPLEEKPSQPYSA[p.R4359L]LESLSEVQSLSSFQSESCDDNGYHWD	SALESLSEV,KPSQPYSAL,QPYSALESL,YSALESLSEV,SQPYSALESL,LESLSEVQSL	LUAD
FAT3	c.10720C>A	p.H3574N	PTAIPLEIFIVTMEDDFPGGVIGKI[p.H3574N]NATDQDMYDVLTFALKSEQKSLFKVN	KINATDQDM,KINATDQDMY,NATDQDMYDV,GKINATDQDM	LUAD
FAT3	c.12475G>A	p.A4159T	GLRPVVVPNIQAGHSYVGKEELIGI[p.A4159T]TVVLFVIFILVVLFIVFRKKVFRKNY	ELIGITVVL,ITVVLFVIF,TVVLFVIFI,KEELIGITV,LIGITVVLF,ELIGITVV,LIGITVVLFV,IGITVVLFVI,ITVVLFVIFI,TVVLFVIFIL,ELIGITVVLF,KEELIGITVV,GITVVLFVIF,EELIGITVVL	UCEC
FAT3	c.3797G>A	p.R1266H	VVQVLDENDNKPQFPEKVYQIKLPE[p.R1266H]HDRKKRGEPIYRAFAFDRDEGPNAEI	KVYQIKLPEH,QIKLPEHDRK	LUAD
FAT3	c.5696G>T	p.G1899V	TDVNDNPPVFTQAVFETILLLPTYV[p.G1899V]VVEVLKVSATDPDSEVPPELTYSLME	ILLLPTYVV,LLLPTYVVV,YVVVEVLKV,LPTYVVVEV,TILLLPTYVV,ILLLPTYVVV,LLPTYVVVEV,PTYVVVEVLK,TYVVVEVLKV,LPTYVVVEVL	LUAD
FBRSL1	c.2507C>T	p.A836V	GRSGAPAEREAEPRVKESRSPAKEE[p.A836V]VAKMPARASPPHSKAAPGDVKVKEER	EVAKMPARA,KEEVAKMPA,RSPAKEEVAK,SPAKEEVAKM,EEVAKMPARA	ACC
FBXL13	c.306T>A	p.S102R	RIQQIIYCHKLTIILTKWRNTARHK[p.S102R]RKKKEDELILKHELQLKKWKNRLIL K	RNTARHKRK,TARHKRKKK,KWRNTARHKR,RNTARHKRKK,RKKKEDELIL	CLL

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
FBXL14	c.143T>G	p.V48G	RDKGRAAQVCTAWRDAAYHKSVWRG[p.V48G]GEAKLHLRRANPSLFPSLQARGIRRV	SVWRGGEAK,KSVWRGGEA,KSVWRGGEAK,GEAKLHLRRA	TGCT
FBXO18	c.432G>T	p.M144I	KQPCTNDMAKSNSVGQDSCQDSEGD[p.M144I]IIFPAESSCALPQEGSAGPGSPGSAP	CQDSEGDII,SEGDIIFPA,IIFPAESSCA,CQDSEGDIIF	LUAD
FBXO21	c.432delT	p.F144fs	KRFFSEHVPCNGFSDIENLEGPEIF[p.F144fs]LRMNWCVS*	IFLRMNWCV,FLRMNWCVS,PEIFLRMNW,EIFLRMNWCV,LEGPEIFLRM,GPEIFLRMNW	STAD
FBXO24	c.1657A>G	p.M553V	HLPASRVVGTPEPSLGARAPQDPGG[p.M553V]VAQACEEYLSQIHSCQTLQDRTEKMK	GVAQACEEY,APQDPGGVA,GGVAQACEEY	HNSC
FBXO31	c.1329_1330insG	p.G443fs	TPGEDGGEPGDAVAAAEQPAQCGQG[p.G443fs]AAVRAARGRELQE*	AQCGQGAAV,AVRAARGRE,QGAAVRAAR,GQGAAVRAA,VRAARGREL,AVRAARGREL,QPAQCGQGAA	LUAD
FBXW7	c.1268G>T	p.G423V	SDDNTLKVWSAVTGKCLRTLVGHTG[p.G423V]VVWSSQMRDNIIISGSTDRTLKVWNA	TLVGHTGVV,GVVWSSQMR,RTLVGHTGV,LVGHTGVVW,TGVVWSSQM,RTLVGHTGVV,TLVGHTGVVW,HTGVVWSSQM	UCEC
FBXW7	c.1393C>T	p.R465C	DRTLKVWNAETGECIHTLYGHTSTV[p.R465C]CCMHLHEKRVVSGSRDATLRVWDIET	STVCCMHLH,GHTSTVCCM,TLYGHTSTVC,TVCCMHLHEK,HTSTVCCMHL,YGHTSTVCCM	CESC,CRC,STAD,UCEC,UCS
FBXW7	c.1394G>A	p.R465H	DRTLKVWNAETGECIHTLYGHTSTV[p.R465H]HCMHLHEKRVVSGSRDATLRVWDIET	STVHCMHLH,HCMHLHEKR,GHTSTVHCM,TVHCMHLHEK,HTSTVHCMHL,TLYGHTSTVH,YGHTSTVHCM	CLL,CRC,UCEC,UCS
FBXW7	c.1436G>A	p.R479Q	IHTLYGHTSTVRCMHLHEKRVVSGS[p.R479Q]QDATLRVWDIETGQCLHVLMGHVAAV	SQDATLRVW	STAD,UCS
FBXW7	c.1513C>G	p.R505G	DATLRVWDIETGQCLHVLMGHVAAV[p.R505G]GCVQYDGRRVVSGAYDFMVKVWDPET	VAAVGCVQY,HVAAVGCVQY	BLCA,CESC,HNSC,LUSC,UCS
FBXW7	c.1513C>T	p.R505C	DATLRVWDIETGQCLHVLMGHVAAV[p.R505C]CCVQYDGRRVVSGAYDFMVKVWDPET	VAAVCCVQY,VLMGHVAAVC,HVAAVCCVQY,AVCCVQYDGR	CRC,UCEC
FBXW7	c.1637C>T	p.S546L	FMVKVWDPETETCLHTLQGHTNRVY[p.S546L]LLQFDGIHVVSGSLDTSIRVWDVETG	LLQFDGIHV,VYLLQFDGI,TNRVYLLQF,YLLQFDGIH,YLLQFDGIHV,LLQFDGIHVV,RVYLLQFDGI,HTNRVYLLQF,LQGHTNRVYL	BLCA
FBXW7	c.1745C>T	p.S582L	GSLDTSIRVWDVETGNCIHTLTGHQ[p.S582L]LLTSGMELKDNILVSGNADSTVKIWD	QLLTSGMEL,LLTSGMELK,HTLTGHQLL,IHTLTGHQL,GHQLLTSGM,QLLTSGMELK,IHTLTGHQLL,TGHQLLTSGM,HQLLTSGMEL	CRC
FBXW7	c.2065C>T	p.R689W	ESGGSGGVVWRIRASNTKLVCAVGS[p.R689W]WNGTEETKLLVLDFDVDMK*	KLVCAVGSW,GSWNGTEETK,TKLVCAVGSW	CRC,UCEC,UCS
FBXW7	c.41G>A	p.R14Q	MNQELLSVGSKRR[p.R14Q]QTGGSLRGNPSSSQVDEEQMNRVVEE	KRRQTGGSL,RQTGGSLRG,KRRQTGGSLR,SKRRQTGGSL	CRC
FBXW9	c.893_894insG	p.G298fs	YDKKVTIYDPRDRMETRDALMGWGG[p.G298fs]AFEGL*	GWGGAFEGL,ALMGWGGAF,DALMGWGGAF,MGWGGAFEGL	STAD
FCAR	c.697G>A	p.V233M	SNALELVVTDSIHQDYTTQNLIRMA[p.V233M]MAGLVLVALLAILVENWHSHTALNKE	RMAMAGLVL,MAMAGLVLV,AMAGLVLVA,LIRMAMAGL,TQNLIRMAM,IRMAMAGLV,MAGLVLVAL,NLIRMAMAGL,RMAMAGLVLV,MAMAGLVLVA,AMAGLVLVAL,LIRMAMAGLV,IRMAMAGLVL	HNSC
FCGBP	c.12055G>A	p.V4019M	VYYEPEQTVLIDNCRQQCTCHVGKV[p.V4019M]MVCQEHSCKPGQVCQPSGGILSCVTK	VMVCQEHSCK	UCS
FCGBP	c.3064G>T	p.A1022S	EALCGLCGNFNGDPADDLALRGGGQ[p.A1022S]SANALAFGNSWQEETRPGCGATEPGD	ALRGGGQSA,GQSANALAF,LALRGGGQSA,GGQSANALAF	LUAD
FCGBP	c.7478C>T	p.A2493V	RFDFMGTCVYVLAQTCGTRPGLHRF[p.A2493V]VVLQENVAWGNGRVSVTRVITVQVAN	RPGLHRFVV,VVLQENVAW,GTRPGLHRFV,RPGLHRFVVL,FVVLQENVAW	PAAD
FCGR2A	c.665T>G	p.V222G	SSKPVTITVQVPSMGSSSPMGIIVA[p.V222G]GVIATAVAAIVAAVVALIYCRKKRIS	IVAGVIATA,PMGIIVAGV,SPMGIIVAG,IIVAGVIATA,IVAGVIATAV,GVIATAVAAI,SPMGIIVAGV	KIRP

基因	cDNA變化	蛋白質變化	突變背景序列二	肽	實例性疾病
FCGRT	c.118C>G	p.P40A	LFLLPGSLGAESHLSLLYHLTAVSS[p.P40A]AAPGTPAFWVSGWLGPQQYLSYNSLR	HLTAVSSAA,SSAAPGTPA,SAAPGTPAF,YHLTAVSSA,SSAAPGTPAF,YHLTAVSSAA,SAAPGTPAFW	THCA
FCRL2	c.1513G>T	p.V505L	MQQPESSANIRTLLENKDSQVIYSS[p.V505L]LKKS*	SQVIYSSLK,QVIYSSLKK,SQVIYSSLKK,DSQVIYSSLK,KDSQVIYSSL	LUAD
FEM1A	c.1858C>A	p.L620M	AIMNALIEAGAHMDATNAFKKTAYE[p.L620M]MLDEKLLARGTMQPFNYVTLQCLAAR	TAYEMLDEK,AFKKTAYEM,FKKTAYEML,YEMLDEKLL,KTAYEMLDEK,EMLDEKLLAR,NAFKKTAYEM,YEMLDEKLLA	PRAD
FER	c.1422delA	p.L474fs	SEKPLAEQDWYHGAIPRIEAQELLK[p.L474fs]NKETFWCERVMGNLVNMSFLYILMDRGDILSYNMLITCIDSRALGFQTFLNL*	CIDSRALGF,RVMGNLVNM,ILMDRGDIL,LVNMSFLYI,NMSFLYILM,LITCIDSRA,SYNMLITCI,RALGFQTFL,NLVNMSFLY,MDRGDILSY,SFLYILMDR,MLITCIDSR,ETFWCERVM,DILSYNMLI,MGNLVNMSF,CERVMGNLV,VNMSFLYIL,RGDILSYNM,SRALGFQTF,LGFQTFLNL,KETFWCERV,GDILSYNML,LMDRGDILSY,NLVNMSFLYI,MLITCIDSRA,ALGFQTFLNL,MSFLYILMDR,VMGNLVNMSF,LYILMDRGDI,KNKETFWCER,GNLVNMSFLY,NMLITCIDSR,DSRALGFQTF,QELLKNKETF,KETFWCERVM,LVNMSFLYIL,VNMSFLYILM,LSYNMLITCI,TCIDSRALGF,SRALGFQTFL,GDILSYNMLI	STAD
FERD3L	c.275C>A	p.P92H	CEVDQGDGEEEEEEERGRGVSLLGR[p.P92H]HKRKRVITYAQRQAANIRERKRMFNL	SLLGRHKRK,GVSLLGRHK,VSLLGRHKR,HKRKRVITY,VSLLGRHKRK,RGVSLLGRHK,SLLGRHKRKR,LGRHKRKRVI,RHKRKRVITY	LUAD
FEZ2	c.149C>T	p.P50L	NCNASPEPGAEAGAEAGGGADGFPA[p.P50L]LACSLEEKLSLCFRPSDPGAEPPRTA	ALACSLEEK,GGADGFPAL,ALACSLEEKL,FPALACSLEE	ACC
FEZF2	c.244G>A	p.E82K	GSQGKKLLNLCSPLPCMIPLQPLGY[p.E82K]KVPSKTLLSYSELWKSSLRAGGGGGG	YKVPSKTLL,MIPLQPLGYK,KVPSKTLLSY,LGYKVPSKTL,IPLQPLGYKV	CESC
FGB	c.1015G>C	p.E339Q	NYCGLPGEYWLGNDKISQLTRMGPT[p.E339Q]QLLIEMEDWKGDKVKAHYGGFTVQNE	RMGPTQLLI,LTRMGPTQL,GPTQLLIEM,TRMGPTQLL,QLTRMGPTQL,LTRMGPTQLL,SQLTRMGPTQ	LUAD
FGF14	c.686C>T	p.T229M	KPLEVAMYREPSLHDVGETVPKPGV[p.T229M]MPSKSTSASAIMNGGKPVNKSKTT*	VMPSKSTSA,MPSKSTSAS,GVMPSKSTSA,VPKPGVMPSK,MPSKSTSASA,GETVPKPGVM	GBM
FGF14	c.707C>T	p.A236V	YREPSLHDVGETVPKPGVTPSKSTS[p.A236V]VSAIMNGGKPVNKSKTT*	VTPSKSTSV,VSAIMNGGK,KSTSVSAIM,SKSTSVSAI,GVTPSKSTSV,SVSAIMNGGK,TPSKSTSVSA,SKSTSVSAIM	CRC
FGFR3	c.1138G>A	p.G380R	VVLPAEEELVEADEAGSVYAGILSY[p.G380R]RVGFFLFILVVAAVTLCRLRSPPKKG	YAGILSYRV,ILSYRVGFF,SYRVGFFLF,VYAGILSYR,GILSYRVGF,LSYRVGFFL,ILSYRVGFFL,RVGFFLFILV,SVYAGILSYR,VYAGILSYRV,LSYRVGFFLF,SYRVGFFLFI,AGILSYRVGF,GILSYRVGFF,YRVGFFLFIL	BLCA
FGFR3	c.1711_1712insG	p.R571fs	QGGPLYVLVEYAAKGNLREFLRARR[p.R571fs]APGPGLLLRHLQAARGAAHLQGPGVLCLPGGPGHGVLGLPEVHPQGPGCPQCAGDRGQRDEDRRLRAGPGRAQPRLLQEDDQRPAAREVDGA*	LLLRHLQAA,RARRAPGPG,LLRHLQAAR,RLRAGPGRA,GPGHGVLGL,FLRARRAPG,LQAARGAAH,REFLRARRA,ARRAPGPGL,RRAPGPGLL,RAPGPGLLL,RHLQAARGA,AHLQGPGVL,LQGPGVLCL,LQEDDQRPA,LPGGPGHGV,CLPGGPGHGV,GLLLRHLQAA,LQAARGAAHL,LLQEDDQRPA,RARRAPGPGL,RLRAGPGRAQ,RAGPGRAQPR,LLLRHLQAAR,LPGGPGHGVL,RPAAREVDGA,FLRARRAPGP,REFLRARRAP,RRAPGPGLLL,RHLQAARGAA,HLQAARGAAH,AAHLQGPGVL,HLQGPGVLCL,LQEDDQRPAA	KIRC
FGFR3	c.2147C>A	p.P716H	GGSPYPGIPVEELFKLLKEGHRMDK[p.P716H]HANCTHDLYMIMRECWHAAPSQRPTF	HANCTHDLY,KHANCTHDLY,RMDKHANCTH,HANCTHDLYM	KIRC
FGFR3	c.2420G>C	p.*807S	SSGDDSVFAHDLLPPAPPSSGGSRT[p.*807S]SRATGPQQCEGSLAAHPAAGAQPLPGMRLSADGETATQSFGLCVCVCVCVCVCAHPRVPVCVRILPPGAEVPWVSPLLCNGLLTGAAAPRGLCSGGTQCRM*	RILPPGAEV,RLSADGETA,CVCVCAHPR,GSRTSRATG,GSLAAHPAA,CVRILPPGA,LLTGAAAPR,LAAHPAAGA,ETATQSFGL,QSFGLCVCV,EVPWVSPLL,GPQQCEGSL,HPAAGAQPL,SPLLCNGLL,QQCEGSLAA,AGAQPLPGM,AQPLPGMRL,AEVPWVSPL,LPPGAEVPW,VPWVSPLLC,SLAAHPAAGA,TQSFGLCVCV,GLCVCVCVCV,LLCNGLLTGA,WVSPLLCNGL,ILPPGAEVPW,ETATQSFGLC,CVCAHPRVPV,QPLPGMRLSA,HPRVPVCVRI,QQCEGSLAAH,ADGETATQSF,GETATQSFGL,AEVPWVSPLL,CEGSLAAHPA,LPPGAEVPWV	MM

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
FGFR3	c.742C>T	p.R248C	RGNYTCVVENKFGSIRQTYTLDVLE[p.R248C]CSPHRPILQAGLPANQTAVLGSDVEF	DVLECSPHR,LECSPHRPI,LECSPHRPIL	BLCA
FGFR3	c.746C>G	p.S249C	GNYTCVVENKFGSIRQTYTLDVLER[p.S249C]CPHRPILQAGLPANQTAVLGSDVEFH	DVLERCPHR,LERCPHRPI,CPHRPILQA,LERCPHRPIL	BLCA,LUSC
FGFRL1	c.1435_1436delCA	p.H479fs	LGPGPVAGPKLYPKLYTDIHTHTHT[p.H479fs]LSHTLTRGGQGPPAHPLSVLDGTVSAVGTGGPARQADWEDGGRSCRRRQGTHGEEEWPAPQAVCV*	SVLDGTVSA,VLDGTVSAV,HTHTHTLSH,HTLSHTLTR,HTHTLSHTL,RSCRRRQGT,DIHTHTHTL,GPPAHPLSV,PPAHPLSVL,WPAPQAVCV,GQGPPAHPL,EEWPAPQAV,EEEWPAPQA,SVLDGTVSAV,HTHTHTLSHT,HTHTLSHTLT,LTRGGQGPPA,RSCRRRQGTH,GPPAHPLSVL,HPLSVLDGTV,TDIHTHTHTL,IHTHTHTLSH,RQGTHGEEEW,EEWPAPQAVC,EEEWPAPQAV,GEEEWPAPQA	BLCA
FGFRL1	c.728G>T	p.R243L	KYTCRVSNRAGAINATYKVDVIQRT[p.R243L]LSKPVLTGTHPVNTTVDFGGTTSFQC	RTLSKPVLT,IQRTLSKPV,VIQRTLSKPV,TLSKPVLTGT,RTLSKPVLTG,IQRTLSKPVL,YKVDVIQRTL	LUAD
FGFRL1	c.820G>T	p.V274L	TGTHPVNTTVDFGGTTSFQCKVRSD[p.V274L]LKPVIQWLKRVEYGAEGRHNSTIDVG	KVRSDLKPV,QCKVRSDLK,FQCKVRSDL,KVRSDLKPVI,DLKPVIQWLK,CKVRSDLKPV	LUAD
FGGY	c.412_413insG	p.G138fs	LDHRAVSQVNRINETKHSVLQYVGG[p.G138fs]GDVCGNAGPETSVAERELERDLLG*	SVAERELER,LQYVGGGDV,AERELERDL,VLQYVGGGDV,LQYVGGGDVC,AERELERDLL	STAD
FHDC1	c.298delT	p.F100fs	PGLPPTTHMNGYSHLGKKKRMRSFF[p.F100fs]GKLFRRSKFEAKPTSGPWQPGRNITTKLIQRPLRSSLGSRKTPPSLPFLGEEEL*	RMRSFFGKL,RSFFGKLFR,KRMRSFFGK,SFFGKLFRR,KTPPSLPFL,KKRMRSFFG,FGKLFRRSK,LFRRSKFEA,RSKFEAKPT,TTKLIQRPL,IQRPLRSSL,PLRSSLGSR,GSRKTPPSL,TSGPWQPGR,NITTKLIQR,GPWQPGRNI,LPFLGEEEL,MRSFFGKLF,GKLFRRSKF,RKTPPSLPF,KLFRRSKFEA,SLPFLGEEEL,RSFFGKLFRR,RMRSFFGKLF,KKRMRSFFGK,LFRRSKFEAK,RSKFEAKPTS,TTKLIQRPLR,IQRPLRSSLG,PLRSSLGSRK,GPWQPGRNIT,LIQRPLRSSL,KRMRSFFGKL,FGKLFRRSKF,SKFEAKPTSG,FEAKPTSGPW,SRKTPPSLPF,RKTPPSLPFL	STAD
FHDC1	c.760C>T	p.R254W	SGDVSKLSLADSFLYGLIQVPNYSL[p.R254W]WIEAMVLKKEFLPSCSSLYTDITVLR	YSLWIEAMV,SLWIEAMVL,LWIEAMVLK,WIEAMVLKK,IQVPNYSLW,NYSLWIEAM,IQVPNYSLWI,SLWIEAMVLK,NYSLWIEAMV,YSLWIEAMVL,VPNYSLWIEA	CRC
FHL1	c.552T>G	p.D184E	AKHCVKCNKAITSGGITYQDQPWHA[p.D184E]ECFVCVTCSKKLAGQRFTAVEDQYYC	AECFVCVTC,QPWHAECFV,AECFVCVTCS	CLL
FIGNL1	c.926delA	p.K309fs	NGPKEDSSLPTFKTAKEQLWVDQQK[p.K309fs]STTNLSVHQGLHMVV*	SVHQGLHMV,LSVHQGLHM,DQQKSTTNL,QKSTTNLSV,SVHQGLHMVV,QQKSTTNLSV,TTNLSVHQGL,QKSTTNLSVH,NLSVHQGLHM	STAD
FILIP1	c.1565T>A	p.I522K	LKDDLTKLKSFTVMLVDERKNMMEK[p.I522K]KKQEERKVDGLNKNFKVEQGKVMDVT	MMEKKKQEER	CLL
FKBPL	c.481G>C	p.E161Q	GPPEGWTELTMGVGPWREETWGELI[p.E161Q]QKCLESMCQGEEAELQLPGHSGPPVR	ETWGELIQK,LIQKCLESM,ELIQKCLESM	CESC
FKBPL	c.959G>T	p.R320L	AQAALGNLEKATADLKKVLAIDPKN[p.R320L]LAAQEELGKVVIQGKNQDAGLAQGLR	VLAIDPKNL,KNLAAQEEL,VLAIDPKNLA	LUAD
FLG	c.477delA	p.K159fs	KGNKGRSKSPRETGGKRHESSSEKK[p.K159fs]KEKDIHLLIEKKNMEKTIITQVKKRKTRLKILD*	KTIITQVKK,LIEKKNMEK,TIITQVKKR,QVKKRKTRL,KKKEKDIHL,KEKDIHLLI,KKNMEKTII,MEKTIITQV,KKRKTRLKI,NMEKTIITQV,LIIEKKNMEK,KTIITQVKKR,TIITQVKKRK,QVKKRKTRLK,ITQVKKRKTR,KKKEKDIHLL,TQVKKRKTRL,KKRKTRLKIL	STAD
FLG	c.8657G>A	p.R2886H	ASTHADISRHSQAVQGQSEGSRRSR[p.R2886H]HQGSSVSQDSDSEGHSEDSERWSGSA	GSRRSRHQG,RSRHQGSSV,RSRHQGSSVS,RRSRHQGSSV	GBM
FLG	c.9761C>A	p.P3254H	ERWSGSASRNHRGSVQEQSRHGSRH[p.P3254H]HRSHHEDRAGHGHSADRSRQSGTRHA	GSRHHRSHH,QSRHGSRHHR	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
FLG2	c.1716G>T	p.L572F	GSGSSQSSGYGQYGSRETSGFGQHG[p.L572F]FGSGQSTGFGQYGSGSGQSSGFGQHG	FGSGQSTGF,GFGSGQSTGF	LUAD
FLG2	c.4634G>T	p.G1545V	HTHGQSGSQHGESESIIHDRHRITH[p.G1545V]VQTGDTTRHSYSGHEQTTQTGSRTTG	HVQTGDTTR	LUAD
FLG2	c.5703_5704delCA	p.H1901fs	RRSGHSESSDSEVHSGGSHTHSGHT[p.H1901fs]QPSQVSTWRVRIHSSQETPNYSWTDRRYH*	HSSQETPNY,TWRVRIHSS,RVRIHSSQE,QVSTWRVRI,TQPSQVSTW,SQETPNYSW,HTHSGHTQPS,RVRIHSSQET,IHSSQETPNY,ETPNYSWTDR,HTQPSQVSTW,SQVSTWRVRI,SSQETPNYSW,QPSQVSTWRV	GBM
FLJ43860	c.2549_2550insT	p.L850fs	SHTFQLWRALGAGQPTSHLVLTTLL[p.L850fs]GLSAGATPAHRCQRQQPLPQGEDLPAFAGCHEHAARAAVCPGVQAGRAGGLPQALPGPPHPDALCLGAEPAQRAPQAAGPGGGRAQPPKLQHVTGGTEEPAVHHGALA*	LVLTTLLGL,TLLGLSAGA,GLSAGATPA,ALCLGAEPA,AQPPKLQHV,ATPAHRCQR,AARAAVCPG,GGGRAQPPK,EPAVHHGAL,HRCQRQQPL,LSAGATPAH,PQGEDLPAF,HEHAARAAV,VQAGRAGGL,RAGGLPQAL,AQRAPQAAG,LQHVTGGTE,LPQGEDLPA,HLVLTTLLGL,VLTTLLGLSA,AVCPGVQAGR,AARAAVCPGV,AGRAGGLPQA,RAQPPKLQHV,LSAGATPAHR,FAGCHEHAAR,TTLLGLSAGA,HVTGGTEEPA,LPQGEDLPAF,LPGPPHPDAL,AHRCQRQQPL,GLSAGATPAH,GRAGGLPQAL,LQHVTGGTEE,EEPAVHHGAL,LPAFAGCHEH,LPQALPGPPH,HEHAARAAVC,AEPAQRAPQA,TEEPAVHHGA	PRAD
FLNA	c.3718G>A	p.V1240M	GTHTITYIPLCPGAYTVTIKYGGQP[p.V1240M]MPNFPSKLQVEPAVDTSGVQCYGPGI	TIKYGGQPM,YGGQPMPNF,KYGGQPMPNF,GQPMPNFPSK,QPMPNFPSKL,MPNFPSKLQV,VTIKYGGQPM	GBM
FLNB	c.1586_1587insG	p.W529fs	LDGVYAFEYYPSTPGRYSIAITWGG[p.W529fs]TPHSKEPL*	ITWGGTPHSK,YSIAITWGGT,IAITWGGTPH	STAD
FLNB	c.1586delG	p.W529fs	FLDGVYAFEYYPSTPGRYSIAITWG[p.W529fs]DTTFQRAPLKFKLALKRVCRKSVLGALGSMVGLSGGQRTSW*	VLGALGSMV,TTFQRAPLK,LALKRVCRK,TFQRAPLKF,FQRAPLKFK,RAPLKFKLA,PLKFKLALK,KFKLALKRV,KLALKRVCR,RVCRKSVLG,TWGDTTFQR,MVGLSGGQR,DTTFQRAPL,APLKFKLAL,AITWGDTTF,SVLGALGSM,KRVCRKSVL,LSGGQRTSW,SVLGALGSMV,ALKRVCRKSV,KLALKRVCRK,ITWGDTTFQR,TFQRAPLKFK,IAITWGDTTF,TTFQRAPLKF,RVCRKSVLGA,DTTFQRAPLK,RAPLKFKLAL,LKRVCRKSVL,KSVLGALGSM,FQRAPLKFKL,LKFKLALKRV,GLSGGQRTSW	STAD
FLT3	c.1800_1801insTTCAGAGAATATGAATATGAT	p.600_601insFREYEYD	LQMVQVTGSSDNEYFYVDFREYEYD[p.600_601insFREYEYD]FREYEYDLKWEFPRENLEFGKVLGSGAFGKVMNATAYGISKTGVSI	YEYDFREYE,REYEYDFRE,REYEYDFREY,YEYDFREYEY,DFREYEYDFR,VDFREYEYDF,YDFREYEYDL	LAML
FLT3	c.2503G>C	p.D835H	RDLAARNVLVTHGKVVKICDFGLAR[p.D835H]HIMSDSNYVVRGNARLPVKWMAPESL	HIMSDSNYV,RHIMSDSNY,CDFGLARHI,HIMSDSNYVV,CDFGLARHIM,ARHIMSDSNY,RHIMSDSNYV	LAML
FLT3	c.2503G>T	p.D835Y	RDLAARNVLVTHGKVVKICDFGLAR[p.D835Y]YIMSDSNYVVRGNARLPVKWMAPESL	ICDFGLARY,YIMSDSNYV,RYIMSDSNY,CDFGLARYI,YIMSDSNYVV,KICDFGLARY,RYIMSDSNYV,CDFGLARYIM,ARYIMSDSNY	LAML
FLT3	c.2505T>A	p.D835E	RDLAARNVLVTHGKVVKICDFGLAR[p.D835E]EIMSDSNYVVRGNARLPVKWMAPESL	EIMSDSNYV,REIMSDSNY,CDFGLAREI,EIMSDSNYVV,CDFGLAREIM,AREIMSDSNY,REIMSDSNYV	LAML
FMN2	c.2252C>T	p.S751F	CLEALRLEEKEVRHHRILEAKSIQT[p.S751F]FPTEEGGVLTLPPVDGLPGRPPCPPG	FPTEEGGVL,LEAKSIQTF,QTFPTEEGGV,ILEAKSIQTF,FPTEEGGVLT	BRCA
FMN2	c.2974C>A	p.P992T	GIPLPPPLPGAGIPPPPPLPGAGIP[p.P992T]TPPPLPGAGIPPPPPLPGAGIPPPPP	AGIPTPPPL	LUAD
FMNL1	c.2779G>C	p.E927Q	HFLDKAGSVSLDSVLADVRSLQRGL[p.E927Q]QLTQREFVRQDDCMVLKEFLRANSPT	SLQRGLQLT,RSLQRGLQL,QLTQREFVR,LQRGLQLTQ,GLQLTQREF,LQLTQREFV,GLQLTQREFV,RGLQLTQREF	CESC
FMO3	c.1530C>A	p.F510L	AILTQWDRSLKPMQTRVVGRLQKPC[p.F510L]LFFHWLKLFA!PILLIAVFLVLT*	CLFFHWLKL,RLQKPCLFF,LFFHWLKLF,LQKPCLFFH,RLQKPCLFFH,LQKPCLFFHW,CLFFHWLKLF,KPCLFFHWLK,GRLQKPCLFF	CRC
FMOD	c.993C>A	p.S331R	QKIPPVNTNLENLYLQGNRINEFSI[p.S331R]RSFCTVVDVVNFSKLQVLRLDGNEIK	FSIRSFCTV,SIRSFCTVV,RSFCTVVDV,INEFSIRSF,FSIRSFCTVV,RSFCTVVDVV,RINEFSIRSF,NEFSIRSFCT	KIRP

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
FN1	c.868C>T	p.R290C	RGEWKCERHTSVQTTSSGSGPFTDV[p.R290C]CAAVYQPQPHPQPPPYGHCVTDSGVV	FTDVCAAVY,GPFTDVCAAV	UCEC
FNBP4	c.172_177delACCACC	p.TT58del	PEPDTEPDSTAAVPSQPAPSAATTT[p.TT58del]AVTAAAASDDSPSEDEQEAVQEVPRVVQNPP	APSAATTTA,ATTTAVTAAA,APSAATTTAV	PRAD
FNDC1	c.1955G>A	p.R652H	QGTSHRPSLPASLNDNDLVDSDEDE[p.R652H]HAVGSLHPKGAFAQPRPALSPSRQSP	HAVGSLHPK,DEHAVGSLH,DEDEHAVGSL	CRC
FNDC1	c.3535_3537delGAC	p.D1180del	APGKSEPPSKRPLSSKSQQSVSAED[p.D1180del]EEEDAGFFKGGKEDLLSSSVPKWPSSST	AEDEEEDAGF	PAAD
FOLH1	c.1501delA	p.S501fs	NLTKELKSPDEGFEGKSLYESWTKK[p.S501fs]VLPQSSVACPG*	KVLPQSSVA,YESWTKKVL,KKVLPQSSV,SLYESWTKKV,LYESWTKKVL,KKVLPQSSVA	STAD
FOLH1	c.1927G>T	p.A643S	HPQEMKTYSVSFDSLFSAVKNFTEI[p.A643S]SSKFSERLQDFDKSNPIVLRMMNDQL	KNFTEISSK,NFTEISSKF,EISSKFSER,ISSKFSERL,EISSKFSERL,KNFTEISSKF	LUAD
FOXD4L4	c.1215delC	p.C405fs	GQFCSNSSSRRTAPTAALPPRARC[p.C405fs]GRAPVGLVGAAEVSGSGGGL*	RARCGRAPV,CGRAPVGLV,EVSGSGGGL,APVGLVGAA,RARCGRAPVG,AEVSGSGGGL	KIRC
FOXK1	c.1060C>T	p.R354W	SGIYAHITKHYPYYRTADKGWQNSI[p.R354W]WHNLSLNRYFIKVPRSQEEPGKGSFW	WQNSIWHNL,NSIWHNLSL,WHNLSLNRY,SIWHNLSLNR,GWQNSIWHNL,IWHNLSLNRY,WHNLSLNRYF	CRC
FOXN3	c.287delC	p.P96fs	NLLKSFGESVLRSVSPVQDLDDDTP[p.P96fs]HPLPTLTCPTMPGRTPTANPPTPSAASYLWPSRTLQPSACQ*	TMPGRTPTA,LTCPTMPGR,AASYLWPSR,SYLWPSRTL,DTPHPLPTL,SAASYLWPS,LPTLTCPTM,PPTPSAASY,TPSAASYLW,SAASYLWPSR,ASYLWPSRTL,TLTCPTMPGR,HPLPTLTCPT,CPTMPGRTPT,WPSRTLQPSA,NPPTPSAASY	CRC,STAD
FOXQ1	c.404C>T	p.S135L	RSKPYTRRPKPPYSYIALIAMAIRD[p.S135L]LAGGRLTLAEINEYLMGKFPFFRGSY	AIRDLAGGR,IAMAIRDLA,ALIAMAIRDL,LIAMAIRDLA,AIRDLAGGRL,MAIRDLAGGR,RDLAGGRLTL	BLCA
FOXRED1	c.407G>T	p.R136L	SVGGICQQFSLPENIQLSLFSASFL[p.R136L]LNINEYLAVVDAPPLDLRFNPSGYLL	SLFSASFLL,FSASFLLNI,FLLNINEYL,LLNINEYLA,SFLLNINEY,LNINEYLAV,FLLNINEYLA,LLNINEYLAV,ASFLLNINEY,LFSASFLLNI,SFLLNINEYL,LSLFSASFLL,LNINEYLAVV	LUAD
FPGS	c.64A>G	p.I22V	MSRARSHLRAALFLAAASARG[p.I22V]VTTQVAARRGLSAWPVPQEPSMEYQD	SARGVTTQV,GVTTQVAAR,VTTQVAARR,LAAASARGV,FLAAASARGV,ASARGVTTQV,SARGVTTQVA	ACC
FPGT-TNNI3K	c.1364G>A	p.R455H	NVININHQGRDGHTGLHSACYHGHI[p.R455H]HLVQFLLDNGADMNLVACDPSRSSGE	CYHGHIHLV,HIHLVQFLL,ACYHGHIHL,HGHIHLVQF,GHIHLVQFL,YHGHIHLVQF,HSACYHGHIH,SACYHGHIHL,GHIHLVQFLL	CRC
FPR2	c.161G>A	p.R54Q	PLVVLGVTFVLGVLGNGLVIWVAGF[p.R54Q]QMTRTVTTICYLNLALADFSFTATLP	FQMTRTVTT,QMTRTVTTI,WVAGFQMTR,VIWVAGFQM,AGFQMTRTV,FQMTRTVTTI,IWVAGFQMTR,LVIWVAGFQM	GBM
FRAS1	c.1145G>T	p.C382F	FMSSNASEVKRIPEGEKWEDGPCKV[p.C382F]FECRGAQVTCYEPSCPPCPVGTLALE	WEDGPCKVF,FECRGAQVT,KVFECRGAQV,KWEDGPCKVF	LUAD
FRG1	c.254_256delAAG	p.E86del	AIEMDKGTYIHALDNGLFTLGAPHK[p.E86del]VDEGPSPPEQFTAVKLSDSRIALKSGYG	FTLGAPHKV	PRAD
FRG1B	c.101T>C	p.I34T	RIALKSGYGKYLGINSDELVGHSDA[p.I34T]TGPREQWEPVFQNGKMALLASNSCFI	DELVGHSDAT	PRAD
FRG1B	c.110G>A	p.R37K	LKSGYGKYLGINSDELVGHSDAIGP[p.R37K]KEQWEPVFQNGKMALLASNSCFIRCN	GPKEQWEPV,DAIGPKEQW,VGHSDAIGPK	UCS
FRG1B	c.115C>A	p.Q39K	SGYGKYLGINSDELVGHSDAIGPRE[p.Q39K]KWEPVFQNGKMALLASNSCFIRCNEA	GPREKWEPV,DAIGPREKW,HSDAIGPREK,KWEPVFQNGK,GPREKWEPVF	CLL
FRG1B	c.125C>A	p.P42Q	GKYLGINSDELVGHSDAIGPREQWE[p.P42Q]QVFQNGKMALLASNSCFIRCNEAGDI	GPREQWEQV,EQVFQNGKM,GPREQWEQVF,WEQVFQNGKM,QVFQNGKMAL,REQWEQVFQN	PRAD
FRG1B	c.145A>G	p.M49V	SDELVGHSDAIGPREQWEPVFQNGK[p.M49V]VALLASNSCFIRCNEAGDIEAKSKTA	FQNGKVALL,FQNGKVALLA,VFQNGKVALL,VALLASNSCF,WEPVFQNGKV	TGCT

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
FRG1B	c.148G>C	p.A50P	DELVGHSDAIGPREQWEPVFQNGKM[p.A50P]PLLASNSCFIRCNEAGDIEAKSKTAG	FQNGKMPLL,VFQNGKMPL,MPLLASNSC,PLLASNSCF,FQNGKMPLLA,VFQNGKMPLL,MPLLASNSCF	KIRP,PRAD,SKCM
FRG1B	c.155T>C	p.L52S	LVGHSDAIGPREQWEPVFQNGKMAL[p.L52S]SASNSCFIRCNEAGDIEAKSKTAGEE	SASNSCFIR,LSASNSCFI,ALSASNSCF,FQNGKMALSA,ALSASNSCFI,KMALSASNSC,LSASNSCFIR,MALSASNSCF	PRAD,UCS
FRG1B	c.157G>A	p.A53T	VGHSDAIGPREQWEPVFQNGKMALL[p.A53T]TSNSCFIRCNEAGDIEAKSKTAGEEE	LLTSNSCFI,LTSNSCFIR,ALLTSNSCF,ALLTSNSCFI,FQNGKMALLT,KMALLTSNSC,LLTSNSCFIR,MALLTSNSCF	GBM,PRAD
FRG1B	c.163A>G	p.N55D	HSDAIGPREQWEPVFQNGKMALLAS[p.N55D]DSCFIRCNEAGDIEAKSKTAGEEEMI	LLASDSCFI,LASDSCFIR,ALLASDSCF,ALLASDSCFI,LLASDSCFIR,MALLASDSCF	PRAD
FRG1B	c.175A>G	p.I59V	IGPREQWEPVFQNGKMALLASNSCF[p.I59V]VRCNEAGDIEAKSKTAGEEEMIKSLS	LLASNSCFV,LASNSCFVR,ALLASNSCFV,LLASNSCFVR	PRAD,SKCM
FRG1B	c.194G>A	p.G65E	WEPVFQNGKMALLASNSCFIRCNEA[p.G65E]EDIEAKSKTAGEEEMIKSLSHSLPSS	FIRCNEAEDI	UCS
FRG1B	c.29T>C	p.I10T	MAVKLSDSR[p.I10T]TALKSGYGKYLGINSDELVGHSDAIG	LSDSRTALK,KLSDSRTAL,TALKSGYGK,RTALKSGYG,KLSDSRTALK,RTALKSGYGK,AVKLSDSRTA,TALKSGYGKY,VKLSDSRTAL	PRAD,UCS
FRG1B	c.31G>A	p.A11T	MAVKLSDSRI[p.A11T]TLKSGYGKYLGINSDELVGHSDAIGP	KLSDSRITL,ITLKSGYGK,LSDSRITLK,TLKSGYGKY,SRITLKSGY,TLKSGYGKYL,KLSDSRITLK,RITLKSGYGK,ITLKSGYGKY,VKLSDSRITL	PRAD
FRG1B	c.39A>T	p.K13N	MAVKLSDSRIAL[p.K13N]NSGYGKYLGINSDELVGHSDAIGPRE	IALNSGYGK,SRIALNSGY,ALNSGYGKY,ALNSGYGKYL,RIALNSGYGK,IALNSGYGKY,DSRIALNSGY	GBM,PRAD,UCS
FRG1B	c.59T>C	p.L20P	MAVKLSDSRIALKSGYGKY[p.L20P]PGINSDELVGHSDAIGPREQWEPVFQ	YPGINSDEL,KYPGINSDEL,KSGYGKYPGI,YPGINSDELV	KIRP
FRG1B	c.95A>T	p.D32V	DSRIALKSGYGKYLGINSDELVGHS[p.D32V]VAIGPREQWEPVFQNGKMALLASNSC	ELVGHSVAI,VAIGPREQW,DELVGHSVA,NSDELVGHSV,DELVGHSVAI	PRAD,UCS
FRG2B	c.424G>T	p.D142Y	ECSLSLNKKSRSSTPVHNSEIQETC[p.D142Y]YAHHRGRSRACTGRSKRHRSRALGVQ	NSEIQETCY,YAHHRGRSR,TCYAHHRGR,SEIQETCYA,IQETCYAHH,ETCYAHHRGR,CYAHHRGRSR,YAHHRGRSRA,SEIQETCYAH	LUAD
FRMD4A	c.3014delC	p.P1005fs	CKATSAALPQSQRSSTPSSEIGATP[p.P1005fs]QAAPTTS*	SEIGATPQA,SEIGATPQAA	STAD
FRMPD1	c.3277G>C	p.E1093Q	APKYTEPLLSPRDEPRSDECGINPG[p.E1093Q]QKIASIPTKEEPQGQLSLERDREVTN	NPGQKIASI,GQKIASIPT,GQKIASIPTK	LUAD
FRS2	c.140T>C	p.L47S	KVINVDDDGNELGSGIMELTDTELI[p.L47S]SYTRKRDSVKWHYLCLRRYGYDSNLF	LTDTELISY,DTELISYTR,ELISYTRKR,ISYTRKRDSV,SYTRKRDSVK,ELTDTELISY	TGCT
FSHB	c.128C>A	p.T43N	CNSCELTNITIAIEKEECRFCISIN[p.T43N]NTWCAGYCYTRDLVYKDPARPKIQKT	NTWCAGYCY,INNTWCAGY,FCISINNTW,RFCISINNTW,SINNTWCAGY,NTWCAGYCYT	LUAD
FUBP1	c.1288C>T	p.R430C	QSGARIELQRNPPPNADPNMKLFTI[p.R430C]CGTPQQIDYARQLIEEKIGGPVNPLG	CGTPQQIDY,FTICGTPQQI	UCEC

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
FUT6	c.418_419insA	p.S140fs	NPSAQLPRSPRRQGQRWIWFSMESP[p.S140fs]KPLLAAESHGRILQSHHVLPQRLRHLHALRLAGAVVRPACPPTAQPLGQDRAGGLGSVQLGAKLRQGALLPEPAGPSQGGRVRTLPQAPAPGNHDGDAVPVQVLSGLRELLAPRLHHREAVEERPGGLGRARGAGPQQKQLREVPATRRLHPRGRLPEPQGPGPVPAGAGQGPRPLPELLSLAGDAAASLLQLGTRFLQGLLETAGGIQVPDTRHSGLVHLRGWCGAWAARNLIFLGPHLSGGLIYLRTRLPEASPA*	VLSGLRELL,FLQGLLETA,GLLETAGGI,NLIFLGPHL,HLSGGLIYL,FSMESPKPL,VLPQRLRHL,ALRLAGAVV,GLGSVQLGA,PLPELLSLA,LLSLAGDAA,LLQLGTRFL,FLGPHLSGG,IWFSMESPK,RLRHLHALR,ASLLQLGTR,LSGGLIYLR,AWAARNLIF,RILQSHHVL,VVRPACPPT,KLRQGALLP,RVRTLPQAP,GLRELLAPR,RARGAGPQQ,ATRRLHPRG,RLHPRGRLP,GTRFLQGLL,AARNLIFLG,QSHHVLPQR,LLAPRLHHR,QLREVPATR,PATRRLHPR,GWCGAWAAR,ESPKPLLAA,DAAASLLQL,WAARNLIFL,RPACPPTAQ,VPVQVLSGL,APRLHHREA,HPRGRLPEP,GPRPLPELL,RPLPELLSL,VPDTRHSGL,GPHLSGGLI,QRLRHLHAL,GAKLRQGAL,SLLQLGTRF,HLRGWCGAW,SMESPKPLL,MESPKPLLA,LQSHHVLPQ,LRHLHALRL,RHLHALRLA,HLHALRLAG,AKLRQGALL,RQGALLPEP,SQGGRVRTL,KQLREVPAT,REVPATRRL,LSLAGDAAA,LAGDAAASL,LETAGGIQV,TRHSGLVHL,RGWCGAWAA,GAWAARNLI,FSMESPKPLL,LLAAESHGRI,RLAGAVVRPA,GLRELLAPRL,SLAGDAAASL,SLLQLGTRFL,FLGPHLSGGL,RLRHLHALRL,HLHALRLAGA,VLSGLRELLA,LLSLAGDAAA,QLGTRFLQGL,LLETAGGIQV,HLRGWCGAWA,WIWFSMESPK,GLGSVQLGAK,HLSGGLIYLR,GAWAARNLIF,AWAARNLIFL,HGRILQSHHV,HVLPQRLRHL,ALRLAGAVVR,VVRPACPPTA,KLRQGALLPE,GGRVRTLPQA,RVRTLPQAPA,RTLPQAPAPG,RARGAGPQQK,ATRRLHPRGR,RLHPRGRLPE,RGWCGAWAAR,ELLAPRLHHR,QLREVPATRR,VPATRRLHPR,EAVEERPGGL,QVPDTRHSGL,LPQRLRHLHA,APGNHDGDAV,APRLHHREAV,GPQQKQLREV,LPEPQGPGPV,PQRLRHLHAL,GPHLSGGLIY,MESPKPLLAA,LAAESHGRIL,GRILQSHHVL,HALRLAGAVV,RAGGLGSVQL,RQGALLPEPA,VQVLSGLREL,RELLAPRLHH,QQKQLREVPA,REVPATRRLH,GQGPRPLPEL,GDAAASLLQL,ASLLQLGTRF,LQLGTRFLQG,RFLQGLLETA,IQVPDTRHSG,VHLRGWCGAW,RNLIFLGPHL,AESHGRILQS,PELLSLAGDA,VPDTRHSGLV	KIRC
FYB	c.972delG	p.G324fs	NQEELASGTPPARFPKAPSKLTVGG[p.G324fs]HGAKVRKRKRETRIQPPRNRSHCLPCLPWVHLHQNPTDHQMLT*	LTVGGHGAK,GGHGAKVRK,HGAKVRKRK,KVRKRKRET,RIQPPRNRS,RNRSHCLPC,TVGGHGAKV,PPRNRSHCL,HQNPTDHQM,IQPPRNRSH,SHCLPCLPW,LPCLPWVHL,LPWVHLHQN,CLPCLPWVHL,KLTVGGHGAK,KVRKRKRETR,RIQPPRNRSH,RNRSHCLPCL,ETRIQPPRNR,LTVGGHGAKV,QPPRNRSHCL,RSHCLPCLPW,LHQNPTDHQM,HQNPTDHQML,LPWVHLHQNP	STAD
FZD3	c.1099G>A	p.D367N	LTIILLAMNKIEGDNISGVCFVGLY[p.D367N]NVDALRYFVLAPLCLYVVVGVSLLLA	NVDALRYFV,GLYNVDALR,LYNVDALRY,YNVDALRYF,GVCFVGLYNV,GLYNVDALRY,LYNVDALRYF,YNVDALRYFV	CRC
FZD6	c.1247G>A	p.R416Q	ISLNHVRQVIQHDGRNQEKLKKFMI[p.R416Q]QIGVFSGLYLVPLVTLLGCYVYEQVN	KLKKFMIQI,IQIGVFSGL,KFMIQIGVF,QIGVFSGLY,KKFMIQIGV,FMIQIGVFSG,MIQIGVFSGL,KLKKFMIQIG,IQIGVFSGLY,KKFMIQIGVF	UCEC
GABRA3	c.218G>A	p.R73H	LSPKHAPDIPDDSTDNITIFTRILD[p.R73H]HLLDGYDNRLRPGLGDAVTEVKTDIY	ILDHLLDGY,IFTRILDHL,HLLDGYDNR,FTRILDHLL,HLLDGYDNRL,TIFTRILDHL,IFTRILDHLL,RILDHLLDGY	UCEC
GABRA4	c.1379G>A	p.R460Q	PFSRANAAETISAARALPSASPTSI[p.R460Q]QTGYMPRKASVGSASTRHVFGSRLQR	SIQTGYMPR,IQTGYMPRK,SPTSIQTGY,SIQTGYMPRK,TSIQTGYMPR,ASPTSIQTGY,SPTSIQTGYM,IQTGYMPRKA	CRC,UCEC
GABRA5	c.377G>A	p.S126N	RQSWKDERLRFKGPMQRLPLNNLLA[p.S126N]NKIWTPDTFFHNGKKSIAHNMTTPNK	NKIWTPDTF,ANKIWTPDTF,NKIWTPDTFF	CRC
GABRA5	c.670C>A	p.Q224K	SEVVYVWTNGSTKSVVVAEDGSRLN[p.Q224K]KYHLMGQTVGTENISTSTGEYTIMTA	KYHLMGQTV,GSRLNKYHL,SRLNKYHLM,GSRLNKYHLM,AEDGSRLNKY,NKYHLMGQTV	LUAD
GABRA6	c.940G>A	p.V314I	SARHSLPKVSYATAMDWFIAVCFAF[p.V314I]IFSALIEFAAVNYFTNLQTQKAKRKA	FIAVCFAFI,FAFIFSALI,FIFSALIEF,IAVCFAFIF,CFAFIFSAL,FIFSALIEFA,WFIAVCFAFI,CFAFIFSALI,AFIFSALIEF,FIAVCFAFIF,VCFAFIFSAL	GBM
GABRB1	c.1246C>T	p.R416C	KATMYSYDSASIQYRKPLSSREAYG[p.R416C]CALDRHGVPSKGRIRRRASQLKVKIP	SSREAYGCA,EAYGCALDR,SREAYGCAL,SSREAYGCAL	PRAD

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
GABRB3	c.1498G>A	p.D500N	RSLPHKKTHLRRRSSQLKIKIPDLT[p.D500N]NVNAIDRWSRIVFPFTFSLFNLVYWL	LTNVNAIDR,IKIPDLTNV,KIKIPDLTNV,KIPDLTNVNA,DLTNVNAIDR,NVNAIDRWSR,IPDLTNVNAI	CRC
GABRD	c.1236delG	p.Q412fs	GSYRSVGVETGETKKEGAARSGGQG[p.Q412fs]ASVPGSGPSTQTPLTFTPALCSLRRLRPSMSSTGRHTPCEHRTQATLACPGARRQLPRNFLGERALGLPSPLRVSKWDDSRPRKTRGSLGLPEL*	FLGERALGL,RLRPSMSST,ATLACPGAR,ALGLPSPLR,RVSKWDDSR,TFTPALCSL,AARSGGQGA,RSGGQGASV,SLRRLRPSM,RQLPRNFLG,RALGLPSPL,KWDDSRPRK,KTRGSLGLP,FTPALCSLR,ALCSLRRLR,TLACPGARR,QTPLTFTPA,TPLTFTPAL,RPRKTRGSL,PSTQTPLTF,CEHRTQATL,TQATLACPG,ARRQLPRNF,RRQLPRNFL,RNFLGERAL,GERALGLPS,RKTRGSLGL,RGSLGLPEL,ALGLPSPLRV,ATLACPGARR,RALGLPSPLR,CSLRRLRPSM,SLRRLRPSMS,RLRPSMSSTG,RTQATLACPG,KTRGSLGLPE,TFTPALCSLR,QTPLTFTPAL,LTFTPALCSL,TPALCSLRRL,LPRNFLGERA,RPRKTRGSLG,GSGPSTQTPL,GPSTQTPLTF,TQTPLTFTPA,TQATLACPGA,LACPGARRQL,GARRQLPRNF,RQLPRNFLGE,ERALGLPSPL,TRGSLGLPEL,LPSPLRVSKW,CEHRTQATLA,GERALGLPSP	STAD
GABRG1	c.613G>A	p.E205K	LRLTINAECYLQLHNFPMDEHSCPL[p.E205K]KFSSYGYPKNEIEYKWKKPSVEVADP	KFSSYGYPK,PLKFSSYGY,DEHSCPLKF,HSCPLKFSSY,CPLKFSSYGY,MDEHSCPLKF	SKCM
GABRR2	c.1103C>T	p.A368V	VSYVKAVDIYLWVSFVFVFLSVLEY[p.A368V]VAVNYLTTVQERKERKLREKFPCMCG	VFLSVLEYV,FLSVLEYVA,VAVNYLTTV,VLEYVAVNY,LEYVAVNYL,FVFLSVLEYV,FLSVLEYVAV,VLEYVAVNYL,YVAVNYLTTV,SVLEYVAVNY,LEYVAVNYLT	PRAD
GADL1	c.1054C>A	p.L352I	VAWNPHKMLMAGIQCCALLVKDKSD[p.L352I]ILKKCYSAKASYLFQQDKFYDVSYDT	KSDILKKCY,ILKKCYSAK,ILKKCYSAKA,LVKDKSDILK,DILKKCYSAK	LUAD
GAL3ST3	c.811G>T	p.A271S	ESLVLLRRLLAWDLDDVLYAKLNAR[p.A271S]SASSRLAAIPAALARAARTWNALDAG	SASSRLAAI,KLNARSASS,RSASSRLAA,NARSASSRL,YAKLNARSA,VLYAKLNARS,KLNARSASSR,NARSASSRLA,RSASSRLAAI,LNARSASSRL,ARSASSRLAA	LUAD
GALNT13	c.1072G>T	p.G358C	LEIVTCSHVGHVFRKATPYTFPGGT[p.G358C]CHVINKNNRRLAEVWMDEFKDFFYII	GGTCHVINK,YTFPGGTCH,FPGGTCHVI,YTFPGGTCHV,TFPGGTCHVI	LUSC
GALNT14	c.702T>A	p.D234E	VNRDWLQPLLHRVKEDYTRVVCPVI[p.D234E]EIINLDTFTYIESASELRGGFDWSLH	RVVCPVIEI,IEIINLDTF,CPVIEIINL,EIINLDTFTY,RVVCPVIEII	LUAD
GALNTL1	c.950_951insG	p.W317fs	GIFVIDKSWFNHLGKYDAQMDIWGG[p.W317fs]REF*	AQMDIWGGR,MDIWGGREF,DAQMDIWGGR,QMDIWGGREF	STAD
GALNTL2	c.1183G>A	p.E395K	AMDRHYFQNTGAYDSLMSLRGGENL[p.E395K]KLSFKAWLCGGSVEILPCSRVGHIYQ	SLRGGENLK,GGENLKLSF,NLKLSFKAW,LKLSFKAWL,SLRGGENLKL,MSLRGGENLK,NLKLSFKAWL,RGGENLKLSF,GENLKLSFKA	UCEC
GALNTL5	c.133G>A	p.A45T	TALLFIYLHHNHVSSWQKKSQEPLS[p.A45T]TWSPGKKVHQQIIYGSEQIPKPHVIV	LSTWSPGKK,KSQEPLSTW,KKSQEPLSTW	LIHC
GALNTL5	c.785G>T	p.R262I	LEPLLHAIAKDPKMVVCPLIDVIDD[p.R262I]ITLEYKPSPLVRGTFDWNLQFKWDNV	VIDDITLEY,PLIDVIDDI,VIDDITLEYK,DVIDDITLEY,ITLEYKPSPL,CPLIDVIDDI	CRC
GALNTL6	c.1694_1696delAGA	p.K567del	WGYRKDRTLFHPVSNSCMDCNPAEK[p.K567del]IFMARCDPLSETQQWIFEHINMTVLEKF	NPAEKIFMA,CMDCNPAEKI,NPAEKIFMAR,MDCNPAEKIF	BRCA
GARS	c.124C>G	p.P42A	LLLLPPRLLARPSLLLRRSLSAASC[p.P42A]APISLPAAASRSSMDGAGAEEVLAPL	RSLSAASCA,LSAASCAPI,APISLPAAA,AASCAPISL,SLSAASCAPI,SAASCAPISL	ACC
GART	c.2420delA	p.K807fs	IESMQINGSVLKNGSLTNHFSFEKK[p.K807fs]RPEWLS*	FEKKRPEWL,FSFEKKRPEW	OV
GAS2L2	c.566A>C	p.D189A	AAPTLVQLEEEIEEEVRRELALPPP[p.D189A]APSPPAPPRRQPCHFRNLDQMVQSLV	RELALPPPA,LPPPAPSPPA,RELALPPPAP	TGCT

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
GAS6	c.449delG	p.G150fs	CDRKGTQACQDLMGNFFCLCKAGWG[p.G150fs]AGSATKMSTNAARRTGAASRSATTSRVASTVPATAASSSPLMAGPAKT*	TTSRVASTV,ATAASSSPL,KMSTNAARR,GWGAGSATK,ATKMSTNAA,ARRTGAASR,RTGAASRSA,ASRSATTSR,RSATTSRVA,STVPATAAS,NAARRTGAA,WGAGSATKM,SRVASTVPA,TAASSSPLM,ATTSRVASTV,RVASTVPATA,ATKMSTNAAR,AASRSATTSR,SSPLMAGPAK,AGWGAGSATK,STNAARRTGA,AARRTGAASR,RTGAASRSAT,ASRSATTSRV,TSRVASTVPA,ATAASSSPLM,SRVASTVPAT	STAD
GAS8	c.937C>A	p.R313S	EEMSEMQKQLANYERDKQILLCTKA[p.R313S]SLKVREKELKDLQWEHEVLEQRFTKV	ILLCTKASL,LLCTKASLK,KASLKVREK,CTKASLKVR,SLKVREKEL,LLCTKASLKV,ILLCTKASLK,SLKVREKELK,KQILLCTKAS	LUAD
GATA3	c.1002_1003insG	p.N334fs	ARRAGTSCANCQTTTTTLWRRNANG[p.N334fs]GPCLQCLWALLQASQY*	CLQCLWALL,WALLQASQY,RNANGGPCL,LWALLQASQY,RRNANGGPCL,LQCLWALLQA	BRCA
GATA3	c.1200_1201insA	p.H400fs	CKKVHDSLEDFPKNSSFNPAALSRH[p.H400fs]NVLPEPHLALQPLQPHADHAHADAPAIQPVLWTTPPLQHGHRHGLEPCSMLTGPPARVPAVPFDLHFCRSSIMKPKRDGYMFLKAESKIMFATLQRSSLWCLCSNH*	VLPEPHLAL,ALQPLQPHA,AIQPVLWTT,MLTGPPARV,FLKAESKIM,IMFATLQRS,YMFLKAESK,KIMFATLQR,SMLTGPPAR,HFCRSSIMK,MFLKAESKI,CSMLTGPPA,RSSIMKPKR,IMKPKRDGY,KAESKIMFA,VPFDLHFCR,AALSRHNVL,EPHLALQPL,GPPARVPAV,KPKRDGYMF,FATLQRSSL,DLHFCRSSI,LHFCRSSIM,ESKIMFATL,LALQPLQPH,LQPHADHAH,HAHADAPAI,LQHGHRHGL,RHGLEPCSM,PARVPAVPF,PAVPFDLHF,LKAESKIMF,ATLQRSSLW,LQRSSLWCL,AESKIMFAT,ADAPAIQPV,APAIQPVLW,SMLTGPPARV,YMFLKAESKI,TLQRSSLWCL,CSMLTGPPAR,LHFCRSSIMK,FCRSSIMKPK,IMKPKRDGYM,GYMFLKAESK,SIMKPKRDGY,TTPPLQHGHR,AVPFDLHFCR,HADAPAIQPV,NPAALSRHNV,QPVLWTTPPL,KPKRDGYMFL,DLHFCRSSIM,MFATLQRSSL,FLKAESKIMF,RHNVLPEPHL,HLALQPLQPH,ADAPAIQPVL,HRHGLEPCSM,ARVPAVPFDL,VPAVPFDLHF,FDLHFCRSSI,MKPKRDGYMF,MFLKAESKIM,AESKIMFATL,IMFATLQRSS,FATLQRSSLW,LQRSSLWCLC,PPARVPAVPF,PEPHLALQPL	BRCA
GATA3	c.1222_1223insC	p.S408fs	EDFPKNSSFNPAALSRHMSSLSHIS[p.S408fs]ALQPLQPHADHAHADAPAIQPVLWTTPPLQHGHRHGLEPCSMLTGPPARVPAVPFDLHFCRSSIMKPKRDGYMFLKAESKIMFATLQRSSLWCLCSNH*	ALQPLQPHA,AIQPVLWTT,MLTGPPARV,FLKAESKIM,IMFATLQRS,YMFLKAESK,KIMFATLQR,SMLTGPPAR,HFCRSSIMK,MFLKAESKI,MSSLSHISA,SSLSHISAL,CSMLTGPPA,RSSIMKPKR,IMKPKRDGY,KAESKIMFA,VPFDLHFCR,GPPARVPAV,KPKRDGYMF,FATLQRSSL,DLHFCRSSI,LHFCRSSIM,ESKIMFATL,SHISALQPL,SALQPLQPH,LQPHADHAH,HAHADAPAI,LQHGHRHGL,RHGLEPCSM,PARVPAVPF,PAVPFDLHF,LKAESKIMF,ATLQRSSLW,LQRSSLWCL,AESKIMFAT,ADAPAIQPV,APAIQPVLW,SMLTGPPARV,YMFLKAESKI,TLQRSSLWCL,HMSSLSHISA,CSMLTGPPAR,LHFCRSSIMK,FCRSSIMKPK,IMKPKRDGYM,GYMFLKAESK,SIMKPKRDGY,TTPPLQHGHR,AVPFDLHFCR,MSSLSHISAL,HADAPAIQPV,QPVLWTTPPL,KPKRDGYMFL,DLHFCRSSIM,MFATLQRSSL,FLKAESKIMF,LSHISALQPL,ADAPAIQPVL,HRHGLEPCSM,ARVPAVPFDL,VPAVPFDLHF,FDLHFCRSSI,MKPKRDGYMF,MFLKAESKIM,AESKIMFATL,IMFATLQRSS,FATLQRSSLW,LQRSSLWCLC,PPARVPAVPF	BRCA

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
GATA3	c.1223_1224insT	p.S408fs	EDFPKNSSFNPAALSRHMSSLSHIS[p.S408fs]ALQPLQPHADHAHADAPAIQPVLWTTPPLQHGHRHGLEPCSMLTGPPARVPAVPFDLHFCRSSIMKPKRDGYMFLKAESKIMFATLQRSSLWCLCSNH*	ALQPLQPHA,AIQPVLWTT,MLTGPPARV,FLKAESKIM,IMFATLQRS,YMFLKAESK,KIMFATLQR,SMLTGPPAR,HFCRSSIMK,MFLKAESKI,MSSLSHISA,SSLSHISAL,CSMLTGPPA,RSSIMKPKR,IMKPKRDGY,KAESKIMFA,VPFDLHFCR,GPPARVPAV,KPKRDGYMF,FATLQRSSL,DLHFCRSSI,LHFCRSSIM,ESKIMFATL,SHISALQPL,SALQPLQPH,LQPHADHAH,HAHADAPAI,LQHGHRHGL,RHGLEPCSM,PARVPAVPF,PAVPFDLHF,LKAESKIMF,ATLQRSSLW,LQRSSLWCL,AESKIMFAT,ADAPAIQPV,APAIQPVLW,SMLTGPPARV,YMFLKAESKI,TLQRSSLWCL,HMSSLSHISA,CSMLTGPPAR,LHFCRSSIMK,FCRSSIMKPK,IMKPKRDGYM,GYMFLKAESK,SIMKPKRDGY,TTPPLQHGHR,AVPFDLHFCR,MSSLSHISAL,HADAPAIQPV,QPVLWTTPPL,KPKRDGYMFL,DLHFCRSSIM,MFATLQRSSL,FLKAESKIMF,LSHISALQPL,ADAPAIQPVL,HRHGLEPCSM,ARVPAVPFDL,VPAVPFDLHF,FDLHFCRSSI,MKPKRDGYMF,MFLKAESKIM,AESKIMFATL,IMFATLQRSS,FATLQRSSLW,LQRSSLWCLC,PPARVPAVPF	BRCA
GATA3	c.1290_1291insT	p.S430fs	ISPFSHSSHMLTTPTPMHPPSSLSF[p.S430fs]WTTPPLQHGHRHGLEPCSMLTGPPARVPAVPFDLHFCRSSIMKPKRDGYMFLKAESKIMFATLQRSSLWCLCSNH*	MLTGPPARV,FLKAESKIM,IMFATLQRS,YMFLKAESK,KIMFATLQR,SMLTGPPAR,HFCRSSIMK,MFLKAESKI,LSFWTTPPL,CSMLTGPPA,RSSIMKPKR,IMKPKRDGY,KAESKIMFA,VPFDLHFCR,GPPARVPAV,KPKRDGYMF,FATLQRSSL,DLHFCRSSI,LHFCRSSIM,ESKIMFATL,LQHGHRHGL,RHGLEPCSM,PARVPAVPF,PAVPFDLHF,LKAESKIMF,ATLQRSSLW,LQRSSLWCL,AESKIMFAT,HPPSSLSFW,SLSFWTTPPL,SMLTGPPARV,YMFLKAESKI,TLQRSSLWCL,CSMLTGPPAR,MHPPSSLSFW,LHFCRSSIMK,FCRSSIMKPK,IMKPKRDGYM,GYMFLKAESK,SIMKPKRDGY,TTPPLQHGHR,AVPFDLHFCR,KPKRDGYMFL,DLHFCRSSIM,MFATLQRSSL,FLKAESKIMF,HRHGLEPCSM,ARVPAVPFDL,VPAVPFDLHF,FDLHFCRSSI,MKPKRDGYMF,MFLKAESKIM,AESKIMFATL,IMFATLQRSS,FATLQRSSLW,LQRSSLWCLC,PPARVPAVPF	BRCA
GATA3	c.1301_1302insC	p.H434fs	FSHSSHMLTTPTPMHPPSSLSFGPH[p.H434fs]PPLQHGHRHGLEPCSMLTGPPARVPAVPFDLHFCRSSIMKPKRDGYMFLKAESKIMFATLQRSSLWCLCSNH*	MLTGPPARV,FLKAESKIM,IMFATLQRS,YMFLKAESK,KIMFATLQR,SMLTGPPAR,HFCRSSIMK,MFLKAESKI,CSMLTGPPA,RSSIMKPKR,IMKPKRDGY,KAESKIMFA,VPFDLHFCR,GPPARVPAV,KPKRDGYMF,FATLQRSSL,DLHFCRSSI,LHFCRSSIM,ESKIMFATL,LSFGPHPPL,LQHGHRHGL,RHGLEPCSM,PARVPAVPF,PAVPFDLHF,LKAESKIMF,ATLQRSSLW,LQRSSLWCL,AESKIMFAT,SLSFGPHPPL,SMLTGPPARV,YMFLKAESKI,TLQRSSLWCL,CSMLTGPPAR,LHFCRSSIMK,FCRSSIMKPK,IMKPKRDGYM,GYMFLKAESK,SIMKPKRDGY,AVPFDLHFCR,KPKRDGYMFL,DLHFCRSSIM,MFATLQRSSL,FLKAESKIMF,HRHGLEPCSM,ARVPAVPFDL,VPAVPFDLHF,FDLHFCRSSI,MKPKRDGYMF,MFLKAESKIM,AESKIMFATL,IMFATLQRSS,FATLQRSSLW,LQRSSLWCLC,PPARVPAVPF	BRCA
GATA3	c.1304_1305insC	p.H435fs	HSSHMLTTPTPMHPPSSLSFGPHHP[p.H435fs]LQHGHRHGLEPCSMLTGPPARVPAVPFDLHFCRSSIMKPKRDGYMFLKAESKIMFATLQRSSLWCLCSNH*	MLTGPPARV,FLKAESKIM,IMFATLQRS,YMFLKAESK,KIMFATLQR,SMLTGPPAR,HFCRSSIMK,MFLKAESKI,CSMLTGPPA,RSSIMKPKR,IMKPKRDGY,KAESKIMFA,VPFDLHFCR,LSFGPHHPL,GPPARVPAV,KPKRDGYMF,FATLQRSSL,DLHFCRSSI,LHFCRSSIM,ESKIMFATL,LQHGHRHGL,RHGLEPCSM,PARVPAVPF,PAVPFDLHF,LKAESKIMF,ATLQRSSLW,LQRSSLWCL,HPLQHGHRH,AESKIMFAT,SLSFGPHHPL,SMLTGPPARV,YMFLKAESKI,TLQRSSLWCL,CSMLTGPPAR,LHFCRSSIMK,FCRSSIMKPK,IMKPKRDGYM,GYMFLKAESK,SIMKPKRDGY,AVPFDLHFCR,KPKRDGYMFL,DLHFCRSSIM,MFATLQRSSL,FLKAESKIMF,HRHGLEPCSM,ARVPAVPFDL,VPAVPFDLHF,FDLHFCRSSI,MKPKRDGYMF,MFLKAESKIM,AESKIMFATL,IMFATLQRSS,FATLQRSSLW,LQRSSLWCLC,PPARVPAVPF	BRCA
GATA3	c.1329G>T	p.M443I	TTPTPMHPPSSLSFGPHHPSSMVTA[p.M443I]TG*	HPSSMVTAI	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	胜肽	實例性疾病
GATA3	c.983_984insCTGGAGG	p.L328fs	RRLSAARRAGTSCANCQTTTTTLWR[p.L328fs]LEEECQWGPCLQCLWALLQASQY*	CLQCLWALL,QWGPCLQCL,TTTTTLWRL,WALLQASQY,EECQWGPCL,QWGPCLQCLW,LWALLQASQY,QTTTTTLWRL,CQWGPCLQCL,LQCLWALLQA	BRCA
GBP7	c.1292_1293insG	p.G431fs	QAELKRLSELLTESISRGTFFVPGG[p.G431fs]AQYLLRSKKED*	FVPGGAQYL,AQYLLRSKK,GAQYLLRSK,FFVPGGAQY,VPGGAQYLL,FVPGGAQYLL,GAQYLLRSKK,FFVPGGAQYL,TFFVPGGAQY	STAD
GCDH	c.1167delG	p.L389fs	VSLLKRNNCGKALDIARQARDMLGG[p.L389fs]MGFLTSIT*	MLGGMGFLT,RDMLGGMGF,GGMGFLTSI,RQARDMLGGM,RDMLGGMGFL	STAD
GCDH	c.244C>T	p.R82C	EEQLTTDEILIRDTFRTYCQERLMP[p.R82C]CILLANRNEVFHREIISEMGELGVLG	RLMPCILLA,MPCILLANR,QERLMPCIL,LMPCILLANR,CQERLMPCIL,QERLMPCILL	LUAD
GDAP1	c.919A>G	p.T307A	RVLKRKTFNKVLGHVNNILISAVLP[p.T307A]AAFRVAKKRAPKVLGTTLVVGLLAGV	ILISAVLPA,LISAVLPAA,AVLPAAFRV,VLPAAFRVA,SAVLPAAFR,LPAAFRVAK,ISAVLPAAF,ILISAVLPAA,VLPAAFRVAK,ISAVLPAAFR,AVLPAAFRVA,SAVLPAAFRV,LISAVLPAAF	BRCA
GDF5	c.315_316insA	p.E105fs	GQTGGLTQPKKDEPKKLPPRPGGPE[p.E105fs]TQARTPSPNKAGYSPDCDPKRTASRRQGTPKSRICPQLLPAEEGQGARAPTRAQGAVSPTPHHTPRVHALAVQDAVRC*	RICPQLLPA,ASRRQGTPK,QARTPSPNK,RTASRRQGT,KSRICPQLL,HTPRVHALA,SPTPHHTPR,HALAVQDAV,APTRAQGAV,TPRVHALAV,RQGTPKSRI,RAQGAVSPT,AQGAVSPTP,HHTPRVHAL,TPSPNKAGY,AEEGQGARA,LLPAEEGQGA,TQARTPSPNK,TASRRQGTPK,QARTPSPNKA,AGYSPDCDPK,ASRRQGTPKS,KSRICPQLLP,RVHALAVQDA,RTPSPNKAGY,HALAVQDAVR,HTPRVHALAV,TPKSRICPQL,SPTPHHTPRV,SRICPQLLPA,AQGAVSPTPH	TGCT
GDPD5	c.1779_1780insC	p.G593fs	SVCSDNSYDTYANSTATPVGPRGGG[p.G593fs]QPHQDPHRAEWALAEDMSVPPVPDTEAGEPRRAGGSVSELGVLWERAPQPPCGLQPLVSRSLS*	GPRGGGQPH,EPRRAGGSV,QPPCGLQPL,HQDPHRAEW,AEWALAEDM,WALAEDMSV,AEDMSVPPV,RAGGSVSEL,WERAPQPPC,LQPLVSRSL,SELGVLWER,DPHRAEWAL,ALAEDMSVPP,GLQPLVSRSL,RAEWALAEDM,RRAGGSVSEL,AEWALAEDMS,SELGVLWERA,QPPCGLQPLV	KIRP
GEM	c.803G>T	p.R268L	RDSKEKNERRLAYQKRKESMPRKAR[p.R268L]LFWGKIVAKNNKNMAFKLKSKSCHDL	RLFWGKIVA,SMPRKARLF,RKARLFWGK,KARLFWGKI,LFWGKIVAK,MPRKARLFW,ESMPRKARL,RLFWGKIVAK,SMPRKARLFW,KARLFWGKIV,MPRKARLFWG,KESMPRKARL,RKARLFWGKI	LUAD
GEN1	c.1526C>T	p.S509L	VMSFQSHMTLKPTCEIFHKQNSKLN[p.S509L]LGISPDPTLPQESISASLNSLLLPKN	HKQNSKLNL,SKLNLGISP,LGISPDPTL,KQNSKLNLGI,FHKQNSKLNL	UCEC
GFM1	c.49_50insC	p.A17fs	MRLLGAAAVAALGRGRAP[p.A17fs]RLPRLAEEAG*	RLPRLAEEA,ALGRGRAPR,RGRAPRLPR,APRLPRLAE,AALGRGRAPR,RGRAPRLPRL	KICH
GFRAL	c.922C>A	p.Q308K	LGTVLQVQCTCRTITQSEESLCKIF[p.Q308K]KHMLHRKSCFNYPTLSNVKGMALYTR	KIFKHMLHR,IFKHMLHRK,SLCKIFKHM,SLCKIFKHML,KIFKHMLHRK,KHMLHRKSCF	LUAD
GGA2	c.188C>T	p.A63V	MSEQDWSAIQNFCEQVNTDPNGPTH[p.A63V]VPWLLAHKIQSPQEKEALYALTVLEM	HVPWLLAHK,THVPWLLAH,VPWLLAHKI,GPTHVPWLL,NTDPNGPTHV,HVPWLLAHKI,DPNGPTHVPW	UCEC
GIGYF2	c.680G>A	p.R227H	PNFEEGGPTSVGRKHEFIRSESENW[p.R227H]HIFREEQNGEDEDGGWRLAGSRRDGE	ESENWHIFR,SESENWHIF,RSESENWHIF	UCEC
GIMAP7	c.827delT	p.V276fs	LLKLKYDEKIKNIREEAERNIFKDV[p.V276fs]LIGFGRCFQKYGIGFCRNVSFILPNLL*	NVSFILPNL,IGFGRCFQK,IFKDVLIGF,CFQKYGIGF,IGFCRNVSF,GFGRCFQKY,VLIGFGRCF,VSFILPNLL,LIGFGRCFQK,KYGIGFCRNV,IGFGRCFQKY,FQKYGIGFCR,NVSFILPNLL,NIFKDVLIGF,AERNIFKDVL,RCFQKYGIGF,GIGFCRNVSF,IGFCRNVSFI,RNVSFILPNL	STAD
GIMAP8	c.1630G>T	p.A544S	SCCEKGDTFFVLVFQLGRFTEEDKT[p.A544S]SVAKLEAIFGADFTKYAIMLFTRKED	KTSVAKLEA,FTEEDKTSV,SVAKLEAIF,KTSVAKLEAI,TSVAKLEAIF,EEDKTSVAKL	KIRP

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
GIPC3	c.679delG	p.G227fs	SRSSKCPVEAKVTSGRETLRLRSGG[p.G227fs]LPQWRKRPVSLRRRHLGRLMTCWKATWAFGTPSWRPPWWRRPRRQRAPRSLHAV*	RLMTCWKAT,RAPRSLHAV,SLRRRHLGR,TCWKATWAF,TWAFGTPSW,RLRSGGLPQ,QWRKRPVSL,RKRPVSLRR,RRRHLGRLM,LGRLMTCWK,CWKATWAFG,SWRPPWWRR,RPRRQRAPR,RQRAPRSLH,WAFGTPSWR,RPPWWRRPR,MTCWKATWA,LPQWRKRPV,TLRLRSGGL,LRSGGLPQW,LMTCWKATW,RRQRAPRSL,TPSWRPPWW,LMTCWKATWA,GLPQWRKRPV,SLRRRHLGRL,HLGRLMTCWK,RSGGLPQWRK,VSLRRRHLGR,RLMTCWKATW,MTCWKATWAF,RLRSGGLPQW,QWRKRPVSLR,RKRPVSLRRR,SWRPPWWRRP,WWRRPRRQRA,RQRAPRSLHA,TWAFGTPSWR,TPSWRPPWWR,RPPWWRRPRR,ETLRLRSGGL,LPQWRKRPVS,RPVSLRRRHL,RPRRQRAPRS,PQWRKRPVSL,LRRRHLGRLM,RHLGRLMTCW,ATWAFGTPSW,FGTPSWRPPW	STAD
GIT2	c.368G>T	p.R123L	KVHPNKAEFIRAKYQMLAFVHRLPC[p.R123L]LDDDSVTAKDLSKQLHSSVRTGNLET	CLDDDSVTA,LPCLDDDSV,RLPCLDDDSV,LAFVHRLPCL	LUAD
GJA1	c.932delC	p.A311fs	YKLVTGDRNNSSCRNYNKQASEQNW[p.A311fs]VITVQNKIEWGRREAPSLTPMHSLLISPMITRILKN*	SLTPMHSLL,LISPMITRI,KQASEQNWV,LLISPMITR,SPMITRILK,QASEQNWVI,WVITVQNKI,REAPSLTPM,SEQNWVITV,WGRREAPSL,MHSLLISPM,IEWGRREAP,KQASEQNWVI,SLTPMHSLLI,LLISPMITRI,LISPMITRIL,SLLISPMITR,ISPMITRILK,NWVITVQNKI,TVQNKIEWGR,APSLTPMHSL,RREAPSLTPM,REAPSLTPMH,PMHSLLISPM,MHSLLISPMI,IEWGRREAPS	KIRC
GJB3	c.479G>A	p.R160H	LIFKLIIEFLFLYLLHTLWHGFNMP[p.R160H]HLVQCANVAPCPNIVDCYIARPTEKK	NMPHLVQCA,HLVQCANVA,MPHLVQCAN,LWHGFNMPHL,MPHLVQCANV	GBM
GJB4	c.64C>A	p.R22S	MNWAFLQGLLSGVNKYSTVLS[p.R22S]SIWLSVVFIFRVLVYVVAAEEVWDDE	VLSSIWLSV,SIWLSVVFI,LSSIWLSVV,KYSTVLSSI,SSIWLSVVF,STVLSSIWL,NKYSTVLSS,YSTVLSSIW,TVLSSIWLSV,VLSSIWLSVV,KYSTVLSSIW,SIWLSVVFIF,SSIWLSVVFI,LSSIWLSVVF,NKYSTVLSSI,YSTVLSSIWL	LUAD
GLB1L2	c.1221C>G	p.I407M	KMPYEPLTPVLYLSLWDALKYLGEP[p.I407M]MKSEKPINMENLPVNGGNGQSFGYIL	ALKYLGEPM,EPMKSEKPI,MKSEKPINM,ALKYLGEPMK,DALKYLGEPM	LUAD
GLI1	c.815delG	p.W272fs	QEQLVHHINSEHIHGERKEFVCHWG[p.W272fs]AAPGS*	KEFVCHWGA,KEFVCHWGAA	STAD
GLI3	c.2993C>T	p.P998L	VHAPRRCSDGGAHGYGRRHLQPHDA[p.P998L]LGHGVRRASDPVRTGSEGLALPRVPR	ALGHGVRRA,DALGHGVRR,RHLQPHDAL,RRHLQPHDAL	ACC
GLI3	c.3098delC	p.P1033fs	PVRTGSEGLALPRVPRFSSLSSCNP[p.P1033fs]RRWPRPRRSAVSCFRITRGPRAASPETSTRPPVLPASPRTSPWSP*	AVSCFRITR,SSLSSCNPR,SLSSCNPRR,SCNPRRWPR,RWPRPRRSA,RRSAVSCFR,RSAVSCFRI,CFRITRGPR,ITRGPRAAS,STRPPVLPA,NPRRWPRPR,WPRPRRSAV,RPRRSAVSC,GPRAASPET,LPASPRTSP,FSSLSSCNPR,SSLSSCNPRR,SSCNPRRWPR,SAVSCFRITR,RWPRPRRSAV,CFRITRGPRA,ITRGPRAASP,RAASPETSTR,STRPPVLPAS,CNPRRWPRPR,SCFRITRGPR,WPRPRRSAVS,RPRRSAVSCF,SPETSTRPPV,LPASPRTSPW,RRWPRPRRSA,RRSAVSCFRI,FRITRGPRAA	STAD

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
GLIPR1L2	c.276delA	p.G92fs	IPRGSNLRFMTWDVALSRTARAWGK[p.G92fs]NVCLRIIFIYKMYKWSILNFMVLVKICGSALKMNLLQVLLSEVGMQRRKCTILKMAVALETVLIIFSLFGTTLTKLVVLLLHVQKLDILYMQQFSYATMRQEEH*	HVQKLDILY,SILNFMVLV,ALKMNLLQV,KMNLLQVLL,LLQVLLSEV,KMAVALETV,LIIFSLFGT,TLTKLVVLL,KLVVLLLHV,VLLLHVQKL,YMQQFSYAT,VLVKICGSA,CLRIIFIYK,IIFIYKMYK,KMYKWSILN,ILNFMVLVK,SLFGTTLTK,VVLLLHVQK,ILYMQQFSY,QQFSYATMR,IFIYKMYKW,IYKMYKWSI,MYKWSILNF,KWSILNFMV,TVLIIFSLF,IFSLFGTTL,LYMQQFSYA,TARAWGKNV,MQRRKCTIL,QRRKCTILK,RIIFIYKMY,LLSEVGMQR,CTILKMAVA,ETVLIIFSL,LVKICGSAL,YKMYKWSIL,GMQRRKCTI,VQKLDILYM,MQQFSYATM,RAWGKNVCL,KNVCLRIIF,LRIIFIYKM,YKWSILNFM,WSILNFMVL,KICGSALKM,LKMNLLQVL,LQVLLSEVG,RRKCTILKM,LKMAVALET,MAVALETVL,VALETVLII,ALETVLIIF,LHVQKLDIL,LDILYMQQF,FIYKMYKWSI,YKWSILNFMV,WSILNFMVLV,ILNFMVLVKI,NLLQVLLSEV,KMAVALETVL,VLIIFSLFGT,IIFSLFGTTL,SLFGTTLTKL,TLTKLVVLLL,ILYMQQFSYA,YMQQFSYATM,VLVKICGSAL,ALKMNLLQVL,RIIFIYKMYK,KMYKWSILNF,SILNFMVLVK,LVKICGSALK,MQRRKCTILK,FSLFGTTLTK,RAWGKNVCLR,LVVLLLHVQK,MQQFSYATMR,AWGKNVCLRI,IYKMYKWSIL,MYKWSILNFM,KWSILNFMVL,VALETVLIIF,ETVLIIFSLF,LYMQQFSYAT,RTARAWGKNV,CLRIIFIYKM,DILYMQQFSY,CTILKMAVAL,MAVALETVLI,VGMQRRKCTI,GMQRRKCTIL,LQVLLSEVGM,ARAWGKNVCL,GKNVCLRIIF,LRIIFIYKMY,IIFIYKMYKW,VKICGSALKM,LKMNLLQVLL,QRRKCTILKM,LKMAVALETV,LETVLIIFSL,LHVQKLDILY,HVQKLDILYM,KLDILYMQQF,QQFSYATMRQ	STAD
GLOD4	c.667_668insC	p.Q223fs	KLELQGVKGGVDHAAAFGRIAFSCP[p.Q223fs]PERVARLRRLDEKGEPEDSDSPGEPGHPRESNSTGGHSGRP*	IAFSCPPER,NSTGGHSGR,HPRESNSTG,RESNSTGGH,CPPERVARL,RIAFSCPPER,VARLRRLDEK,FSCPPERVAR,IAFSCPPERV	LUAD
GLRA3	c.1360C>A	p.L454I	DTISRACFPLAFLIFNIFYWVIYKI[p.L454I]IRHEDIHQQQD*	FYWVIYKII,IFYWVIYKII,IYKIIRHEDI,FYWVIYKIIR	CRC
GLRA3	c.396C>A	p.F132L	AYSEYPDDSLDLDPSMLDSIWKPDL[p.F132L]LFANEKGANFHEVTTDNKLLRIFKNG	LLFANEKGA,SIWKPDLLF,IWKPDLLFA,DSIWKPDLL,SIWKPDLLFA,LFANEKGANF	CRC
GLT8D2	c.533C>T	p.A178V	IYLDDDVIVQGDIQELYDTTLALGH[p.A178V]VAAFSDDCDLPSAQDINRLVGLQNTY	TLALGHVAA,DTTLALGHV,TTLALGHVA,LALGHVAAF,DTTLALGHVA,TTLALGHVAA,TLALGHVAAF	GBM
GLTSCR2	c.1166A>G	p.Q389R	RHQELFRLRGIKAQVALRLAELARR[p.Q389R]RRRRQARREAEADKPRRLGRLKYQAP	RRRRRQARR,ELARRRRRR,RLAELARRR,LARRRRRRQA,RRRRRRQARR,RLAELARRRR	ACC
GLYR1	c.1139_1140insG	p.G380fs	CYVDMSTVDADTVTELAQVIVSRGG[p.G380fs]ALSGSPRLRESAAV*	SPRLRESAA,GALSGSPRL,RGGALSGSPR,QVIVSRGGAL,SPRLRESAAV	STAD
GNA13	c.598A>G	p.R200G	KYFLDNLDKLGEPDYIPSQQDILLA[p.R200G]GRPTKGIHEYDFEIKNVPFKMVDVGG	ILLAGRPTK,SQQDILLAG,LLAGRPTKGI	BLCA
GNAO1	c.848C>A	p.P283Q	KWFTDTSIILFLNKKDIFEEKIKKS[p.P283Q]QLTICFPEYTGPSAFTEAVAYIQAQY	KIKKSQLTI,QLTICFPEY,KKSQLTICF,KIKKSQLTIC,SQLTICFPEY,IKKSQLTICF,FEEKIKKSQL	LUAD
GNAS	c.2530C>T	p.R844C	QYFLDKIDVIKQADYVPSDQDLLRC[p.R844C]CVLTSGIFETKFQVDKVNFHMFDVGG	CCVLTSGIF,RCCVLTSGIF	LIHC
GNAS	c.2531G>A	p.R844H	QYFLDKIDVIKQADYVPSDQDLLRC[p.R844H]HVLTSGIFETKFQVDKVNFHMFDVGG	LLRCHVLTS,CHVLTSGIF,RCHVLTSGIF	PAAD
GNB1	c.239T>C	p.I80T	LAKIYAMHWGTDSRLLVSASQDGKL[p.I80T]TIWDSYTTNKVHAIPLRSSWVMTCAY	LTIWDSYTT,SQDGKLTIW,GKLTIWDSY,TIWDSYTTNK,ASQDGKLTIW	CLL
GNG12	c.202delA	p.T68fs	CEEHARSDPLLIGIPTSENPFKDKK[p.T68fs]LASSYSGIEKQLLASSQQRKL*	KLASSYSGI,ASSYSGIEK,LLASSQQRK,KDKKLASSY,KKLASSYSG,KQLLASSQQ,IEKQLLASS,LLASSQQRKL,QLLASSQQRK,LASSYSGIEK,SYSGIEKQLL,FKDKKLASSY,KKLASSYSGI,SSYSGIEKQL,SENPFKDKKL	STAD
GNPNAT1	c.162delT	p.F54fs	AISPTHPGEGLVLRPLCTADLNRGF[p.F54fs]LRYWVS*	RGFLRYWVS,DLNRGFLRY,TADLNRGFLR,CTADLNRGFL,ADLNRGFLRY	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
GNPTAB	c.3566G>A	p.R1189Q	VKAVLRDFYESMFPIPSQFELPREY[p.R1189Q]QNRFLHMHELQEWRAYRDKLKFWTHC	EYQNRFLHM,LPREYQNRF,REYQNRFLH,YQNRFLHMH,LPREYQNRFL,REYQNRFLHM,SQFELPREYQ	UCEC
GOLGA4	c.4608G>T	p.Q1536H	KKESNLETELKSQTARIMELEDHIT[p.Q1536H]HKTIEIESLNEVLKNYNQQKDIEHKE	MELEDHITH,HKTIEIESL,LEDHITHKTI	CRC
GOLGA5	c.1474C>A	p.L492I	ELEELRHEKEMQREEIQKLMGQIHQ[p.L492I]IRSELQDMEAQQVNEAESAREQLQDL	KLMGQIHQI,KLMGQIHQIR,HQIRSELQDM,QKLMGQIHQI,GQIHQIRSEL	KIRC
GOT2	c.1063C>T	p.R355W	ILNTPDLRKQWLQEVKVMADRIIGM[p.R355W]WTQLVSNLKKEGSTHNWQHITDQIGM	RIIGMWTQL,IIGMWTQLV,WTQLVSNLK,MWTQLVSNL,MADRIIGMW,RIIGMWTQLV,GMWTQLVSNL,MWTQLVSNLK,WTQLVSNLKK,VMADRIIGMW	PRAD
GP2	c.122C>T	p.S41L	LALVSCILTQASAVQRGYGNPIEAS[p.S41L]LYGLDLDCGAPGTPEAHVCFDPCQNY	NPIEASLYG,YGNPIEASLY,NPIEASLYGL,IEASLYGLDL	CRC
GPATCH4	c.629_630insA	p.K210fs	FLARLKGQDPGAPQLQSESKPPKKK[p.K210fs]EKEKEAERGGRSYSI*	EAERGGRSY,KEAERGGRSY,AERGGRSYSI	PRAD
GPATCH4	c.629delA	p.K210fs	AFLARLKGQDPGAPQLQSESKPPKK[p.K210fs]RKRKGGRKRRKKLQHLKGMMQMRSTQNMLSRTSEKARRRKGDIKKERSQMKERVQLKGMRRRTLQEQVGLGN*	MQMRSTQNM,QMRSTQNML,MLSRTSEKA,NMLSRTSEK,QMKERVQLK,RSTQNMLSR,RVQLKGMRR,KRKRKGGRK,KGGRKRRKK,RRKKLQHLK,LSRTSEKAR,RTSEKARRR,KARRRKGDI,RRRKGDIKK,KGMRRRTLQ,GMRRRTLQE,HLKGMMQMR,LKGMRRRTL,KKLQHLKGM,QHLKGMMQM,GMMQMRSTQ,SQMKERVQL,KERVQLKGM,RTLQEQVGL,MQMRSTQNML,MMQMRSTQNM,SQMKERVQLK,RTSEKARRRK,KKRKRKGGRK,KRKGGRKRRK,KRRKKLQHLK,QMRSTQNMLS,QNMLSRTSEK,LSRTSEKARR,KARRRKGDIK,RSQMKERVQL,RVQLKGMRRR,MLSRTSEKAR,QLKGMRRRTL,LQHLKGMMQM,RKRRKKLQHL,RKKLQHLKGM,KKLQHLKGMM,MKERVQLKGM,KERSQMKERV	STAD
GPC5	c.1040G>T	p.R347L	LVNDAVLQAHLNGQKLLEQVNRICG[p.R347L]LPVRTPTQSPRCSFDQSKEKHGMKTT	EQVNRICGL,QVNRICGLPV,VNRICGLPVR,LEQVNRICGL	LUSC
GPC6	c.640G>A	p.A214T	CVSKYTDQLKPFGDVPRKLKIQVTR[p.A214T]TFIAARTFVQGLTVGREVANRVSKVS	VTRTFIAAR,RTFIAARTF,KIQVTRTFI,QVTRTFIAA,TFIAARTFV,LKIQVTRTF,IQVTRTFIA,RTFIAARTFV,KLKIQVTRTF,KIQVTRTFIA,VTRTFIAART,QVTRTFIAAR,LKIQVTRTFI,IQVTRTFIAA,TRTFIAARTF	CRC
GPLD1	c.2150G>A	p.R717Q	TRMYALTSDAQPLLLSTFSGDRRFS[p.R717Q]QFGGVLHLSDLDDDGLDEIIMAAPLR	SQFGGVLHL,SGDRRFSQF,RRFSQFGGV,RFSQFGGVL,FSGDRRFSQF,RRFSQFGGVL,FSQFGGVLHL,SQFGGVLHLS	CRC
GPM6A	c.149C>T	p.A50V	IPYASLIATILLYAGVALFCGCGHE[p.A50V]VLSGTVNILQTYFEMARTAGDTLDVF	VLSGTVNIL,EVLSGTVNI,ALFCGCGHEV,EVLSGTVNIL,HEVLSGTVNI	KIRC
GPNMB	c.522C>G	p.I174M	GQSHHNVFPDGKPFPHHPGWRRWNF[p.I174M]MYVFHTLGQYFQKLGRCSVRVSVNTA	FMYVFHTLG,RRWNFMYVF,NFMYVFHTL,GWRRWNFMY,RWNFMYVFH,MYVFHTLGQY,GWRRWNFMYV,RWNFMYVFHT,HPGWRRWNFM,WNFMYVFHTL,WRRWNFMYVF,FMYVFHTLGQ	LUAD
GPNMB	c.9_10delTC	p.C3fs	MECL[p.C3fs]LFPGISAPGCKIAT*	LLFPGISAP,MECLLFPGI,LLFPGISAPG,MECLLFPGIS	TGCT
GPR110	c.1327A>G	p.R443G	TALPLNFSRKFIDWKGIPVNKSQLK[p.R443G]GGYSYQIKMCPQNTSIPIRGRVLIGS	KGGYSYQIK,SQLKGGYSY,LKGGYSYQI,GGYSYQIKM,QLKGGYSYQI,VNKSQLKGGY,KSQLKGGYSY,SQLKGGYSYQ,KGGYSYQIKM	CLL
GPR112	c.3848C>A	p.S1283Y	KDQMTISLGKTPRTMEVTEMSPSKN[p.S1283Y]YFISYSRGTPSLEMTDTGFPETTKIS	KNYFISYSR,MSPSKNYFI,PSKNYFISY,EMSPSKNYF,TEMSPSKNY,VTEMSPSKNY,EMSPSKNYFI,SPSKNYFISY,TEMSPSKNYF	UCEC
GPR123	c.1889T>C	p.L630P	PRTPHCVGKKVPQPVGAADLAPDTS[p.L630P]PCRKEGSSASRSCRPGPGHLTRREED	DLAPDTSPCR	CLL
GPR125	c.338G>A	p.R113Q	LSNNKISELKNGSFSGLSLLERLDL[p.R113Q]QNNLISSIDPGAFWGLSSLKRLDLTN	LQNNLISSI,LERLDLQNNL	CRC

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
GPR137B	c.718G>T	p.G240C	KISKMSLANIYLESKGSSVCQVTAI[p.G240C]CVTVILLYTSRACYNLFILSFSQNKS	QVTAICVTV,ICVTVILLY,TAICVTViL,CQVTAICVT,CQVTAICVTV,AICVTVILLY,SVCQVTAICV,QVTAICVTVI,TAICVTVILL	LUAD
GPR156	c.2262C>A	p.F754L	PVPSGCASLSSQHSYFDTESSSSDE[p.F754L]LFCRCHRPYCEICFQSSSDSSDSGTS	SSSDELFCR,LFCRCHRPY,TESSSSDEL,SSSSDELFCR,ELFCRCHRPY,TESSSSDELF	CRC
GPR158	c.1696G>A	p.D566N	LIGWTSSVCQNLEKQISLIGQGKTS[p.D566N]NHLIFNMCLIDRWDYMTAVAEFLFLL	KTSNHLIFN,TSNHLIFNM,GQGKTSNHL,GKTSNHLIF,KTSNHLIFNM,GQGKTSNHLI,QGKTSNHLIF	CRC
GPR158	c.2284C>A	p.P762T	NPHLQKKRCSKKGLGRSIMRRiTEI[p.P762T]TETVSRQCSKEDKEGADHGTAKGTAL	RITEITETV,RRITEITETV	LUAD
GPR161	c.1550delG	p.G517fs	AEAKINLFGEEALPGVLVTARTVPG[p.G517fs]AASGAAEAAELL*	TARTVPGAA,VTARTVPGA,TVPGAASGA,VPGAASGAA,LVTARTVPGA,RTVPGAASGA,VTARTVPGAA,TVPGAASGAA	STAD
GPR21	c.647G>A	p.R216H	FTLFIVMMLYAPAALIVCFTYFNIF[p.R216H]HICQQHTKDISERQARFSSQSGETGE	FTYFNIFHI,TYFNIFHIC,CFTYFNIFHI,IFHICQQHTK,FTYFNIFHIC	CRC
GPR6	c.106_165delGCGGCGCGGCCACAGCAGCAGGGGGGCCGGACACGGGCGAATGGGGACCCCCTGCT	p.AAAAATAAGGPDTGEWGPPA36del	AAMNASAASLNDSQVVVVAAEGAAA[p.AAAAATAAGGPDTGEWGPPA36del]LGAGGGANGSLELSSQLSAGPPGLLLPAVNPWDVLLCVSGTVIAGENALVVALIASTPALRTPMFVLVGSLATADLLAGCGLILH	VAAEGAAAL,AEGAAALGA,VVAAEGAAAL,AEGAAALGAG	PAAD
GPR98	c.12424C>T	p.R4142W	RFTIQLISIDEVEISPVKGSASIII[p.R4142W]WGDKRASGEVGIAPSSRHILIGEPSA	ASIIIWGDK,SIIIWGDKR,KGSASIIIW,SASIIIWGDK,VKGSASIIIW	CRC,UCEC
GPR98	c.12919G>T	p.G4307W	QRVNITIIRSSGDFGHVRLWYKTMS[p.G4307W]WTAEAGLDFVPAAGELLFEAGEMRKS	WTAEAGLDF,KTMSWTAEA,RLWYKTMSW,WYKTMSWTA,MSWTAEAGL,TMSWTAEAGL,WTAEAGLDFV,RLWYKTMSWT,SWTAEAGLDF,VRLWYKTMSW,LWYKTMSWTA,YKTMSWTAEA	LUAD
GPR98	c.18455A>T	p.Y6152F	AYRHFWMLVLFVIFNSLQGLYVFMV[p.Y6152F]FFILHNQMCCPMKASYTVEMNGHPGP	YVFMVFFIL,QGLYVFMVF,LYVFMVFFI,VFFILHNQM,GLYVFMVFF,GLYVFMVFFI,LQGLYVFMVF,QGLYVFMVFF,LYVFMVFFIL,MVFFILHNQM	CLL
GPRASP1	c.2117C>T	p.S706L	KEPCMYPAGGGSWKSRPEEEEDIVN[p.S706L]LWFWSRKYTKPEAIIGSWLWATEESN	IVNLWFWSR,VNLWFWSRK,NLWFWSRKY,EEEDIVNLW,EEDIVNLWF,EEEEDIVNL,IVNLWFWSRK,LWFWSRKYTK,VNLWFWSRKY,DIVNLWFWSR,EEEDIVNLWF,EEDIVNLWFW	HNSC
GPRC5A	c.88G>A	p.V30I	VPDGCRNGLKSKYYRLCDKAEAWGI[p.V30I]ILETVATAGVVTSVAFMLTLPILVCK	IILETVATA,AWGIILETV,EAWGIILET,KAEAWGIIL,AEAWGIILE,ILETVATAGV,GIILETVATA,EAWGIILETV,AEAWGIILET	CRC
GPRIN1	c.693_716delGAAGGAGGATCCTGGGTCTTTGAG	p.231_239RKEDPGSLR>R	KEDLGSLGKVDPLCSSKTYTVSPRK[p.231_239RKEDPGSLR>R]VDPVSSDKVDPVFPRKEEPRYSGKEHPVSSEKVAPTSAEKVDLVLSGKR	TVSPRKVDPV,KTYTVSPRKV	KIRC
GPRIN2	c.1337G>A	p.R446H	APASEDSLSVEGRRGPLRAVMQSLR[p.R446H]HPSCCGCSGAAPE*	MQSLRHPSC	ACC
GPRIN2	c.298A>C	p.T100P	ARASGPKARPSAGGHWWSSTVGNVS[p.T100P]PMGGSDLCRLRAPSAAAMQRSHSDLV	STVGNVSPM,SSTVGNVSPM	CESC
GPRIN2	c.721G>A	p.V241M	KAAEQLATTTCHALPPAALLCGMRE[p.V241M]MRAGGCCHALPATGILAFPKLVASVS	ALLCGMREM,LLCGMREMR,REMRAGGCC,AALLCGMREM,REMRAGGCCH,MRAGGCCHAL	ACC
GPRIN3	c.1898delG	p.R633fs	PSDPMGDSSPGSGKKTPSRSVKASP[p.R633fs]PGPAASASSSRSKS*	ASASSSRSK,RSVKASPPG,KASPPGPAA,SPPGPAASA,AASASSSRSK,SVKASPPGPA,VKASPPGPAA	HNSC
GPT2	c.29G>C	p.R10P	MQRAAALVR[p.R10P]PGCGPRTPSSWGRSQSSAAAEASAVL	LVRPGCGPR,RPGCGPRTPS,MQRAAALVRP	TGCT
GRAMD2	c.369C>G	p.I123M	DFLLQGRLYISPNWLCFHASLFGKD[p.I123M]MKVVIPVVSVQMIKKHKMARLLPNGL	SLFGKDMKV,ASLFGKDMK,HASLFGKDM,KDMKVVIPV,SLFGKDMKVV,HASLFGKDMK,FHASLFGKDM,KDMKVVIPVV,MKVVIPVVSV	CESC

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
GRAP2	c.207G>T	p.E69D	GYVPKNFIDIQFPKWFHEGLSRHQA[p.E69D]DNLLMGKEVGFFIIRASQSSPGDFSI	QADNLLMGK,SRHQADNLL,RHQADNLLM,HQADNLLMG,GLSRHQADNL,HQADNLLMGK,SRHQADNLLM	CRC
GRB14	c.898G>A	p.A300T	RHLQFFSEFGNSDIYVSLAGKKKHG[p.A300T]TPTNYGFCFKPNKAGGPRDLKMLCAE	KKHGTPTNY,HGTPTNYGF,TPTNYGFCF,GTPTNYGFCF,KKHGTPTNY,KHGTPTNYGF	BRCA
GRB7	c.716G>T	p.R239L	ISHEDLIQNFLNAGSFPEIQGFLQL[p.R239L]LGSGRKLWKRFFCFLRRSGLYYSTKG	LGSGRKLWK,EIQGFLQLL,LLGSGRKLW,LLGSGRKLWK,LQLLGSGRKL,QLLGSGRKLW,PEIQGFLQLL	LUAD
GREB1	c.1031C>A	p.S344Y	ESPSAPDGGCPQGGGNRAKYESAGM[p.S344Y]YCVPQVGLVGPASVTFPVVASGEPVS	AGMYCVPQV,MYCVPQVGL,AKYESAGMY,YESAGMYCV,GMYCVPQVG,GMYCVPQVGL,KYESAGMYCV,MYCVPQVGLV,RAKYESAGMY,YESAGMYCVP	KIRC
GRHL1	c.1822G>T	p.G608W	LVNMDDNIVKHYSNEDTFQLQIEEA[p.G608W]WGSYKLTLTEI*	AWGSYKLTL,QIEEAWGSY,FQLQIEEAW,EEAWGSYKL,QIEEAWGSYK,TFQLQIEEAW,LQIEEAWGSY,IEEAWGSYKL,EEAWGSYKLT	LUAD
GRIA1	c.652C>T	p.R218C	EGYRMLFQDLEKKKERLVVVDCESE[p.R218C]CLNAILGQIIKLEKNGIGYHYILANL	CLNAILGQI,CESECLNAI,CLNAILGQII,CESECLNAIL	CRC
GRIA2	c.2534G>A	p.R845Q	LVGGLGLAMLVALIEFCYKSRAEAK[p.R845Q]QMKVAKNAQNINPSSSQNSQNFATYK	KSRAEAKQM,AEAKQMKVA,KQMKVAKNA,KSRAEAKQMK,YKSRAEAKQM,KQMKVAKNAQ	CRC
GRID1	c.1864G>A	p.E622K	PRPSASATLHSAIWIVYGAFVQQGG[p.E622K]KSSVNSMAMRIVMGSWWLFTLIVCSS	GAFVQQGGK,KSSVNSMAM,VQQGGKSSV,GGKSSVNSM,FVQQGGKSSV,KSSVNSMAMR,GKSSVNSMAM	DLBCL
GRID1	c.2048G>T	p.R683L	VSRMDNPIRTFQDLSKQVEMSYGTV[p.R683L]LDSAVYEYFRAKGTNPLEQDSTFAEL	VLDSAVYEY,VEMSYGTVL,LDSAVYEYF,VLDSAVYEYF,TVLDSAVYEY,MSYGTVLDSA	LUAD
GRID2	c.1947delG	p.T649fs	YTTLATRMMMGAWWLFALIVISSYT[p.T649fs]QTSLLSSLLHALKVPSSLSRTFPSKQKSLMAQS*	SLLSSLLHA,LLSSLLHAL,TQTSLLSSL,LSSLLHALK,SLSRTFPSK,SSYTQTSLL,SSLSRTFPS,KQKSLMAQS,QTSLLSSLL,HALKVPSSL,VPSSLSRTF,FPSKQKSLM,ISSYTQTSL,SLLSSLLHAL,VISSYTQTSL,YTQTSLLSSL,TQTSLLSSLL,LLSSLLHALK,ALKVPSSLSR,SSLSRTFPSK,KVPSSLSRTF,LSRTFPSKQK,RTFPSKQKSL,FPSKQKSLMA,ISSYTQTSLL,LHALKVPSSL	HNSC
GRIK1	c.1103G>A	p.R368Q	VSSLQCHRHKPWRLGPRFMNLIKEA[p.R368Q]QWDGLTGHITFNKTNGLRKDFDLDII	AQWDGLTGH,KEAQWDGLT,AQWDGLTGHI,LIKEAQWDGL,FMNLIKEAQW,KEAQWDGLTG	LUAD
GRIN2B	c.1556G>A	p.R519Q	WNGMIGEVVMKRAYMAVGSLTINEE[p.R519Q]QSEVVDFSVPFIETGISVMVSRSNGT	TINEEQSEV,EEQSEVVDF,LTINEEQSEV,TINEEQSEVV,EQSEVVDFSV,NEEQSEVVDF	OV
GRK4	c.64_65insA	p.K22fs	MELENIVANSLLLKARQGGYGKK[p.K22fs]KWS*	RQGGYGKKKW	STAD
GRM3	c.2046C>A	p.F682L	SALLTKTNCIARIFDGVKNGAQRPK[p.F682L]LISPSSQVFICLGLILVQIVMVSVWL	KLISPSSQV,LISPSSQVF,LISPSSQVFI,KLISPSSQVF,AQRPKLISPS,VKNGAQRPKL	HNSC
GRM3	c.547C>T	p.R183C	ANLLRLFQIPQISYASTSAKLSDKS[p.R183C]CYDYFARTVPPDFYQAKAMAEILRFF	LSDKSCYDY,KSCYDYFAR,AKLSDKSCY,LSDKSCYDYF,KLSDKSCYDY,SAKLSDKSCY	GBM
GRM5	c.2685_2686insC	p.P895fs	SSGETLRYKDRRLAQHKSEIECFTP[p.P895fs]QREYGEWWESNNEQFQWKIRHVGPE*	WWESNNEQF,EIECFTPQR,SEIECFTPQ,REYGEWWES,EQFQWKIRH,FQWKIRHVG,TPQREYGEW,ESNNEQFQW,EWWESNNEQF,EQFQWKIRHV,IECFTPQREY,WESNNEQFQW,FQWKIRHVGP,REYGEWWESN,GEWWESNNEQ,TPQREYGEWW	LUAD
GRM6	c.1089G>T	p.E363D	GFDQYFMTRSLENNRRNIWFAEFWE[p.E363D]DNFNCKLTSSGTQSDDSTRKCTGEER	WEDNFNCKL,EFWEDNFNCK,AEFWEDNFNC	UCEC
GRM6	c.2152_2153insG	p.A718fs	SPTSQLVITFSLTSLQVVGMIAWLG[p.A718fs]GPAPTQRD*	MIAWLGGPA,GMIAWLGGPA	KIRC
GRM7	c.2036G>A	p.R679Q	VCSFRRVFLGLGMCISYAALLTKTN[p.R679Q]QIYRIFEQGKKSVTAPRLISPTSQLA	ALLTKTNQI,LTKTNQIYR,KTNQIYRIF,LLTKTNQIY,QIYRIFEQGK,LTKTNQIYRI,KTNQIYRIFE,ALLTKTNQIY,LLTKTNQIYR,TKTNQIYRIF	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
GRM8	c.2554C>T	p.R852C	SVSLGMLYMPKVYIIIFHPEQNVQK[p.R852C]CKRSFKAVVTAATMQSKLIQKGNDRP	VQKCKRSFK,KCKRSFKAV,CKRSFKAVV,NVQKCKRSFK,VQKCKRSFKA,KCKRSFKAVV	LIHC
GTF2E1	c.575G>T	p.R192L	AMPKKDARTLLARFNEQIEPIYALL[p.R192L]LETEDVNLAYEILEPEPTEIPALKQS	ALLLETEDV,IEPIYALLL,LETEDVNLA,LLLETEDVNL,LETEDVNLAY,EPIYALLLET	LUAD
GTF3A	c.918G>T	p.K306N	HAGCGKTFAMKQSLTRHAVVHDPDK[p.K306N]NKMKLKVKKSREKRSLASHLSGYIPP	VVHDPDKNK,KNKMKLKVK,AVVHDPDKNK,KNKMKLKVKK	CRC
GTF3C1	c.2299delA	p.S767fs	KEGPSGSGDSQLSASSRSESGRMKK[p.S767fs]VIIKWA*	RMKKVIIKW,SGRMKKVII,RMKKVIIKWA,SGRMKKVIIK	STAD
GTF3C4	c.1685delA	p.E562fs	LIDLVRWKILKDKHIPQFLQEALEK[p.E562fs]RLKAVESPIFGVLSFSS*	AVESPIFGV,ALEKRLKAV,RLKAVESPI,SPIFGVLSF,LKAVESPIF,VESPIFGVL,FLQEALEKRL,KAVESPIFGV,RLKAVESPIF,EALEKRLKAV,KRLKAVESPI,VESPIFGVLS,QEALEKRLKA	STAD
GUCY2C	c.1645G>T	p.G549C	NFTEKQKIELNKLLQIDYYNLTKFY[p.G549C]CTVKLDTMIFGVIEYCERGSLREVLN	NLTKFYCTV,LTKFYCTVK,TKFYCTVKL,FYCTVKLDTM,LTKFYCTVKL,YNLTKFYCTV,CTVKLDTMIF	BRCA
GUSB	c.1498T>C	p.C500R	PSRPVTFVSNSNYAADKGAPYVDVI[p.C500R]RLNSYYSWYHDYGHLELIQLQLATQF	RLNSYYSWY,IRLNSYYSW,VIRLNSYYS,DVIRLNSYY,APYVDVIRL,VDVIRLNSY,YVDVIRLNSY,RLNSYYSWYH,DVIRLNSYYS,VDVIRLNSYY,VIRLNSYYSW,IRLNSYYSWY	KIRC
GUSB	c.1501T>G	p.L501V	SRPVTFVSNSNYAADKGAPYVDVIC[p.L501V]VNSYYSWYHDYGHLELIQLQLATQFE	CVNSYYSWY,DVICVNSYY,VDVICVNSY,ICVNSYYSW,APYVDVICV,YVDVICVNSY,CVNSYYSWYH,DVICVNSYYS,VDVICVNSYY,ICVNSYYSWY	KIRC
GXYLT1	c.667_668insT	p.L223fs	SQRLFLPLILKEVDSLLYVDTDILF[p.L223fs]FTTS*	YVDTDILFF,YVDTDILFFT,LYVDTDILFF	STAD
H1FOO	c.642_643insA	p.A214fs	PGAATEKARKQGGAAKDTRAQSGEA[p.A214fs]KEGAPQARQGHAGTFQCWWAQQEGKGQRQQEQPRRC*	APQARQGHA,ARQGHAGTF,GHAGTFQCW,HAGTFQCWW,EAKEGAPQAR,QARQGHAGTF,GEAKEGAPQA,RQGHAGTFQC	BLCA
H2AFV	c.374A>G	p.Q125R	LIKATIAGGGVIPHIHKSLIGKKGQ[p.Q125R]RKTA*	SLIGKKGQR,KSLIGKKGQR	TGCT
H2AFY2	c.432delG	p.K144fs	GKSETILSPPPEKRGRKATSGKKGG[p.K144fs]RNPRLPNHGRPKSPNQRTAIKKELQIPPLKMGQGMDSPFCLLRALFWDRSCP*	GMDSPFCLL,RLPNHGRPK,LLRALFWDR,SPFCLLRAL,MGQGMDSPF,KKELQIPPL,KSPNQRTAIK,GMDSPFCLLR,KMGQGMDSPF,SGKKGGRNPR,GGRNPRLPNH,HGRPKSPNQR,RTAIKKELQI,CLLRALFWDR,RPKSPNQRTA,IPPLKMGQGM,SPFCLLRALF,NQRTAIKKEL,IKKELQIPPL,KELQIPPLKM,GQGMDSPFCL	STAD
H3F3C	c.392G>T	p.R131L	DTNLCAIHAKRVTIMPKDIQLARRI[p.R131L]LGERA*	LARRILGER,QLARRILGER,KDIQLARRIL	LUAD
HAO1	c.514C>T	p.R172C	AEKMGYKAIFVTVDTPYLGNRLDDV[p.R172C]CNRFKLPPQLRMKNFETSTLSFSPEE	RLDDVCNRF,RLDDVCNRFK	CRC
HAO2	c.34C>A	p.H12N	MSLVCLTDFQA[p.H12N]NAREQLSKSTRDFIEGGADDSITRDD	CLTDFQANA,FQANAREQL,QANAREQLSK,CLTDFQANAR	LUAD
HARS2	c.503G>A	p.R168H	NKVKKMKRYHVGKVWRRESPTIVQG[p.R168H]HYREFCQCDFDIAGQFDPMIPDAECL	IVQGHYREF,PTIVQGHYR,SPTIVQGHY,HYREFCQCDF,TIVQGHYREF,RESPTIVQGH	CRC
HAUS6	c.1588delA	p.S530fs	ENSPLSDVAKNTESSAFGGSLPAKK[p.S530fs]VIHFKKSKIIW*	KVIHFKKSK,PAKKVIHFK,AKKVIHFKK,LPAKKVIHF,IHFKKSKII,SLPAKKVIHF,PAKKVIHFKK,KVIHFKKSKI,IHFKKSKIIW	STAD
HBB	c.126C>A	p.F42L	GKVNVDEVGGEALGRLLVVYPWTQR[p.F42L]LFESFGDLSTPDAVMGNPKVKAHGKK	VVYPWTQRL,RLFESFGDL,VYPWTQRLF,WTQRLFESF,RLFESFGDLS,VVYPWTQRLF,PWTQRLFESF,LVVYPWTQRL,YPWTQRLFES	CRC
HBB	c.257T>G	p.F86C	VKAHGKKVLGAFSDGLAHLDNLKGT[p.F86C]CATLSELHCDKLHVDPENFRLLGNVL	NLKGTCATL,KGTCATLSEL	KIRC
HCN1	c.1496G>T	p.G499V	PLFANADPNFVTAMLSKLRFEVFQP[p.G499V]VDYIIREGAVGKKMYFIQHGVAGVIT	VFQPVDYII,EVFQPVDYI,LRFEVFQPV,FEVFQPVDY,KLRFEVFQPV,RFEVFQPVDY,VFQPVDYIIR,EVFQPVDYII,FEVFQPVDYI	LUSC
HCN1	c.1976G>T	p.R659L	QAIAPINYPQMTTLNSTSSTTTPTS[p.R659L]LMRTQSPPVYTATSLSHSNLHSPSPS	LMRTQSPPV,TTTPTSLMR,STTTPTSLM,SSTTTPTSL,SLMRTQSPPV,STTTPTSLMR,LMRTQSPPVY,SSTTTPTSLM	LUSC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
HCN1	c.2140G>T	p.A714S	QPSAILSPCSYTTAVCSPPVQSPLA[p.A714S]SRTFHYASPTASQLSLMQQQPQQQVQ	ASRTFHYAS,PLASRTFHY,LASRTFHYA,VQSPLASRT,PLASRTFHYA,ASRTFHYASP,VQSPLASRTF,SPLASRTFHY	LUSC
HCN1	c.692C>A	p.P231Q	IILDPKVIKMNYLKSWFVVDFISSI[p.P231Q]QVDYIFLIVEKGMDSEVYKTARALRI	FISSIQVDY,QVDYIFLIV,IQVDYIFLI,SSIQVDYIF,VVDFISSIQV,FISSIQVDYI,SIQVDYIFLI,IQVDYIFLIV,SSIQVDYIFL,ISSIQVDYIF	LUAD
HCN1	c.976C>A	p.P326T	LIGMMLLLCHWDGCLQFLVPLLQDF[p.P326T]TPDCWVSLNEMVNDSWGKQYSYALFK	FTPDCWVSL,FLVPLLQDFT	LUSC
HCN4	c.1574G>A	p.R525H	IVGATCYAMFIGHATALIQSLDSSR[p.R525H]HQYQEKYKQVEQYMSFHKLPPDTRQR	SLDSSRHQY,SSRHQYQEK,RHQYQEKYK,IQSLDSSRH,SRHQYQEKY,QSLDSSRHQY,SSRHQYQEKY,HQYQEKYKQV	CRC
HCRTR2	c.26_27insC	p.S9fs	MSGTKLEDSPP[p.S9fs]LSQLVICFGAE*	DSPPLSQLV,SPPLSQLVI,TKLEDSPPL,LEDSPPLSQL	STAD
HCRTR2	c.26delC	p.S9fs	MSGTKLEDSP[p.S9fs]LVATGHLLRS*	LVATGHLLR,SPLVATGHL,LEDSPLVAT,GTKLEDSPLV,SPLVATGHLL	STAD
HCRTR2	c.298G>T	p.D100Y	VCVAVWKNHHMRTVTNYFIVNLSLA[p.D100Y]YVLVTITCLPATLVVDITETWFFGQS	FIVNLSLAY,IVNLSLAYV,NLSLAYVLV,SLAYVLVTI,YVLVTITCL,VNLSLAYVL,FIVNLSLAYV,SLAYVLVTIT,YFIVNLSLAY,AYVLVTITCL,IVNLSLAYVL,LSLAYVLVTI	HNSC
HDAC4	c.2703delC	p.P901fs	PDEVGTGPGVGFNVNMAFTGGLDPP[p.P901fs]WETLSTWRPSERWSCRSPASLPRMWCWCHQASMPWRATPPLLGATTSPPDASGT*	GLDPPWETL,RMWCWCHQA,HQASMPWRA,ASLPRMWCW,RWSCRSPAS,RSPASLPRM,PWRATPPLL,LSTWRPSER,RPSERWSCR,MPWRATPPL,WSCRSPASL,WCWCHQASM,WCHQASMPW,FTGGLDPPW,PPWETLSTW,SPASLPRMW,RMWCWCHQAS,SMPWRATPPL,RWSCRSPASL,MWCWCHQASM,CWCHQASMPW,SCRSPASLPR,TLSTWRPSER,MPWRATPPLL,SERWSCRSPA,CRSPASLPRM,HQASMPWRAT,WETLSTWRPS,DPPWETLSTW	STAD
HDAC5	c.3130G>A	p.A1044T	CVSALLSVELQPLDEAVLQQKPNIN[p.A1044T]TVATLEKVIEIQSKHWSCVQKFAAGL	QQKPNINTV,NTVATLEKV,KPNINTVAT,LQQKPNINTV,NINTVATLEK,NTVATLEKVI,KPNINTVATL,QQKPNINTVA	CRC
HDLBP	c.1507C>T	p.R503C	SNLIRIEGDPQGVQQAKRELLELAS[p.R503C]CMENERTKDLIIEQRFHRTIIGQKGE	LASCMENER,RELLELASC,LELASCMEN,ELASCMENER,RELLELASCM	TGCT
HDLBP	c.2240delG	p.G747fs	EKQTKSFTVDIRAKPEYHKFLIGKG[p.G747fs]AAKFARCATALEHVSSSLRLRTRTRT*	ALEHVSSSL,HVSSSLRLR,SSSLRLRTR,SLRLRTRTR,LIGKGAAKF,AKFARCATA,KFARCATAL,FLIGKGAAKF,KFLIGKGAAK,KGAAKFARCA,AAKFARCATA,SSLRLRTRTR,VSSSLRLRTR,TALEHVSSSL,SLRLRTRTRT,FARCATALEH,HKFLIGKGAA,AKFARCATAL,LEHVSSSLRL	STAD
HEATR7B2	c.3325G>A	p.E1109K	TVVVNLLQKPLPFDRDTKTLWKALA[p.E1109K]KKPASSGKLLQALIDKLETELEDDIA	KTLWKALAK,TLWKALAKK,WKALAKKPA,KTLWKALAKK,LAKKPASSGK,AKKPASSGKL	BLCA
HECA	c.998_999insG	p.R333fs	MAGGHVFRNAHFDYSPAGLAVHRGG[p.R333fs]TLRHPRAVPSAAGPLRTPHSHPQA*	AVHRGGTLR,RGGTLRHPR,GTLRHPRAV,RTPHSHPQA,HPRAVPSAA,LAVHRGGTL,GLAVHRGGTL,RGGTLRHPRA,LAVHRGGTLR,HPRAVPSAAG,RAVPSAAGPL,LRHPRAVPSA,SAAGPLRTPH	STAD
HECTD2	c.55C>G	p.P19A	MSEAVRVPSPATPLVVAA[p.P19A]AAPEERKGKESEREKLPPIVSAGAGA	ATPLVVAAA,AAAAPEERK,TPLVVAAAA,VAAAAPEERK,ATPLVVAAAA	ACC
HECW1	c.547G>T	p.A183S	ICFKYYHGVSGALRATTPSVTVKNS[p.A183S]SAPIFKSIGADETVQGQGSRRLISFS	KNSSAPIFK,TVKNSSAPI,SSAPIFKSI,VKNSSAPIF,VTVKNSSAPI,NSSAPIFKSI,TVKNSSAPIF	LUAD
HERC1	c.6989G>A	p.R2330H	PVLAVIGGVDAGLRVGGRCVHKQTG[p.R2330H]HHATLLGVVKEGSTSAKVQWDEAEIT	HKQTGHHAT,KQTGHHATL,HKQTGHHATL,KQTGHHATLL	GBM
HERC2	c.986C>T	p.S329F	SQMLSAILLLLQLWDSGAQETDNER[p.S329F]FAQGTSAPLLPLLQRFQSIICRKDAP	FAQGTSAPL,AQETDNERF,ERFAQGTSA,RFAQGTSAPL,GAQETDNERF,NERFAQGTSA,FAQGTSAPLL	CESC
HES3	c.286C>A	p.P96T	SCLPGVSQLLRRGDEVGSGLRCPLV[p.P96T]TESAAGSTMDSAGLGQEAPALFRPCT	TESAAGSTM,CPLVTESAA,VTESAAGSTM	ACC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
HEXDC	c.1444A>C	p.T482P	CRSWRLPCSWLSTRMPWRSGWRKTC[p.T482P]PPACSGCKLCCRTSARCLPPRCHPPA	GWRKTCPPA	KIRC,LUSC
HGF	c.1400C>A	p.S467Y	NPDDDAHGPWCYTGNPLIPWDYCPI[p.S467Y]YRCEGDTTPTIVNLDHPVISCAKTKQ	IPWDYCPIY,LIPWDYCPIY,IPWDYCPIYR	CRC
HGF	c.2057T>C	p.M686T	AEKIGSGPCEGDYGGPLVCEQHKMR[p.M686T]TVLGVIVPGRGCAIPNRPGIFVRVAY	KMRTVLGVI,EQHKMRTVL,HKMRTVLGV,CEQHKMRTV,KMRTVLGVIV,TVLGVIVPGR,CEQHKMRTVL,HKMRTVLGVI	LUAD
HGF	c.686G>C	p.G229A	PQCSEVECMTCNGESYRGLMDHTES[p.G229A]AKICQRWDHQTPHRHKFLPERYPDKG	GLMDHTESA,LMDHTESAK,LMDHTESAKI,GLMDHTESAK,HTESAKICQR,TESAKICQRW	CESC
HHIPL1	c.2075T>C	p.V692A	AFRDGEVRLVRPAGLSSGSGRVEVF[p.V692A]AGGRWGTVCDDSWNISGAAVVCRQLG	VEVFAGGRW,EVFAGGRWGT	ACC
HIF3A	c.214G>A	p.A72T	VSAHLDKASIMRLTISYLRMHRLCA[p.A72T]TGEWNQVGAGGEPLDACYLKALEGFV	RMHRLCATG,LRMHRLCAT,HRLCATGEW,YLRMHRLCAT,MHRLCATGEW	CESC
HIP1	c.2819G>T	p.R940L	AQLVAASKVKADKDSPNLAQLQQAS[p.R940L]LGVNQATAGVVASTISGKSQIEETDN	QLQQASLGV,LAQLQQASL,LQQASLGVN,AQLQQASLGV,NLAQLQQASL,QQASLGVNQA	LUAD
HIPK4	c.839G>A	p.R280H	PDAANPWQLKSSADYLAETKVRPLE[p.R280H]HRKYMLKSLDQIETVNGGSVASRLTF	KVRPLEHRK,LEHRKYMLK,RPLEHRKYM,HRKYMLKSL,KVRPLEHRKY,ETKVRPLEHR,RPLEHRKYML,EHRKYMLKSL	CRC
HIST1H1B	c.564G>C	p.K188N	AAAGVKKVAKSPKKAKAAAKPKKAT[p.K188N]NSPAKPKAVKPKAAKPKAAKPKAAKP	ATNSPAKPK,KKATNSPAK,KATNSPAKPK,ATNSPAKPKA,KPKKATNSPA	CESC
HIST1H1C	c.194C>T	p.A65V	VSELITKAVAASKERSGVSLAALKK[p.A65V]VLAAAGYDVEKNNSRIKLGLKSLVSK	ALKKVLAAA,VLAAAGYDV,AALKKVLAA,KKVLAAAGY,KVLAAAGYDV,SLAALKKVLA,LAALKKVLAA,LKKVLAAAGY	DLBCL
HIST1H1D	c.243C>G	p.I81M	SGVSLAALKKALAAAGYDVEKNNSR[p.I81M]MKLGLKSLVSKGTLVQTKGTGASGSF	RMKLGLKSL,NSRMKLGLK,MKLGLKSLV,RMKLGLKSLV,YDVEKNNSRM,SRMKLGLKSL	BLCA
HIST1H1E	c.398G>C	p.G133A	NKKAASGEAKPKAKKAGAAKAKKPA[p.G133A]AAAKKPKKATGAATPKKSAKKTPKKA	AAAAKKPKK,AAKAKKPAA,AKKPAAAAK,KAKKPAAAAK,AAKAKKPAAA,AKAKKPAAAA	DLBCL
HIST1H1E	c.74G>C	p.R25P	MSETAPAAPAAPAPAEKTPVKKKA[p.R25P]PKSAGAAKRKASGPPVSELITKAVAA	KTPVKKKAPK,KAPKSAGAAK,KKAPKSAGAA	LUAD
HIST1H2AL	c.89G>C	p.R30P	GKQGGKARAKAKTRSSRAGLQFPVG[p.R30P]PVHRLLRKGNYAERVGAGAPVYLAAV	GLQFPVGPV,FPVGPVHRL,LQFPVGPVH,QFPVGPVHRL,FPVGPVHRLL	CESC
HIST1H2BF	c.229G>A	p.E77K	DTGISSKAMGIMNSFVNDIFERIAG[p.E77K]KASRLAHYNKRSTITSREIQTAVRLL	RIAGKASRL,GKASRLAHY,DIFERIAGK,RIAGKASRLA,KASRLAHYNK,AGKASRLAHY,DIFERIAGKA	HNSC
HIST1H2BJ	c.38A>G	p.K13R	MPEPAKSAPAPK[p.K13R]RGSKKAVTKAQKKDGKKRKRSRKESY	RGSKKAVTK,APAPKRGSK,SAPAPKRGSK,APKRGSKKAV	TGCT
HIST1H3B	c.142G>T	p.A48S	TKAARKSAPATGGVKKPHRYRPGTV[p.A48S]SLREIRRYQKSTELLIRKLPFQRLVR	RYRPGTVSL,SLREIRRYQ,VSLREIRRY,TVSLREIRR,HRYRPGTVS,SLREIRRYQK,GTVSLREIRR,RYRPGTVSLR,TVSLREIRRY,RPGTVSLREI,HRYRPGTVSL	DLBCL
HIST1H3B	c.220G>A	p.E74K	LREIRRYQKSTELLIRKLPFQRLVR[p.E74K]KIAQDFKTDLRFQSSAVMALQEACEA	LVRKIAQDF,FQRLVRKIA,KLPFQRLVRK,LVRKIAQDFK,LPFQRLVRKI,RLVRKIAQDF	LUSC
HIST1H3C	c.110A>T	p.K37M	TGGKAPRKQLATKAARKSAPATGGV[p.K37M]MKPHRYRPGTVALREIRRYQKSTELL	GVMKPHRYR,VMKPHRYRP,KSAPATGGVM,VMKPHRYRPG	HNSC
HIST1H4C	c.203G>C	p.R68P	GVKRISGLIYEETRGVLKVFLENVI[p.R68P]PDAVTYTEHAKRKTVTAMDVVYALKR	FLENVIPDA,VIPDAVTYT,NVIPDAVTY,LENVIPDAV,FLENVIPDAV,NVIPDAVTYT,IPDAVTYTEH,LENVIPDAVT	HNSC
HIST2H2AC	c.89G>C	p.R30P	GKQGGKARAKAKSRSSRAGLQFPVG[p.R30P]PVHRLLRKGNYAERVGAGAPVYMAAV	GLQFPVGPV,FPVGPVHRL,LQFPVGPVH,QFPVGPVHRL,FPVGPVHRLL	CESC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
HIST2H2BE	c.161G>A	p.G54D	KRKRSRKESYSIYVYKVLKQVHPDT[p.G54D]DISSKAMGIMNSFVNDIFERIAGEAS	KQVHPDTDI	LUSC
HIVEP3	c.1601delC	p.P534fs	LSSHSEKTKPEQSLLSLQHPPSTAP[p.P534fs]LCLS*	LQHPPSTAPL,HPPSTAPLCL	STAD
HIVEP3	c.1660delC	p.H554fs	PSTAPPVPLLRSHSMPSAACTISTP[p.H554fs]TTPSEVATPSMTISPTPKP*	SMTISPTPK,STPTTPSEV,EVATPSMTI,TPSMTISPT,TPSEVATPS,SEVATPSMT,PSMTISPTPK,TPSEVATPSM,SEVATPSMTI	STAD
HLA-A	c.233A>G	p.Q78R	DDTQFVRFDSDAASQRMEPRAPWIE[p.Q78R]REGPEYWDQETRNVKAQSQTDRVDLG	WIEREGPEY,IEREGPEYW,PWIEREGPEY	BLCA,PRAD
HLA-C	c.312C>A	p.N104K	EGPEYWDRNTQIYKAQAQTDRESLR[p.N104K]KLRGYYNQSEAGSHTLQSMYGCDVGP	QTDRESLRK,SLRKLRGYY,KLRGYYNQS,SLRKLRGYYN,KLRGYYNQSE,RESLRKLRGY,ESLRKLRGYY	CESC
HLA-DMA	c.250G>A	p.E84K	LSEAYDEDQLFFFDFSQNTRVPRLP[p.E84K]KFADWAQEQGDAPAILFDKEFCEWMI	RLPKFADWA,NTRVPRLPK,RVPRLPKFA,TRVPRLPKF	CRC
HLA-DMA	c.706_707insG	p.A236fs	YTAIAYWVPRNALPSDLLENVLCGV[p.A236fs]GLWPGCAGHHRGHCSHHLLPEALLR*	HLLPEALLR,RGHCSHHLL,SHHLLPEAL,LENVLCGVGL,HHRGHCSHHL,CSHHLLPEAL	LUAD
HLA-DPB1	c.340_341insA	p.G114fs	NSQKDILEEKRAVPDRMCRHNYELG[p.G114fs]EAHDPAAPSPA*	ELGEAHDPA,HNYELGEAH,RHNYELGEAH,YELGEAHDPA	CESC
HLA-DQB2	c.740G>A	p.R247H	AQSKMLSGIGGFVLGLIFLGLGLII[p.R247H]HHRGQKGPRGPPPAGNISAMIQSGER	LIIHHRGQK,GLIIHHRGQK	PRAD
HLA-DQB2	c.748G>A	p.G250S	KMLSGIGGFVLGLIFLGLGLIIRHR[p.G250S]SQKGPRGPPPAGNISAMIQSGERAQA	LIIRHRSQK,RHRSQKGPR,GLIIRHRSQK	PRAD
HLCS	c.1084G>A	p.E362K	LPPSSNIVQTPEDFNLLKSSNFRRY[p.E362K]KVLREILTTLGLSCDMKQVPALTPLY	KSSNFRRYK,RYKVLREIL,SSNFRRYKV,NFRRYKVLR,SNFRRYKVL,RRYKVLREI,KVLREILTTL,KSSNFRRYKV,SSNFRRYKVL,SNFRRYKVL,RYKVLREILT,FRRYKVLREI,RRYKVLREIL	CRC
HLX	c.34T>A	p.S12T	MFAAGLAPFYA[p.S12T]TNFSLWSAAYCSSAGPGGCSFPLDPA	ATNFSLWSA,PFYATNFSL,FYATNFSLW,LAPFYATNF,TNFSLWSAA,GLAPFYATNF,PFYATNFSLW,ATNFSLWSAA,TNFSLWSAAY,YATNFSLWSA,APFYATNFSL	HNSC
HLX	c.693C>G	p.N231K	GRPAGVHLSGLQPSAGQFFASLDPI[p.N231K]KEASAILSPLNSNPRNSVQHQFQDTF	KEASAILSP,DPIKEASAI,QFFASLDPIK,KEASAILSPL,DPIKEASAIL	TGCT
HMCN1	c.398C>A	p.S133Y	RELYVQGGGDCPEMSIGAIKIALEI[p.S133Y]YLPGSFIYVFTDARSKDYRLTHEVLQ	YLPGSFIYV,IYLPGSFIY,AIKIALEIY,EIYLPGSFI,LEIYLPGSF,IKIALEIYL,YLPGSFIYVF,IYLPGSFIYV,AIKIALEIYL,GAIKIALEIY,EIYLPGSFIY,ALEIYLPGSF,LEIYLPGSFI	UCEC
HMG20A	c.744G>C	p.E248D	EEFLNHSKAREAELRQLRKSNMEFE[p.E248D]DRNAALQKHVESMRTAVEKLEVDVIQ	MEFEDRNAA,MEFEDRNAAL	CRC
HNF1B	c.1250C>T	p.T417M	GHNLLSPDGKMISVSGGGLPPVSTL[p.T417M]MNIHSLSHHNPQQSQNLIMTPL5GVM	GLPPVSTLM,STLMNIHSL,LMNIHSLSH,MNIHSLSHH,PPVSTLMNI,TLMNIHSLSH,LMNIHSLSHH,GGLPPVSTLM,LPPVSTLMNI	GBM
HNF1B	c.906C>G	p.N302K	GVSPSKAHGLGSNLVTEVRVYNWFA[p.N302K]KRRKEEAFRQKLAMDAYSSNQTHSLN	RVYNWFAKR,VYNWFAKRR,FAKRRKEEA,AKRRKEEAF,RVYNWFAKRR,EVRVYNWFAK,WFAKRRKEEA,FAKRRKEEAF	KIRC
HOOK1	c.1083delA	p.L361fs	QVKTLQETNMMYMHNTVSLEEELKK[p.L361fs]QMQHVHN*	LEEELKKQM,LKKQMQHVH,FELKKQMQHV	STAD
HOXA5	c.31G>T	p.G11C	MSSYFVNSFC[p.G11C]CRYPNGPDYQLHNYGDHSSVSEQFRD	FVNSFCCRY,CRYPNGPDY,YFVNSFCCR,YFVNSFCCRY,CCRYPNGPDY,SYFVNSFCCR	LUAD
HOXD10	c.452A>G	p.Y151C	AEVPSYQRLVPESCPVENPEVPVPG[p.Y151C]CFRLSQTYATGKTQEYNNSPEGSSTV	CFRLSQTYA,EVPVPGCFR,VPVPGCFRL,GCFRLSQTY,EVPVPGCFRL,NPEVPVPGCF	HNSC
HOXD8	c.201G>C	p.Q67H	GRHAAAAAAALQLYGNSAAGFPHAPP[p.Q67H]HAHAHPHPSPPPSGTGCGGREGRGQE	FPHAPPHAH,AGFPHAPPH,AGFPHAPPHA,FPHAPPHAHA	KIRP

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
HOXD8	c.364delC	p.P122fs	GSPAAAYQAAPPPPPHPPPPPPPPP[p.P122fs]AAGLPVTGSPRSFTDTITYRDSRFLRPSKRPSWYNILTVNRPVVILARTQTT*	FTDTITYRD,RSFTDTITY,KRPSWYNIL,ITYRDSRFL,TYRDSRFLR,DSRFLRPSK,SFTDTITYR,DTITYRDSR,WYNILTVNR,NILTVNRPV,TVNRPVVIL,SPRSFTDTI,RPSKRPSWY,SKRPSWYNI,RSFTDTITYR,ITYRDSRFLR,RDSRFLRPSK,RFLRPSKRPS,VNRPVVILAR,DSRFLRPSKR,SWYNILTVNR,TVNRPVVILA,LPVTGSPRSF,SPRSFTDTIT,RPSWYNILTV,FLRPSKRPSW,SKRPSWYNIL,YNILTVNRPV	STAD
HPD	c.852_853delAG	p.R284fs	GGAGVQHIALKTEDIITAIRHLRER[p.R284fs]PGVLICSLHVLQTTAGEAEDGQDQGEGEH*	GVLICSLHV,VLICSLHVL,SLHVLQTTA,VLQTTAGEA,HLRERPGVL,RPGVLICSL,RERPGVLIC,HLRERPGVLI,RHLRERPGVL,RERPGVLICS	UCEC
HPS3	c.1403C>T	p.S468L	NHIILLTKAEPEAIPERRQSPKRLL[p.S468L]LRKDTSVKIKIPPVAEAGWNLYIVNT	LLLRKDTSV,LLRKDTSVK,RQSPKRLLL,RLLLRKDTSV,LLRKDTSVKI,LLLRKDTSVK,RQSPKRLLLR,QSPKRLLLRK,RRQSPKRLLL	CRC
HPS3	c.2436G>C	p.K812N	VACLPDVVLQELFFKLTSQYIWRLS[p.K812N]NRQPPDTTPLRTSEDLINACSHYGLI	QYIWRLSNR,SQYIWRLSN,SQYIWRLSNR,NRQPPDTTPL	HNSC
HPSE2	c.174G>T	p.K58N	LHLSLSSQAGDRRPLPVDRAAGLKE[p.K58N]NTLILLDVSTKNPVRTVNENFLSLQL	GLKENTLIL,LKENTLILL,GLKENTLILL,RAAGLKENTL,KENTLILLDV	CRC
HRAS	c.181C>A	p.Q61K	IEDSYRKQVVIDGETCLLDILDTAG[p.Q61K]KEEYSAMRDQYMRTGEGFLCVFAINN	LDTAGKEEY,AGKEEYSAM,ILDTAGKEEY,DTAGKEEYSA	THCA
HRAS	c.182A>G	p.Q61R	IEDSYRKQVVIDGETCLLDILDTAG[p.Q61R]REEYSAMRDQYMRTGEGFLCVFAINN	LDTAGREEY,AGREEYSAM,ILDTAGREEY,AGREEYSAMR,DTAGREEYSA	THCA
HRAS	c.34G>A	p.G12S	MTEYKLVVVGA[p.G12S]SGVGKSALTIQLIQNHFVDEYDPTIE	LVVVGASGV,KLVVVGASGV,YKLVVVGASG	HNSC
HRAS	c.35G>A	p.G12D	MTEYKLVVVGA[p.G12D]DGVGKSALTIQLIQNHFVDEYDPTIE	LVVVGADGV,VVGADGVGK,KLVVVGADGV,VVVGADGVGK	BLCA,HNSC
HRAS	c.35G>C	p.G12A	MTEYKLVVVGA[p.G12A]AGVGKSALTIQLIQNHFVDEYDPTIE	LVVVGAAGV,VVGAAGVGK,YKLVVVGAA,KLVVVGAAGV,VVVGAAGVGK,YKLVVVGAAG,GAAGVGKSAL	HNSC
HRAS	c.38G>T	p.G13V	MTEYKLVVVGAG[p.G13V]VVGKSALTIQLIQNHFVDEYDPTIED	KLVVVGAGV,VVGAGVVGK,KLVVVGAGVV,VVVGAGVVGK,YKLVVVGAGV	HNSC
HRC	c.1317_1318insC	p.P439fs	PHHHHHRVPREEDEEVSAELGHQAP[p.P439fs]QPQAKPPR*	HQAPQPQAK,AELGHQAPQ	KIRC
HRCT1	c.275A>C	p.H92P	LGIFHHHRHPGHVSHVPNVGLHHHH[p.H92P]PPRHTPHHLHHHHHPHRHHPRHAR*	GLHHHHPPR,PPRHTPHHL,VGLHHHHPPR,HPPRHTPHHL,HHHPPRHTPH	BLCA
HRNR	c.1delA	p.M1fs	[p.M1fs]CLNSYKASSLSSMFSTNMPPSMGSMIR*	NMPPSMGSM,SYKASSLSS,KASSLSSMF,MPPSMGSMI,LNSYKASSL,YKASSLSSM,LSSMFSTNM,FSTNMPPSM,SMFSTNMPP,SLSSMFSTNM,CLNSYKASSL,SMFSTNMPPS,NMPPSMGSMI,SYKASSLSSM,KASSLSSMFS,YKASSLSSMF,MFSTNMPPSM,TNMPPSMGSM	OV
HRNR	c.7615G>A	p.G2539S	QHGSGSSQSSGYGRQGSGSGQSPGH[p.G2539S]SQRGSGSRQSPSYGRHGSGSGRSSSS	HSQRGSGSR	CESC
HRSP12	c.359G>A	p.R120Q	IYKQYFKSNFPARAAYQVAALPKGS[p.R120Q]QIEIEAVAIQGPLTTA5L*	SQIEIEAVA,LPKGSQIEI,AALPKGSQI,SQIEIEAVAI,ALPKGSQIEI	CRC
HS3ST1	c.859G>A	p.E287K	RDRCLHESKGRAHPQVDPKLLNKLH[p.E287K]KYFHEPNKKFFELVGRTFDWH*	KLLNKLHKY,HKYFHEPNK,LLNKLHKYF,KLLNKLHKYF,KYFHEPNKKF,LHKYFHEPNK	CRC
HS3ST3A1	c.1195G>T	p.G399W	EIDREVVRRLREFYRPFNLKFYQMT[p.G399W]WHDFGWDG*	FYQMTWHDF,NLKFYQMTW,LKFYQMTWH,YQMTWHDFG,QMTWHDFGW,FNLKFYQMTW,KFYQMTWHDF,YQMTWHDFGW	LUAD
HSD17B1	c.937G>A	p.G313S	VPAKAEAGAEAGGGAGPGAEDEAGR[p.G313S]SAVGDPELGDPPAAPQ*	AEDEAGRSA,RSAVGDPEL,AEDEAGRSAV,GRSAVGDPEL	ACC
HSD17B6	c.627C>G	p.F209L	EAFSDILRREIQHFGVKISIVEPGY[p.F209L]LRTGMTNMTQSLERMKQSWKEAPKHI	YLRTGMTNM,SIVEPGYLR,YLRTGMTNMT,ISIVEPGYLR,GYLRTGMTNM,VEPGYLRTGM	LUAD
HSF4	c.505C>T	p.R169W	QALRGVQESTEARLRELRQQNEILW[p.R169W]WEVVTLRQSHGQQHRVIGKLIQCLFG	ILWWEVVTL,RQQNEILWW,LWWEVVTLR,NEILWWEVV,WEVVTLRQS,QQNEILWWEV,ILWWEVVTLR,EILWWEVVTL,WEVVTLRQSH,NEILWWEVVT	TGCT

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
HSPA13	c.253G>T	p.V85L	DENGHISIPSMVSFTDNDVYVGYES[p.V85L]LELADSNPQNTIYDAKRFIGKIFTAE	DVYVGYESL,YVGYESLELA,VYVGYESLEL	LUAD
HSPA4L	c.1447C>T	p.R483C	RIGSFTIQNVFPQSDGDSSKVKVKV[p.R483C]CVNIHGIFSVASASVIEKQNLEGDHS	KVKVKVCVN,KVKVCVNIH,VCVNIHGIF,CVNIHGIFSV,SSKVKVKVCV,KVKVKVCVNI,KVKVCVNIHG,VKVCVNIHGI,KVCVNIHGIF	UCEC
HSPBAP1	c.845G>T	p.R282L	HYVESIDPVTVSINSWIELEEDHLA[p.R282L]LVEEAITRMLVCALKTAENPQNTRAW	HLALVEEAI,LEEDHLALV,ALVEEAITRM,IELEEDHLAL	LUAD
HTR2A	c.656C>T	p.S219L	LKIIAVWTISVGISMPIPVFGLQDD[p.S219L]LKVFKEGSCLLADDNFVLIGSFVSFF	LQDDLKVFK,GLQDDLKVF,PVFGLQDDLK,GLQDDLKVFK,IPVFGLQDDL,FGLQDDLKVF,LKVFKEGSCL	UCEC
HTR3B	c.706C>T	p.R236C	SVSSTYSILQSSAGGFAQIQFNVVM[p.R236C]CRHPLVYVVSLLIPSIFLMLVDLGSF	VVMCRHPLV,IQFNVVMCR,VMCRHPLVY,MCRHPLVYV,NVVMCRHPL,VMCRHPLVYV,VVMCRHPLVY,QIQFNVVMCR,NVVMCRHPLV,AQIQFNVVMC,IQFNVVMCRH,FNVVMCRHPL	CRC
HTR5A	c.454C>T	p.R152C	ASIWNVTAIALDRYWSITRHMEYTL[p.R152C]CTRKCVSNVMIALTWALSAVISLAPL	CTRKCVSNV,HMEYTLCTR,YTLCTRKCV,RHMEYTLCT,HMEYTLCTRK,CTRKCVSNVM,MEYTLCTRKC	CRC
HTR5A	c.894G>T	p.W298C	DTWREQKEQRAALMVGILIGVFVLC[p.W298C]CIPFFLTELISPLCSCDIPAIWKSIF	VLCCIPFFL,CIPFFLTEL,VFVLCCIPF,FVLCCIPFF,FVLCCIPFFL,CIPFFLTELI,VFVLCCIPFF,GVFVLCCIPF	LUAD
HTRA3	c.1208A>G	p.Q403R	DFPEVSSGIYVQEVAPNSPSQRGGI[p.Q403R]RDGDIIVKVNGRPLVDSSELQEAVLT	GIRDGDIIVK	GBM
HYAL4	c.664G>A	p.D222N	AFMKETIKLGIKSRPKGLWGYYLYP[p.D222N]NCHNYNVYAPNYSGSCPEDEVLRNNE	YLYPNCHNY,YPNCHNYNV,GLWGYYLYPN,YLYPNCHNYN,YYLYPNCHNY,LYPNCHNYNV,YPNCHNYNVY	TGCT
HYDIN	c.1352G>A	p.R451Q	NPLEAKLYQQTIYCDILGREIRLPL[p.R451Q]QIKGEGMGPKIHFNFELLDIGKVFTG	EIRLPLQIK,REIRLPLQI,QIKGEGMGPK,LPLQIKGEGM	CRC
HYDIN	c.2816G>A	p.R939Q	PELNLGAHFSLDTHYYHFKLINKGR[p.R939Q]QIQQLFWMNDSFRPQAKLSKKGRVKK	RQIQQLFWM,KLINKGRQI,KGRQIQQLF,KGRQIQQLFW,FKLINKGRQI,NKGRQIQQLF,RQIQQLFWMN	CRC
HYDIN	c.3559C>T	p.R1187C	VHYPNLSFETKELDFGCILNDTELI[p.R1187C]CYVTITNCSPLVVKFRWFFLVNDEEN	LNDTELICY,TELICYVTI,ILNDTELICY,DTELICYVTI,TELICYVTIT	CRC
HYOU1	c.472C>T	p.R158C	TVHFQISSQLQFSPEEVLGMVLNYS[p.R158C]CSLAEDFAEQPIKDAVITVPVFFNQA	MVLNYSCSL,VLNYSCSLA,YSCSLAEDF,GMVLNYSCSL,MVLNYSCSLA,NYSCSLAEDF	CRC
IARS2	c.2494C>T	p.R832C	YCEKENDPKRRSCQTALVEILDVIV[p.R832C]CSFAPILPHLAEEVFQHIPYIKEPKS	VIVCSFAPI,CSFAPILPH,ILDVIVCSF,ILDVIVCSFA,VIVCSFAPIL,DVIVCSFAPI,EILDVIVCSF,CSFAPILPHL	SKCM
IBA57	c.390C>A	p.S130R	RTLYDVILYGLQEHSEVSGFLLECD[p.S130R]RSVQGALQKHLALYRIRRKVTVEPHP	FLLECDRSV,RSVQGALQK,LECDRSVQGA	ACC
IBTK	c.3638delA	p.K1213fs	PVNAWASSLHSVSSKSFRDFLLEEK[p.K1213fs]SLLLAIVQAIMSKKFLLKELKILRHQKLSDALPMVPQDQKATIFQIYHF*	FLLEEKSLL,LLEEKSLLL,SLLLAIVQA,LLLAIVQAI,AIMSKKFLL,FLLKELKIL,KLSDALPMV,LLAIVQAIM,AIVQAIMSK,IVQAIMSKK,IMSKKFLLK,KFLLKELKI,ATIFQIYHF,ELKILRHQK,LLKELKILR,VPQDQKATI,VQAIMSKKF,SKKFLLKEL,LKILRHQKL,RHQKLSDAL,QKLSDALPM,QKATIFQIY,EEKSLLLAI,LEEKSLLLA,FLLEEKSLLL,SLLLAIVQAI,LLLAIVQAIM,LLEEKSLLLA,AIVQAIMSKK,AIMSKKFLLK,LAIVQAIMSK,IVQAIMSKKF,KATIFQIYHF,KSLLLAIVQA,MSKKFLLKEL,DQKATIFQIY,VPQDQKATIF,ELKILRHQKL,HQKLSDALPM,RDFLLEEKSL,LEEKSLLLAI,VQAIMSKKFL,KKFLLKELKI,LRHQKLSDAL,EEKSLLLAIV,LPMVPQDQKA	STAD
IDE	c.110delA	p.K37fs	ALPSTFRSVLGARLPPPERLCGFQK[p.K37fs]RLTAK*	GFQKRLTAK,CGFQKRLTAK	STAD
IDH1	c.394C>G	p.R132G	VFREAIICKNIPRLVSGWVKPIIIG[p.R132G]GHAYGDQYRATDFVVPGPGKVEITYT	PIIIGGHAY,GGHAYGDQY,KPIIIGGHAY,IGGHAYGDQY	GBM

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
IDH1	c.394C>T	p.R132C	VFREAIICKNIPRLVSGWVKPIIIG[p.R132C]CHAYGDQYRATDFVVPGPGKVEITYT	PIIIGCHAY,GCHAYGDQY,KPIIIGCHAY,IGCHAYGDQY	LAML,LIHC,MM,SKCM
IDH1	c.395G>A	p.R132H	VFREAIICKNIPRLVSGWVKPIIIG[p.R132H]HHAYGDQYRATDFVVPGPGKVEITYT	PIIIGHHAY,GHHAYGDQY,KPIIIGHHAY,IGHHAYGDQY	GBM,LAML,PRAD
IDH2	c.419G>A	p.R140Q	TITPDEARVEEFKLKKMWKSPNGTI[p.R140Q]QNILGGTVFREPIICKNIPRLVPGWT	IQNILGGTV,QNILGGTVF,SPNGTIQNI,TIQNILGGTV,SPNGTIQNIL,IQNILGGTVF	LAML
IDH2	c.515G>A	p.R172K	VFREPIICKNIPRLVPGWTKPITIG[p.R172K]KHAHGDQYKATDFVADRAGTFKMVFT	WTKPITIGK,KHAHGDQYK,GKHAHGDQY,IGKHAHGDQY	LAML
IDUA	c.1120A>C	p.T374P	DNAFLSYHPHPFAQRTLTARFQVNN[p.T374P]PRPPHVQLLRKPVLTAMGLLALLDEE	NPRPPHVQL,FQVNNPRPP,TARFQVNNPR,QVNNPRPPHV,NPRPPHVQLL,FQVNNPRPPH	ACC
IDUA	c.99T>G	p.H33Q	AALLALLASLLAAPPVAPAEAPHLV[p.H33Q]QVDAARALWPLRRFWRSTGFCPPLPH	HLVQVDAAR,VQVDAARAL,AEAPHLVQV,HLVQVDAARA,APHLVQVDAA,VQVDAARALW	KIRP
IER5	c.580C>G	p.R194G	SRAARRPCGCPLGGEDPPGTPAATP[p.R194G]GAACCCAPQPAEDEPPAPPAVCPRKR	TPAATPGAA,TPAATPGAAC	KIRP
IFNA10	c.236T>C	p.V79A	KDRHDFRIPQEEFDGNQFQKAQAIS[p.V79A]ALHEMIQQTFNLFSTEDSSAAWEQSL	ALHEMIQQT,AISALHEMI,KAQAISALH,QAISALHEM,QKAQAISAL,FQKAQAISAL,QAISALHEMI,AQAISALHEM,ALHEMIQQTF	GBM,LUSC
IFNA10	c.238C>T	p.L80F	DRHDFRIPQEEFDGNQFQKAQAISV[p.L80F]FHEMIQQTFNLFSTEDSSAAWEQSLL	KAQAISVFH,QAISVFHEM,QKAQAISVF,AQAISVFHEM,VFHEMIQQTF,QAISVFHEMI,FQKAQAISVF	GBM
IFT140	c.1990G>A	p.E664K	VDEGLKNYVPVNHFWDQSEPRLFVC[p.E664K]KAVQETPRSQPQSANGQPQDGRAGPA	QSEPRLFVCK,EPRLFVCKAV,SEPRLFVCKA	HNSC
IFT172	c.2509G>A	p.A837T	YERAGDLFEKIHNPQKALECYRKGN[p.A837T]TFMKAVELARLAFPVEVVKLEEAWGD	CYRKGNTFM,KGNTFMKAV,NTFMKAVEL,CYRKGNTFMK,TFMKAVELAR,NTFMKAVELA,LECYRKGNTF,RKGNTFMKAV	STAD
IFT172	c.2831C>T	p.A944V	AQHYASLQEYEIAEELYTKGDRTKD[p.A944V]VIDMYTQAGRWEQAHKLAMKCMRPED	RTKDVIDMY,DVIDMYTQA,RTKDVIDMYT	CRC
IGF2BP2	c.556A>T	p.T186S	SSPSPPQRAQRGDHSSREQGHAPGG[p.T186S]SSQARQIDFPLRILVPTQFVGAIIGK	SSQARQIDF,GSSQARQIDF	CLL
IGF2R	c.3942_3943insG	p.T1314fs	HKVAGLLTQKLTYENGLLKMNFTGG[p.T1314fs]GHLP*	KMNFTGGGH,MNFTGGGHL,KMNFTGGGHL,LKMNFTGGGH	STAD
IGHMBP2	c.1843C>A	p.R615S	FLAEDRRINVAVTRARRHVAVICDS[p.R615S]STVNNHAFLKTLVEYFTQHGEVRTAF	AVICDSSTV,STVNNHAFL,SSTVNNHAF,STVNNHAFLK,DSSTVNNHAF	LUAD
IGJ	c.230G>A	p.R77Q	KCARITSRIIRSSEDPNEDIVERNI[p.R77Q]QIIVPLNNRENISDPTSPLRTRFVYH	QIIVPLNNR,DIVERNIQI,VERNIQIIV,RNIQIIVPL	CRC
IK	c.268_269delGA	p.E90fs	DPAARRRKKKSYYAKLRQQEIERER[p.E90fs]ASREVPGSCQGTERWSEQRL*	EIERERASR,REVPGSCQG,TERWSEQRL,RQQEIERERA,IERERASREV,REVPGSCQGT	UCEC
IKZF3	c.485T>G	p.L162R	KRSHTGERPFQCNQCGASFTQKGNL[p.L162R]RRHIKLHTGEKPFKCHLCNYACQRRD	KGNLRRHIK,SFTQKGNLR,FTQKGNLRR,ASFTQKGNLR,KGNLRRHIKL,SFTQKGNLRR,NLRRHIKLHT,TQKGNLRRHI	CLL
IL17B	c.100C>T	p.R34W	FLLTISIFLGLGQPRSPKSKRKGQG[p.R34W]WPGPLAPGPHQVPLDLVSRMKPYARM	GQGWPGPLA,RKGQGWPGPL,WPGPLAPGPH	BRCA
IL17RA	c.2409_2410insC	p.Q803fs	PYEEEQRQSVQSDQGYISRSSPQPP[p.Q803fs]RGTHGNGGRGGRGAGPREAGPATLSRGPGEPEEPPAAAAFPPAAEELGLGHDGVRVRGAQCMRAAPQGPPRSQL*	GLGHDGVRV,RAAPQGPPR,RGGRGAGPR,RVRGAQCMR,GPREAGPAT,VRVRGAQCM,EEPPAAAAF,REAGPATLS,ISRSSPQPPR,GVRVRGAQCM,RVRGAQCMRA,GPREAGPATL,APQGPPRSQL,AAFPPAAEEL,EELGLGHDGV	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
IL1R2	c.1091_1092insG	p.L364fs	KEASSTFSWGIVLAPLSLAFLVLGG[p.L364fs]NMDAQTVQTQNWKSRWSDCAMASSSRLSILSQVK*	RLSILSQVK,QTVQTQNWK,KSRWSDCAM,MASSSRLSI,AQTVQTQNW,CAMASSSRL,ASSSRLSIL,SRLSILSQV,FLVLGGNMDA,AMASSSRLSI,KSRWSDCAMA,SSRLSILSQV,TVQTQNWKSR,MASSSRLSIL,LAFLVLGGNM,VQTQNWKSRW,WKSRWSDCAM,DAQTVQTQNW	CLL
IL1RAP	c.149T>G	p.F50C	DDWGLDTMRQIQVFEDEPARIKCPL[p.F50C]CEHFLKFNYSTAHSAGLTLIWYWTRQ	RIKCPLCEH,IKCPLCEHF,CEHFLKFNY,RIKCPLCEHF,CPLCEHFLKF,CEHFLKFNYS	KIRC
IL1RAPL2	c.1940C>T	p.T647M	KHEIPATTLPVPSLGNHHTYCNLPL[p.T647M]MLLNGQLPLNNTLKDTQEFHRNSSLL	MLLNGQLPL,TYCNLPLML,HTYCNLPLM,LMLLNGQLPL,HTYCNLPLML,TYCNLPLMLL,LPLMLLNGQL,HHTYCNLPLM	CRC
IL2	c.308G>T	p.R103M	CLEEELKPLEEVLNLAQSKNFHLRP[p.R103M]MDLISNINVIVLELKGSETTFMCEYA	RPMDLISNI,NFHLRPMDL,SKNFHLRPM,QSKNFHLRPM,KNFHLRPMDL,MDLISNINVI	LUAD
IL25	c.502_503delTG	p.C168fs	HGEKGTHKGYCLERRLYRVSLACVC[p.C168fs]AAPCDGLAGPAGGWSLFGKPGARCTTTCHEGPGCPDAWPL*	AGGWSLFGK,SLFGKPGAR,GPAGGWSLF,HEGPGCPDA,SLACVCAAPC,RVSLACVCAA,WSLFGKPGAR,GPGCPDAWPL,LAGPAGGWSL,HEGPGCPDAW	KIRP
IL3	c.268G>A	p.A90T	DILMENNLRRPNLEAFNRAVKSLQN[p.A90T]TSAIESILKNLLPCLPLATAAPTRHP	TSAIESILK,KSLQNTSAI,NTSAIESIL,LQNTSAIESI,NTSAIESILK,AVKSLQNTSA,VKSLQNTSAI	CRC
IL32	c.643C>A	p.P215T	LWKQFQSFCCSLSELFMSSFQSYGA[p.P215T]TRGDKEELTPQKCSEPQSSK*	SYGATRGDK,SFQSYGATR,SSFQSYGAT,FQSYGATRG,SSFQSYGATR,QSYGATRGDK	LUAD
IL32	c.653_654insG	p.D218fs	QFQSFCCSLSELFMSSFQSYGAPRG[p.D218fs]EQGGADTPEVL*	APRGEQGGA	SKCM
IL5RA	c.139C>A	p.L47I	LLPDEKISLLPPVNFTIKVTGLAQV[p.L47I]ILQWKPNPDQEQRNVNLEYQVKINAP	GLAQVILQW,GLAQVILQWK,IKVTGLAQVI,TGLAQVILQW	CRC
IL6ST	c.647C>A	p.P216H	FVNIEVWVEAENALGKVTSDHINFD[p.P216H]HVYKVKPNPPHNLSVINSEELSSILK	TSDHINFDH,HINFDHVYK,DHINFDHVY,TSDHINFDHV,HINFDHVYKV,SDHINFDHVY	MM
IL7R	c.161C>T	p.S54L	DLEDAELDDYSFSCYSQLEVNGSQH[p.S54L]LLTCAFEDPDVNITNLEFEICGALVE	EVNGSQHLL,SQHLLTCAF,LEVNGSQHL,GSQHLLTCAF,LEVNGSQHLL	LUSC
ILF3	c.1450G>A	p.E484K	VKVLQDMGLPTGAEGRDSSKGEDSA[p.E484K]KETEAKPAVVAPAPVVEAVSTPSAAF	SSKGEDSAK,KETEAKPAV,KETEAKPAVV,GEDSAKETEA	BLCA
INADL	c.4018C>G	p.P1340A	KLVFIRNEDAVNQMAVTPFPVPSSS[p.P1340A]ASSIEDQSGTEPISSEEDGSVEVGIK	FPVPSSSAS,VPSSSASSI,TPFPVPSSSA,FPVPSSSASS	LUSC
INF2	c.1581delC	p.S527fs	PLLPGMGWGPPPPPPLLPCTCSPP[p.S527fs]WREAWRRSSWPRWTMAWAQHGSPAIGG*	SWPRWTMAW,AWRRSSWPR,RSSWPRWTM,SSWPRWTMA,WPRWTMAWA,WAQHGSPAI,REAWRRSSW,WRRSSWPRW,AWAQHGSPA,AQHGSPAIG,LPCTCSPPW,AWRRSSWPRW,SSWPRWTMAW,RSSWPRWTMA,MAWAQHGSPA,CSPPWREAWR,EAWRRSSWPR,WTMAWAQHGS,WPRWTMAWAQ,LLPCTCSPPW,WREAWRRSSW,RRSSWPRWTM,AWAQHGSPAI	STAD
ING1	c.658G>T	p.A220S	DECYERFSRETDGAQKRRMLHCVQR[p.A220S]SLIRSQELGDEKIQIVSQMVELVENR	MLHCVQRSL,RSLIRSQEL,RMLHCVQRS,RMLHCVQRSL,MLHCVQRSLI,RSLIRSQELG	LUAD
INMT	c.167G>T	p.G56V	PSPEAEMLKFNLECLHKTFGPGGLQ[p.G56V]VDTLIDIGSGPTIYQVLAACDSFQDI	LQVDTLIDI,GLQVDTLIDI,KTFGPGGLQV	LUAD
INMT	c.635C>T	p.S212F	LKPGGHLVTTVTLRLPSYMVGKREF[p.S212F]FCVALEKEEVEQAVLDAGFDIEQLLH	EFFCVALEK,YMVGKREFF,GKREFFCVA,KREFFCVAL,REFFCVALE,MVGKREFFCV,YMVGKREFFC,SYMVGKREFF,GKREFFCVAL,REFFCVALEK	SKCM
INPP5D	c.1568G>A	p.R523Q	SFMFNGTSLGFVNSHLTSGSEKKLR[p.R523Q]QNQNYMNILRFLALGDKKLSPFNITH	RQNQNYMNI,KLRQNQNYM,KKLRQNQNY,KLRQNQNYMN,RQNQNYMNIL,KKLRQNQNYM	CRC
INPP5K	c.787C>T	p.R263C	EGRLLFPPTYKFDRNSNDYDTSEKK[p.R263C]CKPAWTDRILWRLKRQPCAGPDTPIP	KCKPAWTDR,SEKKCKPAW	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
INPPL1	c.1478C>T	p.T493M	VFGTQENSVGDREWLDLLRGGLKEL[p.T493M]MDLDYRPIAMQSLWNIKVAVLVKPEH	LMDLDYRPI,LKELMDLDY,ELMDLDYRPI,GLKELMDLDY,LLRGGLKELM,MDLDYRPIAM	HNSC
INPPL1	c.2921delC	p.A974fs	APREEPLTPRLKPEGAPEPEGVAAP[p.A974fs]HPRTASITLPTTSLKGSRTSCCPRSHPRLPGPLSHLPPRTKWPLQCLLHSLGTTGTLVWERGVLQMRSLEAHCPLQTFHLHHCRTQPSSCPPAWILYQGQWSGAVVGLRPVAHHLPRPIQGLHCPQAPHQPALSWGKWPVGMTGPARCCRWPRR*	RLPGPLSHL,SLGTTGTLV,YQGQWSGAV,ALSWGKWPV,VLQMRSLEA,GLRPVAHHL,HLPRPIQGL,ITLPTTSLK,LSHLPPRTK,TTGTLVWER,QTFHLHHCR,HQPALSWGK,MTGPARCCR,AWILYQGQW,SWGKWPVGM,RTASITLPT,GSRTSCCPR,RTSCCPRSH,RSHPRLPGP,RTKWPLQCL,RSLEAHCPL,RPVAHHLPR,PARCCRWPR,SCPPAWILY,EGVAAPHPR,SCCPRSHPR,WSGAVVGLR,APHPRTASI,HPRTASITL,HPRLPGPLS,LPPRTKWPL,CPQAPHQPA,APHQPALSW,WPVGMTGPA,LQMRSLEAH,EAHCPLQTF,SHLPPRTKW,TKWPLQCLL,LLHSLGTTG,HSLGTTGTL,LGTTGTLVW,RGVLQMRSL,TQPSSCPPA,SSCPPAWIL,ILYQGQWSG,GQWSGAVVG,VAHHLPRPI,GLHCPQAPH,PQAPHQPAL,EPEGVAAPH,CPLQTFHLH,QPSSCPPAW,QPALSWGKW,LEAHCPLQT,SSCPPAWILY,HLPPRTKWPL,ILYQGQWSGA,YQGQWSGAVV,GQWSGAVVGL,LLHSLGTTGT,SITLPTTSLK,TSCCPRSHPR,GTTGTLVWER,RTASITLPTT,KGSRTSCCPR,RSHPRLPGPL,RTKWPLQCLL,RTQPSSCPPA,PARCCRWPRR,LQTFHLHHCR,QWSGAVVGLR,HSLGTTGTLV,APHPRTASIT,CPRSHPRLPG,HPRLPGPLSH,WPLQCLLHSL,CPQAPHQPAL,LEAHCPLQTF,LVWERGVLQM,ASITLPTTSL,LSHLPPRTKW,LHSLGTTGTL,SLGTTGTLVW,LQMRSLEAHC,MRSLEAHCPL,TQPSSCPPAW,HQPALSWGKW,LSWGKWPVGM,WERGVLQMRS,QPSSCPPAWI	STAD
INPPL1	c.3460delC	p.P1154fs	SEVDYAPAGPARSALLPGPLELQPP[p.P1154fs]GDCPRTMAGPSASLHPASGRASRKTWQRRLRACRAGGPAGWARQA*	TMAGPSASL,SLHPASGRA,ASLHPASGR,RASRKTWQR,RTMAGPSAS,ASRKTWQRR,KTWQRRLRA,WQRRLRACR,RLRACRAGG,RACRAGGPA,HPASGRASR,CPRTMAGPS,GPSASLHPA,SGRASRKTW,RTMAGPSASL,RASRKTWQRR,ASRKTWQRRL,KTWQRRLRAC,RLRACRAGGP,ELQPPGDCPR,SASLHPASGR,TWQRRLRACR,CPRTMAGPSA,WQRRLRACRA,TMAGPSASLH,ASGRASRKTW	STAD
INTS12	c.1A>G	p.M1V	[p.M1V]VAATVNLELDPIFLKALGFLHSKSKD	VAATVNLEL	MM
INTS4	c.1378T>G	p.S460A	MRKISNNITLREDQLDTVLAVLEDS[p.S460A]ARDIREALHELLCCTNVSTKEGIHLA	VLAVLEDSA,SARDIREAL,SARDIREALH,DSARDIREAL	TGCT
INTS7	c.2818C>T	p.R940C	GIVWKTGPRTTIFVKSLEDPYSQQI[p.R940C]CLQQQQAQQPLQQQQQRNAYTRF*	DPYSQQICL,QQICLQQQQA	UCEC
INTS7	c.317G>T	p.R106I	LCVLKVTQQSEKHLEKILNVDEFVK[p.R106I]IIFSVIHSNDPVARAITLRMLGSLAS	FVKIIFSVI,EFVKIIFSV,DEFVKIIFS,ILNVDEFVKI,EFVKIIFSVI,DEFVKIIFSV	UCEC
INVS	c.2396G>A	p.R799K	WKPSRRHDTEPKAKCAPQKRRTQEL[p.R799K]KGGRCSPAGSSRPGSARGEAVHAGQN	PQKRRTQELK,ELKGGRCSPA	CESC
INVS	c.2444delG	p.R815fs	KRRTQELRGGRCSPAGSSRPGSARG[p.R815fs]RRSMLGRILPTIVHQETK*	SMLGRILPT,MLGRILPTI,SARGRRSML,RGRRSMLGR,RSMLGRILP,GSARGRRSM,RRSMLGRIL,SMLGRILPTI,MLGRILPTIV,ILPTIVHQET,SSRPGSARGR,SARGRRSMLG,RGRRSMLGRI,RSMLGRILPT	STAD
IPO11	c.2532delT	p.S844fs	ERYPVVMSTYLGVMGRVLLQNTSFF[p.S844fs]LHYLMRWPINLIRRWTSFWEI*	LLQNTSFFL,YLMRWPINL,LMRWPINLI,TSFFLHYLM,SFFLHYLMR,FFLHYLMRW,RRWTSFWEI,LQNTSFFLH,QNTSFFLHY,NTSFFLHYL,LHYLMRWPI,NLIRRWTSF,LIRRWTSFW,WPINLIRRW,NTSFFLHYLM,VLLQNTSFFL,FLHYLMRWPI,YLMRWPINLI,TSFFLHYLMR,SFFLHYLMRW,HYLMRWPINL,RWPINLIRRW,LMRWPINLIR,LQNTSFFLHY,INLIRRWTSF,NLIRRWTSFW,IRRWTSFWEI	STAD
IRAK3	c.800G>A	p.R267Q	PYMRNGTLFDRLQCVGDTAPLPWHI[p.R267Q]QIGILIGISKAIHYLHNVQPCSVICG	IQIGILIGI,APLPWHIQI,WHIQIGILI,LPWHIQIGI,QIGILIGISK,TAPLPWHIQI,LPWHIQIGIL	CRC

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
IREB2	c.1256G>A	p.R419Q	HLEHTGFSKAKLESMETYLKAVKLF[p.R419Q]QNDQNSSGEPEYSQVIQINLNSIVPS	FQNDQNSSG	CRC
IRF4	c.368A>G	p.K123R	RCALNKSNDFEELVERSQLDISDPY[p.K123R]RVYRIVPEGAKKGAKQLTLEDPQMSM	ISDPYRVYR,RVYRIVPEG,DISDPYRVY,DPYRVYRIV,QLDISDPYRV,RVYRIVPEGA,SQLDISDPYR,DISDPYRVYR,LDISDPYRVY	MM
IRS4	c.1771_1772insG	p.G591fs	GHGSGGGQGPGDGHGSGGGKNSGGG[p.G591fs]QRLRKWERIRW*	GQRLRKWER,RLRKWERIR,RLRKWERIRW,GKNSGGGQRL	STAD
IRS4	c.63_65delGGC	p.21_22AA>A	MASCSFTRDQATRRLRGAAAAAAA[p.21_22AA>A]LAAVVTTPLLSSGTPTALIGTGSSCPGA	RGAAAAAAAL	PAAD
IRX3	c.1265T>C	p.L422P	LVSAPLGKFPAWTNRPFPGPPPGPR[p.L422P]PHPLSLLGSAPPHLLGLPGAAGHPAA	PPGPRPHPL,GPRPHPLSL,GPRPHPLSLL	ACC
IRX6	c.1274C>T	p.A425V	CDESSCIPKAFGNPKFALQGLPLNC[p.A425V]VPCPRRSEPVVQCQYPSGAEAG*	PLNCVPCPR,ALQGLPLNCV,VPCPRRSEPV	STAD
ISX	c.256C>T	p.R86C	AASGSGLEKPPKDQPQEGRKSKRRV[p.R86C]CTTFTTEQLHELEKIFHFTHYPDVHI	KSKRRVCTT,CTTFTTEQL,SKRRVCTTF,RRVCTTFTT,KSKRRVCTTF	SKCM
ISX	c.5G>T	p.C2F	M[p.C2F]FAEVGPALCRGMERNSLGCCEAPKKL	MFAEVGPAL	LUSC
ITGA10	c.2006G>A	p.R669Q	PIVHLTPSLEVTPQAISVVQRDCRR[p.R669Q]QGQEAVCLTAALCFQVTSRTPGRWDH	CRRQGQEAV,RQGQEAVCL,RRQGQEAVCL,RQGQEAVCLT	HNSC
ITGA4	c.2018C>T	p.T673M	YLAVGSMKTLMLNVSLFNAGDDAYE[p.T673M]MTLHVKLPVGLYFIKILELEEKQINC	MTLHVKLPV,DAYEMTLHV,YEMTLHVKL,NAGDDAYEM,AYEMTLHVKL,DAYEMTLHVK,EMTLHVKLPV,FNAGDDAYEM,YEMTLHVKLP	CRC
ITGA4	c.2700C>A	p.F900L	GIVRFLSKTDKRLLYCIKADPHCLN[p.F900L]LLCNFGKMESGKEASVHIQLEGRPSI	HCLNLLCNF,CLNLLCNFGK,IKADPHCLNL	CRC
ITGA5	c.143C>A	p.A48D	PPLLPLLLLLLPPPPRVGGFNLDAE[p.A48D]DPAVLSGPPGSFFGFSVEFYRPGTDG	NLDAEDPAV	KICH
ITGA8	c.1846G>T	p.G616C	TEFRDKLSPINISLNYSLDESTFKE[p.G616C]CLEVKPILNYYRENIVSEQAHILVDC	STFKECLEV,TFKECLEVK,KECLEVKPI,DESTFKECL,CLEVKPILNY,STFKECLEVK,ESTFKECLEV,KECLEVKPIL	LUAD
ITGAX	c.2054G>A	p.R685H	KRSKNLLGSRDLQSSVTLDLALDPG[p.R685H]HLSPRATFQETKNRSLSRVRVLGLKA	GHLSPRATF	LUSC
ITGAX	c.848G>A	p.R283H	TDGKKEGDSLDYKDVIPMADAAGII[p.R283H]HYAIGVGLAFQNRNSWKELNDIASKP	GIIHYAIGV,DAAGIIHYA,ADAAGIIHY,IHYAIGVGL,MADAAGIIHY,IIHYAIGVGL,HYAIGVGLAF,DAAGIIHYAI,IHYAIGVGLA	LUAD
ITGB1	c.1132C>A	p.L378I	PKSAVGTLSANSSNVIQLIIDAYNS[p.L378I]ISSEVILENGKLSEGVTISYKSYCKN	LIIDAYNSI,QLIIDAYNSI,AYNSISSEVI,DAYNSISSEV	STAD
ITGB1	c.472G>A	p.D158N	LKFKRAEDYPIDLYYLMDLSYSMKD[p.D158N]NLENVKSLGTDLMNEMRRITSDFRIG	SMKDNLENV,LSYSMKDNL,YSMKDNLENV,SMKDNLENVK	HNSC
ITGB8	c.21_22insT	p.A7fs	MCGSALAFF[p.A7fs]YRCICLPAKRPARSRLVPLGSLGVFTCSWTGPR*	CGSALAFFY,ALAFFYRCI,LVPLGSLGV,GSALAFFYR,FTCSWTGPR,FYRCICLPA,RSRLVPLGS,CLPAKRPAR,RPARSRLVP,VPLGSLGVF,PARSRLVPL,AKRPARSRL,SRLVPLGSL,SLGVFTCSW,RLVPLGSLGV,FFYRCICLPA,CGSALAFFYR,FYRCICLPAK,RSRLVPLGSL,MCGSALAFFY,VFTCSWTGPR,RPARSRLVPL,LAFFYRCICL,GSLGVFTCSW,SALAFFYRCI	STAD
ITIH1	c.760G>T	p.G254W	KGHVLFRPTVSQQQSCPTCSTSLLN[p.G254W]WHFKVTYDVSRDKICDLLVANNHFAH	SLLNWHFKV,TSLLNWHFK,STSLLNWHF,LNWHFKVTY,STSLLNWHFK,CSTSLLNWHF,LLNWHFKVTY,TSLLNWHFKV	LUAD
ITIH2	c.2524C>G	p.L842V	TLDKEMSFSVLLHRVWKKHPVNVDF[p.L842V]VGIYIPPTNKFSPKAHGLIGQFMQEP	VNVDFVGIY,NVDFVGIYI,HPVNVDFVG,VGIYIPPTNK,PVNVDFVGIY,HPVNVDFVGI	LUAD
ITK	c.586G>A	p.E196K	PEETVVIALYDYQTNDPQELALRRN[p.E196K]KEYCLLDSSEIHWWRVQDRNGHEGYV	LALRRNKEY,RRNKEYCLL,KEYCLLDSS,ALRRNKEYCL,ELALRRNKEY	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ITK	c.86G>T	p.R29L	FILLEEQLIKKSQQKRRTSPSNFKV[p.R29L]LFFVLTKASLAYFEDRHGKKRTLKGS	SNFKVLFFV,VLFFVLTKA,KVLFFVLTK,NFKVLFFVL,SPSNFKVLF,KVLFFVLTKA,TSPSNFKVLF,RTSPSNFKVL,SPSNFKVLFF,SNFKVLFFVL,LFFVLTKASL	LUAD
ITM2C	c.499G>A	p.E167K	ADIIHDFQRGLTAYHDISLDKCYVI[p.E167K]KLNTTIVLPPRNFWELLMNVKRGTYL	YVIKLNTTI,VIKLNTTIV,SLDKCYVIK,IKLNTTIVL,SLDKCYVIKL,YVIKLNTTIV,ISLDKCYVIK,CYVIKLNTTI	UCEC
ITPR1	c.4707G>T	p.M1569I	CGLERDKFDNKTVTFEEHIKEEHNM[p.M1569I]CHYLCFIVLVKVKDSTEYTGPESYVA	NMCHYLCFI,HNMCHYLCF,KEEHNMCHY,CHYLCFIVL,EEHNMCHYL,NMCHYLCFIV,HNMCHYLCFI,IKEEHNMCHY,KEEHNMCHYL,MCHYLCFIVL	TGCT
ITPR2	c.1073C>A	p.P358Q	RDGVPPTSKKKRQAGEKIMYTLVSV[p.P358Q]QHGNDIASLFELDATTLQRADCLVPR	IMYTLVSVQ,VQHGNDIAS,IMYTLVSVQH,VQHGNDIASL,QHGNDIASLF	LUAD
IWS1	c.2404delA	p.S802fs	FQATSKKGISRLDKQMRKFTDIRKK[p.S802fs]ADLHTQ*	RKFTDIRKKA	STAD
JAG1	c.1384G>A	p.A462T	DCLPGWMGQNCDININDCLGQCQND[p.A462T]TSCRDLVNGYRCICPPGYAGDHCERD	TSCRDLVNGY,CQNDTSCRDL	CRC
JAK1	c.928G>A	p.V310I	IFETSMLLISSENEMNWFHSNDGGN[p.V310I]ILYYEVMVTGNLGIQWRHKPNVVSVE	SNDGGNILY,NILYYEVMV,ILYYEVMVT,HSNDGGNIL,GNILYYEVM,HSNDGGNILY,SNDGGNILYY,FHSNDGGNIL	CRC
JAKMIP2	c.848G>T	p.R283I	MSSPKREIPGRAGDGSEHCSSPDLR[p.R283I]INQKRIAELNATIRKLEDRNTLLGDE	INQKRIAEL,RINQKRIAEL,SSPDLRINQK	UCEC
JARID2	c.1180_1181insG	p.G394fs	VNHTISGKTESSNAKTRKQVLSLGG[p.G394fs]GVQVHWARRQWPQGQWQVEPKVMH*	GQWQVEPKV,QWPQGQWQV,GVQVHWARR,RQWPQGQWQ,WQVEPKVMH,VLSLGGGVQV,RQWPQGQWQV,KQVLSLGGGV,LSLGGGVQVH,SLGGGVQVHW,VQVHWARRQW,ARRQWPQGQW,GQWQVEPKVM	STAD
JARID2	c.1266delG	p.V422fs	TGPAVNGLKVSGRLNPKSCTKEVGG[p.V422fs]GSCGRACSCGRGCGTPRGDWKRHTRRRSRSRPPRR*	CGRACSCGR,KRHTRRRSR,HTRRRSRSR,RRSRSRPPR,RSRSRPPRR,EVGGGSCGR,HTRRRSRSRP,RRRSRSRPPR	STAD
JHDM1D	c.289delA	p.R97fs	HHAVDIDLYHCPNCAVLHGSSLMKK[p.R97fs]GGTGTDMTTQKLMMVPNQCKLELELSLRNYALESSQVPMK*	MMVPNQCKL,MTTQKLMMV,LMMVPNQCK,VPNQCKLEL,ELSLRNYAL,KKGGTGTDM,TDMTTQKLM,NQCKLELEL,CKLELELSL,ALESSQVPM,LELSLRNYA,GTDMTTQKLM,LMMVPNQCKL,SLMKKGGTGT,KLMMVPNQCK,ALESSQVPMK,GTGTDMTTQK,YALESSQVPM,MKKGGTGTDM,TDMTTQKLMM,LELELSLRNY,LELSLRNYAL,RNYALESSQV	STAD
JHDM1D	c.938G>A	p.R313H	TSVWYHVLWGEKIFYLIKPTDENLA[p.R313H]HYESWSSSVTQSEVFFGDKVDKCYKC	PTDENLAHY,AHYESWSSS,DENLAHYES,KPTDENLAHY,AHYESWSSSV,DENLAHYESW	GBM
JMJD1C	c.3592C>A	p.R1198S	SHSVTTFRNDCRSPTHLTVSSTNTL[p.R1198S]SSMPALHRAPVFHPPIHHSLERKEGS	LSSMPALHR,SSMPALHRA,NTLSSMPAL,SSTNTLSSM,TLSSMPALHR,STNTLSSMPA,VSSTNTLSSM	LUAD
JMJD4	c.32C>T	p.A11V	MRAGPEPQAL[p.A11V]VGQKRGALRLLVPRLVLTVSAPAEVR	LVGQKRGAL,LVGQKRGALR	ACC
JMY	c.2429_2464delCACCACCACCTCCCCCACCTCCTCCCCCTCCCCCAC	p.PPPPPPPPPPP811del	LNNNLEPCSVTINPLPSPLPPTPPP[p.PPPPPPPPPPP811del]LPVAKDSGPETLEKDLPRKEGNEKRIPKSASAPSAHLFDSSQLVSARKKLRKTAEGLQRRR	SPLPPTPPPL,LPPTPPPLPV	PAAD
JPH1	c.1183G>A	p.A395T	ARTKVEIANSRTAHARAKADAADQA[p.A395T]TLAARQECDIARAVARELSPDFYQPG	DAADQATLA,TLAARQECDI,DAADQATLAA,KADAADQATL	GBM
JPH3	c.1299G>C	p.Q433H	EARIARITAKEFSPSFQHRENGLEY[p.Q433H]HRPKRQTSCDDIEVLSTGTPLQQESP	NGLEYHRPKR,YHRPKRQTSC	CESC
JSRP1	c.275T>C	p.V92A	EKEPAARGTPGTGKERLKAGASPRS[p.V92A]APARKKAQTAPPLQPPPPPPALSEEL	KAGASPRSA,SPRSAPARK,RSAPARKKA,ASPRSAPARK,GASPRSAPAR,APARKKAQTA,LKAGASPRSA	KIRP

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
JUP	c.1880C>T	p.S627L	RVAAGVLCELAQDKEAADAIDAEGA[p.S627L]LAPLMELLHSRNEGTATYAAAVLFRI	ALAPLMELL,AEGALAPLM,GALAPLMEL,DAIDAEGAL,DAIDAEGALA,IDAEGALAPL	CESC
KAL1	c.907G>A	p.V303I	SKHFRSSKDPSAPPAPANLRLANST[p.V303I]INSDGSVTVTIVWDLPEEPDIPVHHY	STINSDGSV,NLRLANSTI,TINSDGSVTV,NSTINSDGSV,ANLRLANSTI	CRC
KANK3	c.1076G>A	p.R359H	VEADAWVTEALLGLPAAAERELELL[p.R359H]HASLEHQRGVSELLRGRLRELEEARE	AERELELLH,RELELLHAS,LLHASLEHQR,AERELELLHA,RELELLHASL,LELLHASLEH	ACC
KANK4	c.757T>C	p.S253P	VQEGAEPPEGVVKVPNHLPLPGPPF[p.S253P]PFQNVLVVLEDKEDEHNAREAEVLFT	PLPGPPFPF,PFQNVLVVL,FPFQNVLVV,GPPFPFQNV,LPLPGPPFPF,GPPFPFQNVL,FPFQNVLVVL,PPFPFQNVLV	KIRC
KANSL3	c.1127G>A	p.G376E	IGWNTGALVACHVSVMEYVTAVVCL[p.G376E]EFPLLTVDGPRGDVDDPLLDMKTPVL	AVVCLEFPL,CLEFPLLTV,VTAVVCLEF,LEFPLLTVD,YVTAVVCLEF,TAVVCLEFPL	TGCT
KBTBD13	c.242C>T	p.A81V	GGFRATLQVLRGDRPALAAEDELLQ[p.A81V]VVECAAFLQAPALARFLEHNLTSDNC	QVVECAAFL,LQVVECAAF,AEDELLQVV,LLQVVECAAF,LQVVECAAFL,DELLQVVECA	ACC
KBTBD6	c.1325_1326insG	p.G442fs	LADRLLCREGMDVAYLNGYIYILGG[p.G442fs]ARPYYWS*	YILGGARPY,ILGGARPYY,YIYILGGAR,ILGGARPYYW,IYILGGARPY,YILGGARPYY,GYIYILGGAR	STAD
KBTBD8	c.1645G>A	p.V549I	YLKLVLFQNKLHLFVRATQVTVEEH[p.V549I]IFRTSRKNSLYQYDDIADQWMKVYET	VTVEEHIFR,TQVTVEEHI,IFRTSRKNSL,QVTVEEHIFR,TQVTVEEHIF	CRC
KCNA1	c.1126G>T	p.G376C	EAESHFSSIPDAFWWAVVSMTTVGY[p.G376C]CDMYPVTIGGKIVGSLCAIAGVLTIA	TTVGYCDMY,VGYCDMYPV,MTTVGYCDMY,TVGYCDMYPV,GYCDMYPVTI,SMTTVGYCDM	LUAD
KCNA3	c.1244C>T	p.A415V	TLKASMRELGLLIFFLFIGVILFSS[p.A415V]VVYFAEADDPTSGFSSIPDAFWWAVV	ILFSSVVYF,GVILFSSVV,VILFSSVVY,SSVVYFAEA,FIGVILFSSV,ILFSSVVYFA,FSSVVYFAEA,VILFSSVVYF,GVILFSSVVY	CRC
KCNB2	c.692G>A	p.R231H	STIALSLNTLPELQETDEFGQLNDN[p.R231H]HQLAHVEAVCIAWFTMEYLLRFLSSP	HQLAHVEAV,QLNDNHQLA,GQLNDNHQL,GQLNDNHQLA,HQLAHVEAVC,DEFGQLNDNH	BRCA
KCNC1	c.1363delA	p.K455fs	VPVIVNNFGMYYSLAMAKQKLPKKK[p.K455fs]RSIFRGHRSWDLPIIVNLS*	KQKLPKKKR,RSWDLPIIV,LPKKKRSIF,SIFRGHRSW,GHRSWDLPI,WDLPIIVNL,IFRGHRSWDL,KKRSIFRGHR,RGHRSWDLPI,LPKKKRSIFR,RSIFRGHRSW,GHRSWDLPII	STAD
KCND3	c.1313C>T	p.S438L	NQRADKRRAQKKARLARIRVAKTGS[p.S438L]LNAYLHSKRNGLLNEALELTGTPEEE	SLNAYLHSK,KTGSLNAYL,LNAYLHSKR,IRVAKTGSL,AKTGSLNAY,GSLNAYLHSK,KTGSLNAYLH,SLNAYLHSKR,RIRVAKTGSL,RVAKTGSLNA,VAKTGSLNAY,AKTGSLNAYL	CRC,UCEC
KCNH2	c.446G>C	p.G149A	MFILNFEVVMEKDMVGSPAHDTNHR[p.G149A]APPTSWLAPGRAKTFRLKLPALLALT	RAPPTSWLA,NHRAPPTSW,HRAPPTSWL	STAD
KCNH8	c.1365G>A	p.M455I	SSLTSVGFGNVSANTDAEKIFSICT[p.M455I]ILIGALMHALVFGNVTAIIQRMYSRW	KIFSICTIL,ILIGALMHA,SICTILIGA,IFSICTILI,CTILIGALM,EKIFSICTI,KIFSICTILI,FSICTILIGA,ILIGALMHAL,SICTILIGAL,AEKIFSICTI,EKIFSICTIL	LUAD
KCNJ10	c.305delC	p.P102fs	GTWFLFGVVWYLVAVAHGDLLELDP[p.P102fs]RPTTPPVWYRCTHSLEPSSSPLNPKPPLAMASATSVRNVHWPLCFLLPSWCSPPSWKSSSQVPSWRRLPGPRSGLRPFVSASMQLWPPTMASPAS*	LAMASATSV,SMQLWPPTM,MQLWPPTMA,SLEPSSSPL,NVHWPLCFL,RLPGPRSGL,AMASATSVR,SSSQVPSWR,SSQVPSWRR,VWYRCTHSL,RNVHWPLCF,VHWPLCFLL,SVRNVHWPL,SWCSPPSWK,SWRRLPGPR,SGLRPFVSA,PTTPPVWYR,DPRPTTPPV,SPLNPKPPL,KPPLAMASA,VPSWRRLPG,GPRSGLRPF,WPPTMASPA,FLLPSWCSP,KSSSQVPSW,SQVPSWRRL,LRPFVSASM,FVSASMQLW,ASMQLWPPT,WPLCFLLPS,LPSWCSPPS,LELDPRPTT,FLLPSWCSPP,SMQLWPPTMA,PLAMASATSV,LLPSWCSPPS,GLRPFVSASM,LAMASATSVR,PSWCSPPSWK,KSSSQVPSWR,SSSQVPSWRR,PFVSASMQLW,HSLEPSSSPL,SVRNVHWPLC,SWKSSSQVP5,SWRRLPGPRS,RSGLRPFVSA,ASMQLWPPTM,RPTTPPVWYR,MASATSVRNV,TSVRNVHWPL,NVHWPLCFLL,GPRSGLRPFV,RPFVSASMQL,SATSVRNVHW,VRNVHWPLCF,RNVHWPLCFL,WKSSSQVPSW,SQVPSWRRLP,RRLPGPRSGL,MQLWPPTMAS,WPLCFLLPSW,LPSWCSPPSW,DPRPTTPPVW	STAD

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
KCNJ3	c.1290G>T	p.L430F	KITGREDFPKKLLRMSSTTSEKAYS[p.L430F]FGDLPMKLQRISSVPGNSEEKLVSKT	YSFGDLPMK,AYSFGDLPM,SFGDLPMKL,TTSEKAYSF,KAYSFGDLPM,AYSFGDLPMK,YSFGDLPMKL,STTSEKAYSF,SEKAYSFGDL	LUAD
KCNK17	c.61A>G	p.S21G	MYRPRARAAPEGRVRGCAVP[p.S21G]GTVLLLLAYLAYLALGTGVFWTLEGR	GTVLLLLAY,RVRGCAVPG,CAVPGTVLL,VPGTVLLLL,RVRGCAVPGT,PGTVLLLLAY,RGCAVPGTVL,CAVPGTVLL,VPGTVLLLLA	ACC
KCNK18	c.68G>T	p.G23V	MEVSGHPQARRCCPEALGKLFP[p.G23V]VLCFLCFLVTYALVGAVVFSAIEDGQ	ALGKLFPVL,KLFPVLCFL,VLCFLCFLV,EALGKLFPV,GKLFPVLCF,FPVLCFLCF,KLFPVLCFLC,LFPVLCFLCF,FPVLCFLCFL,LGKLFPVLCF,GKLFPVLCFL,PEALGKLFPV	LUAD
KCNK2	c.17C>G	p.S6W	MLPSA[p.S6W]WRERPGYRAGVAAPDLLDPKSAAQNS	AWRERPGYR,SAWRERPGY,MLPSAWRER,SAWRERPGYR,AWRERPGYRA,PSAWRERPGY	BLCA
KCNK2	c.497G>T	p.R166L	HWDLGSSFFFAGTVITTIGFGNISP[p.R166L]LTEGGKIFCIIYALLGIPLFGFLLAG	IGFGNISPL,SPLTEGGKIF	LUAD
KCNMB2	c.453T>G	p.N151K	KLLLYHTEETIKINQKCSYIPKCGK[p.N151K]KFEESMSLVNVVMENFRKYQHFSCYS	CGKKFEESM,KKFEESMSL,CSYIPKCGKK,SYIPKCGKKF,KKFEESMSLV	STAD
KCNS2	c.631G>A	p.D211N	SRVFSILSILVVMGSIITMCLNSLP[p.D211N]NFQIPDSQGNPGEDPRFEIVEHFGIA	MCLNSLPNF,CLNSLPNFQI,TMCLNSLPNF	UCEC
KCTD20	c.942delA	p.L314fs	KLYRFFKYIENRDVAKTVLKERGLK[p.L314fs]TFALELKVTLPVKKKLREGLAAGLKSSIIMYNAPSSRCHGKRKKGRVAMWISSVFEANPSRIW*	KTFALELKV,RVAMWISSV,GLKTFALEL,KLREGLAAG,KVTLPVKKK,IMYNAPSSR,SVFEANPSR,VAMWISSVF,ELKVTLPVK,KSSIIMYNA,SSRCHGKRK,KRKKGRVAM,KGRVAMWIS,GLKSSIIMY,LKERGLKTF,FALELKVTL,LELKVTLPV,KKLREGLAA,LAAGLKSSI,AGLKSSIIM,RKKGRVAMW,MWISSVFEA,FEANPSRIW,KERGLKTFA,ALELKVTLPV,KLREGLAAGL,GLAAGLKSSI,AMWISSVFEA,IMYNAPSSRC,SVFEANPSRI,GLKTFALELK,IIMYNAPSSR,TFALELKVTL,RVAMWISSVF,VFEANPSRIW,RGLKTFALEL,SSRCHGKRKK,KGRVAMWISS,AGLKSSIIMY,VTLPVKKKLR,VLKERGLKTF,KERGLKTFAL,LAAGLKSSII,AAGLKSSIIM,GKRKKGRVAM,RKKGRVAMWI,GRVAMWISSV,REGLAAGLKS	CRC
KCTD21	c.17C>T	p.T6M	MSDPI[p.T6M]MLNVGGKLYTTSLATLTSFPDSMLGA	MSDPIMLNV,MLNVGGKLY,IMLNVGGKL,IMLNVGGKLY	STAD
KDELC1	c.1339C>A	p.L447I	LKWAKDHDEEAKKIAKAGQEFARNN[p.L447I]IMGDDIFCYYFKLFQEYANLQVSEPQ	IMGDDIFCY,GQEFARNNI,QEFARNNIM,IMGDDIFCYY,NIMGDDIFCY,GQEFARNNIM,RNNIMGDDIF	CRC
KDM1B	c.1083C>A	p.F361L	HLSNLEYACGSNLHQVSARSWDHNE[p.F361L]LFAQFAGDHTLLTPGYSVIIEKLAEG	RSWDHNELF,ARSWDHNEL,DHNELFAQF,NELFAQFAG,SARSWDHNEL,RSWDHNELFA,ARSWDHNELF,WDHNELFAQF	UCEC
KDM3B	c.3946delC	p.P1316fs	SLRDLLHSGPGKLPQTPLDTGIPFP[p.P1316fs]RSSLHPQQE*	FPRSSLHPQ,IPFPRSSLH,TGIPFPRSSL	STAD
KDM5A	c.1267C>T	p.P423S	VSSIEEDVIVEYGADISSKDFGSGF[p.P423S]SVKDGRRKILPEEEEYALSGWNLNNM	SVKDGRRKI,DFGSGFSVK,KDFGSGFSV,SSKDFGSGFS,KDFGSGFSVK,SVKDGRRKIL	TGCT
KEAP1	c.1408C>T	p.R470C	PERDEWHLVAPMLTRRIGVGVAVLN[p.R470C]CLLYAVGGFDGTNRLNSAECYYPERN	VAVLNCLLY,AVLNCLLYA,VLNCLLYAV,CLLYAVGGF,GVAVLNCLLY,AVLNCLLYAV	LUSC
KEAP1	c.1438G>T	p.G480W	PMLTRRIGVGVAVLNRLLYAVGGFD[p.G480W]WTNRLNSAECYYPERNEWRMITAMNT	LYAVGGFDW,AVGGFDWTNR,LLYAVGGFDW,FDWTNRLNSA	LUSC
KEAP1	c.1807G>T	p.G603W	LDSVECYDPDTDTWSEVTRMTSGRS[p.G603W]WVGVAVTMEPCRKQIDQQNCTC*	RMTSGRSWV,SWVGVAVTM,SGRSWVGVA,TRMTSGRSW,GRSWVGVAV,RSWVGVAVT,MTSGRSWVGV,SGRSWVGVAV,RSWVGVAVTM,VTRMTSGRSW,RMTSGRSWVG	LUAD
KEAP1	c.431C>T	p.S144F	GMEVVSIEGIHPKVMERLIEFAYTA[p.S144F]FISMGEKCVLHVMNGAVMYQIDSVVR	FISMGEKCV,TAFISMGEK,FAYTAFISM,YTAFISMGE,LIEFAYTAF,IEFAYTAFI,RLIEFAYTAF,LIEFAYTAFI,FISMGEKCVL,YTAFISMGEK,IEFAYTAFIS,EFAYTAFISM	LUAD
KEAP1	c.463G>T	p.V155F	PKVMERLIEFAYTASISMGEKCVLH[p.V155F]FMNGAVMYQIDSVVRACSDFLVQQLD	VLHFMNGAV,FMNGAVMYQ,HFMNGAVMY,CVLHFMNGA,MGEKCVLHF,GEKCVLHFM,LHFMNGAVM,CVLHFMNGAV,FMNGAVMYQI,SMGEKCVLHF,LHFMNGAVMY,VLHFMNGAVM	LUSC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
KEAP1	c.779G>T	p.R260L	DDLNVRCESEVFHACINWVKYDCEQ[p.R260L]LRFYVQALLRAVRCHSLTPNFLQMQL	QLRFYVQAL,KYDCEQLRF,LRFYVQALL,QLRFYVQALL,KYDCEQLRFY,WVKYDCEQLR,EQLRFYVQAL,VKYDCEQLRF,CEQLRFYVQA	LUAD
KEL	c.1231G>A	p.V411M	RKLSQKLRELTEQPPMPARPRWMKC[p.V411M]MEETGTFFEPTLAALFVREAFGPSTR	CMEETGTFF,KCMEETGTF,MKCMEETGTF,KCMEETGTFF	GBM
KHDRBS2	c.608C>T	p.S203L	LNGSEDSGRGRGIRGRGIRIAPTAP[p.S203L]LRGRGGAIPPPPPPGRGVLTPRGSTV	RIAPTAPLR,APLRGRGGA,PLRGRGGAI,IRIAPTAPL,GIRIAPTAPL,APLRGRGGAI	LUAD
KIAA0020	c.188A>G	p.K63R	RKVAKEGGPKVTSRNFEKSITKLGK[p.K63R]RGVKQFKNKQQGDKSPKNKFQPANKF	KSITKLGKR,ITKLGKRGV,RGVKQFKNK,LGKRGVKQF,ITKLGKRGVK,LGKRGVKQFK,KLGKRGVKQF	TGCT
KIAA0182	c.359_360insC	p.T120fs	STPKRVPMGPIIVPPGGHSVPSTPP[p.T120fs]RGDHRSNQNREWCLEE*	HSVPSTPPR,RSNQNREWCL	STAD
KIAA0195	c.2706delC	p.I902fs	GLETGWNCHISLTPNGDMPGSEIPP[p.I902fs]PAPATQAPCMMT*	APATQAPCM,SEIPPPAPA,APATQAPCMM,SEIPPPAPAT,MPGSEIPPPA	STAD
KIAA0240	c.2683delA	p.K895fs	PMNHDQFHLVPNHIVVSAEGNISKK[p.K895fs]QNALAEH*	ISKKQNALA,NISKKQNAL,KKQNALAEH	STAD
KIAA0528	c.542G>A	p.R181Q	YRAVIIHGFVEELVVNEDPEYQWID[p.R181Q]QIRTPRASNEARQRLISLMSGELQRK	EYQWIDQIR,WIDQIRTPR,PEYQWIDQI,QWIDQIRTPR,YQWIDQIRTP,DPEYQWIDQI	CRC
KIAA0556	c.3244C>T	p.R1082W	SHSITIDFTHPCHVALIRIWNYNKS[p.R1082W]WIHSFRGVKDITMLLDTQCIFEGEIA	WIHSFRGVK,YNKSWIHSF,KSWIHSFRG,NKSWIHSFR,RIWNYNKSW,WNYNKSWIH,NYNKSWIHSF,RIWNYNKSWI,KSWIHSFRGV,SWIHSFRGVK,YNKSWIHSFR,IRIWNYNKSW	CRC
KIAA0556	c.988C>A	p.L330I	FPDQERMCSRPGSRRERPLSATRKT[p.L330I]ICEAEYPEEDASAVLQAIQVENAALQ	ATRKTICEA,RKTICEAEY,RPLSATRKTI,TRKTICEAEY	UCEC
KIAA0586	c.4775delC	p.A1592fs	PRWESSATLRFTDAPCQDVSDAAVS[p.A1592fs]DLEDCSQSLSLSTMQEDMESSGADTF*	DVSDAAVSDL,SDLEDCSQSL	STAD
KIAA0907	c.1337A>C	p.Q446P	GQSPMGGPFIPAAPVKTALPAGPQP[p.Q446P]PPQPQPPLPSQPQAQKRRFTEELPDE	QPPPQPQPPL	BLCA
KIAA0907	c.1546_1547delAG	p.R516fs	TGFSSQNEIEGAGSKPASSSGKERE[p.R516fs]GQAVDASTSLSSDWNKNRVR*	TSLSSDWNK,LSSDWNKNR,QAVDASTSL,STSLSSDWNK,SLSSDWNKNR,KEREGQAVDA,REGQAVDAST,GQAVDASTSL,DASTSLSSDW	GBM
KIAA1109	c.14039T>C	p.L4680P	SMSLHGNHMTLACFHGPNFRSKSWA[p.L4680P]PFHLEEPNIAFWTEAQKIWEDGSSDH	RSKSWAPFH,KSWAPFHLE,FRSKSWAPF,SKSWAPFHL,NFRSKSWAPF,RSKSWAPFHL,APFHLEEPNI	CLL
KIAA1109	c.14810C>A	p.S4937Y	ITYTTVDWRDFMCNTWHLEPTLRLI[p.S4937Y]YWTGRKIDPVGVDYILQKLGFHHART	RLIYWTGRK,LEPTLRLIY,LIYWTGRKI,EPTLRLIYW,HLEPTLRLIY,RLIYWTGRKI,TLRLIYWTGR	CRC
KIAA1109	c.4763delA	p.E1588fs	ANSLLDRGMQLSGSTSNTPYTPLEK[p.E1588fs]NSLITQMMKH*	NSLITQMMK,EKNSLITQM,KNSLITQMM,TPLEKNSLI,KNSLITQMMK,LEKNSLITQM,EKNSLITQMM	STAD
KIAA1147	c.446C>T	p.A149V	YFRKGPFFGLACFANMPVESELERG[p.A149V]VRMKSVGILSPSYTLLYRYMHFLENQ	GVRMKSVGI,SELERGVRM,VRMKSVGIL,VESELERGV,GVRMKSVGIL,LERGVRMKSV	UCEC
KIAA1211	c.3608C>A	p.P1203Q	SVTVEISDSAPPAPLVKEVTKRFST[p.P1203Q]QDAAPVSTEPAWLALAKRKAKAWSDC	FSTQDAAPV,KRFSTQDAA,VTKRFSTQDA	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
KIAA1211	c.924delT	p.R308fs	ERAPREEQQRSLEAPGWEDAERRER[p.R308fs]RSASAWRRRRSEGVCRPRPKRRRGGGWRRTPGWRSGGGRRRRKEDARRSSKGRRRRRLRDGKSWNSRRRRCRGRPRRWRRLGRAGGARRRRIWGKRRRRARRTWRTGGGSSVSF*	RSASAWRRR,SASAWRRRR,KRRRGGGWR,GWRRTPGWR,GWRSGGGRR,RSGGGRRRR,SGGGRRRRK,RSSKGRRRR,SSKGRRRRR,KGRRRRRLR,RRRRLRDGK,KSWNSRRRR,RRRCRGRPR,RGRPRRWRR,RWRRLGRAG,LGRAGGARR,RAGGARRRR,GARRRRIWG,ARRRRIWGK,RRRRIWGKR,RIWGKRRRR,RRRARRTWR,RARRTWRTG,DGKSWNSRR,RPRRWRRLG,RERRSASAW,RRLRDGKSW,RRRRARRTW,WRTGGGSSV,TGGGSSVSF,AERRERRSA,RTGGGSSVSF,RERRSASAWR,RSASAWRRRR,AWRRRRSEGV,KRRRGGGWRR,RSGGGRRRRK,RSSKGRRRRR,SSKGRRRRRL,KGRRRRRLRD,RRRRRLRDGK,RLRDGKSWNS,KSWNSRRRRC,NSRRRRCRGR,RRRRCRGRPR,RRRCRGRPRR,RCRGRPRRWR,RGRPRRWRRL,RPRRWRRLGR,RWRRLGRAGG,LGRAGGARRR,RAGGARRRRI,GARRRRIWGK,RIWGKRRRRA,RRRRARRTWR,RARRTWRTGG,TWRTGGGSSV,DARRSSKGRR,DGKSWNSRRR,SWNSRRRRCR,RPRPKRRRGG,RPKRRRGGGW,ERRERRSASA,RRERRSASAW,RRRLRDGKSW	CESC
KIAA1211	c.926_927InsG	p.E309fs	RAPREEQQRSLEAPGWEDAERRERE[p.E309fs]GARAPGGGGGAKASAGPGPSGGEAAAGGGRQAGGAEAAGGGGRKMRGGAQKAGGGGG*	RKMRGGAQK,KMRGGAQKA,REREGARAP,RQAGGAEAA,AERREREGA,RAPGGGGGAK,KMRGGAQKAG,REREGARAPG,RQAGGAEAAG,RKMRGGAQKA	CESC
KIAA1429	c.413C>T	p.S138F	LRGWYNCLTLAIYGSVDRVISHDRD[p.S138F]FPPPPPPPPPPPQPQPSLKRNPKHAD	RVISHDRDF	HNSC
KIAA1429	c.4576G>A	p.D1526N	VLSAPESLQNLFNNRTAYVLADVMD[p.D1526N]NQLKSMWFTPFQAEEIDTDLDLVKVD	VMDNQLKSM,MDNQLKSMW,VLADVMDNQL,DVMDNQLKSM,VMDNQLKSMW,MDNQLKSMWF	HNSC
KIAA1549	c.3816G>T	p.L1272F	DGERLSAVKSSDLINKMDLQRAAII[p.L1272F]FGYRIQGVIAQPVDRVKRPSPESQSN	RAAIIFGYR,LQRAAIIFG,QRAAIIFGY,AAIIFGYRI,FGYRIQGVI,IIFGYRIQGV,RAAIIFGYRI,IFGYRIQGVI,LQRAAIIFGY,MDLQRAAIIF	LUAD
KIAA1751	c.189G>C	p.L63F	LQEAEDDVDPGHSSSVKELDTDADK[p.L63F]FKKKTAEDRTQAFHLRQNLSALDKMH	KFKKKTAEDR,KELDTDADKF	LUSC
KIAA1751	c.291G>C	p.K97N	TQAFHLRQNLSALDKMHEEQELFTE[p.K97N]NMRGELRACRQRRDLIDKQQEAVAAE	EQELFTENM,EEQELFTEN,FTENMRGELR,NMRGELRACR,EEQELFTENM,TENMRGELRA	KIRC
KIAA1755	c.324A>C	p.Q108H	CLRDEVVVHLAPLNPLLLRQGDFYL[p.Q108H]HVEPQEEQSVCIMIKCLSLDLCTVDK	RQGDFYLHV,LLRQGDFYLH,RQGDFYLHVE	LUAD
KIAA1804	c.1420G>A	p.V474M	AALQQKSQEELLKRREQQLAEREID[p.V474M]MLERELNILIFQLNQEKPKVKKRKGK	MLERELNIL,REIDMLERE,QLAEREIDML,MLERELNILI,QQLAEREIDM,REIDMLEREL,IDMLERELNI	CRC
KIAA1804	c.1429C>T	p.R477W	QQKSQEELLKRREQQLAEREIDVLE[p.R477W]WELNILIFQLNQEKPKVKKRKGKFKR	EWELNILIF,EIDVLEWEL,DVLEWELNI,LEWELNILI,WELNILIFQ,VLEWELNILI,AEREIDVLEW,REIDVLEWEL,LEWELNILIF,WELNILIFQL	CRC
KIAA1967	c.1243delC	p.P415fs	TGIDLSGCTKWWRFAEFQYLQPGPP[p.P415fs]GGFRQWWCTCRMSGPSCLLWRSGRPCASRKLQRQLPQPRRHKGKRSLLNRHLMPWSKQQTLLDGTQKLQRPPHSRKRTLISQRPLHPP*	RQWWCTCRM,RMSGPSCLL,TLLDGTQKL,QTLLDGTQK,MSGPSCLLW,LWRSGRPCA,RSGRPCASR,SGRPCASRK,ASRKLQRQL,KGKRSLLNR,RSLLNRHLM,KLQRPPHSR,LQRPPHSRK,HSRKRTLIS,RTLISQRPL,SCLLWRSGR,MPWSKQQTL,PPHSRKRTL,LQPGPPGGF,CRMSGPSCL,RQLPQPRRH,RRHKGKRSL,KRSLLNRHL,LLNRHLMPW,LLNRHLMPWS,HLMPWSKQQT,LMPWSKQQTL,RSGRPCASRK,KLQRPPHSRK,MSGPSCLLWR,YLQPGPPGGF,RMSGPSCLLW,SLLNRHLMPW,SGRPCASRKL,LQRQLPQPRR,RQLPQPRRHK,KGKRSLLNRH,LNRHLMPWSK,LQRPPHSRKR,HSRKRTLISQ,RTLISQRPLH,GFRQWWCTCR,KLQRQLPQPR,MPWSKQQTLL,RPPHSRKRTL,FQYLQPGPPG,FRQWWCTCRM,RQWWCTCRMS,CRMSGPSCLL,RRHKGKRSLL,GKRSLLNRHL,KRSLLNRHLM,KRTLISQRPL	STAD
KIAA2022	c.1034G>T	p.C345F	NVRDKTTLLMQEDAQFNFFPSVFTT[p.C345F]FPKRESKSGALKQSSDFSQFKVPDVS	SVFTTFPKR,TTFPKRESK,PSVFTTFPK,FFPSVFTTF,FTTFPKRESK,NFFPSVFTTF,FPSVFTTFPK	LUSC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
KIAA2026	c.1720C>T	p.R574C	PAKMILDNHDISVEMGVKSNYEIRI[p.R574C]CRPCEIKKTDCCKENLEKPRSPGEVT	RICRPCEIK,ICRPCEIKK,SNYEIRICR,YEIRICRPC,RICRPCEIKK,KSNYEIRICR,EIRICRPCEI	UCEC
KIAA2026	c.2069delA	p.K690fs	LEQSLQSHKKLKLTKMRAKKKKKKK[p.K690fs]RN*	RAKKKKKKKR	STAD
KIDINS220	c.2552A>G	p.N851S	SNiNGHDYMRNIVHLPVFLNSRGLS[p.N851S]SARKFLVTSATNGDVPCSDTTGIQED	FLNSRGLSS,GLSSARKFL,SARKFLVTS,NSRGLSSAR,LSSARKFLV,RGLSSARKF,FLNSRGLSSA,GLSSARKFLV,NSRGLSSARK,RGLSSARKFL,SARKFLVTSA,SRGLSSARKF	TGCT
KIF13A	c.3345delA	p.K1115fs	LNCVRERWSDALIKRREYLDEQIKK[p.K1115fs]SAIKQRKQRTMWSGKPSLWSSG*	TMWSGKPSL,KQRTMWSGK,MWSGKPSLW,KQRKQRTMW,RTMWSGKPS,SAIKQRKQR,IKQRKQRTM,YLDEQIKKSA,TMWSGKPSLW,KSAIKQRKQR,AIKQRKQRTM,KQRKQRTMWS,RKQRTMWSGK,KQRTMWSGKP,RTMWSGKPSL,QIKKSAiKQR,IKQRKQRTMW	STAD
KIF14	c.1793G>A	p.R598Q	VFTLVMTQTKTEFVEGEEHDHRITS[p.R598Q]QINLIDLAGSERCSTAHTNGDRLKEG	RITSQINLI,SQINLIDLA,HRITSQINL,HRITSQINLI,SQINLIDLAG	CRC
KIF15	c.754G>C	p.E252Q	TSMNRESSRSHAVFTITIESMEKSN[p.E252Q]QIVNIRTSLLNLVDLAGSERQKDTHA	SMEKSNQIV,KSNQIVNIR,ESMEKSNQI,QIVNiRTSLL,ESMEKSNQIV,IESMEKSNQI,MEKSNQIVNI,NQIVNIRTSL	LUAD
KIF16B	c.434G>A	p.R145Q	GLIPRICEGLFSRiNETTRWDEASF[p.R145Q]QTEVSYLEIYNERVRDLLRRKSSKTF	SFQTEVSYL,ASFQTEVSY,DEASFQTEV,QTEVSYLEIY,FQTEVSYLEI,EASFQTEVSY,ASFQTEVSYL,DEASFQTEVS	CRC
KIF18A	c.49C>T	p.R17C	MSVTEEDLCHHMKVVV[p.R17C]CVRPENTKEKAAGFHKVVHVVDKHIL	HMKVVVCVR,VVCVRPENTK,CVRPENTKEK,HHMKVVVCVR	CRC
KIF1B	c.3958C>T	p.R1320W	TVTiiHEKGSELHWKDVRELVVGRI[p.R1320W]WNKPEVDEAAVDAILSLNIISAKYLK	LVVGRIWNK,RELVVGRIW	BRCA
KIF20B	c.160G>A	p.E54K	NFDGIKLDLSHEFSLVAPNTEANSF[p.E54K]KSKDYLQVCLRIRPFTQSEKELESEG	KSKDYLQVC,FKSKDYLQV,NTEANSFKSK,SFKSKDYLQV,KSKDYLQVCL,EANSFKSKDY	UCEC
KIF20B	c.2971G>A	p.E991K	NEIETATRSITNNVSQIKLMHTKID[p.E991K]KLRTLDSVSQISNIDLLNLRDLSNGS	LMHTKIDKL,KLMHTKIDK,KLRTLDSVS,TKIDKLRTL,KLMHTKIDKL,HTKIDKLRTL,LMHTKIDKLR	CRC
KIF23	c.1048G>A	p.E350K	KEQITISQLSLVDLAGSERTNRTRA[p.E350K]KGNRLREAGNiNQSLMTLRTCMDVLR	RTNRTRAKG,RTRAKGNRL,RTRAKGNRLR,RAKGNRLREA	BLCA
KIF23	c.449G>A	p.R150Q	SPGEGGLLPRCLDMIFNSIGSFQAK[p.R150Q]QYVFKSNDRNSMDIQCEVDALLERQK	FQAKQYVFK,SFQAKQYVF,IGSFQAKQY,SFQAKQYVFK,KQYVFKSNDR,SIGSFQAKQY,GSFQAKQYVF	UCEC
KIF25	c.7T>A	p.W3R	MT[p.W3R]RTSGQLQREKQARPGSGAVLAFPDDK	MTRTSGQLQ,RTSGQLQREK,MTRTSGQLQR	PRAD
KIF26B	c.3194delC	p.S1065fs	SLQSSRESLNSCGFVEGKPRPMGSP[p.S1065fs]GWASPACPRPRSTSHPALLPRDAKSTPRRGSCRLPPHCLPRARIPAWRLGSPCCSPRCVRPRLE*	RLPPHCLPR,TSHPALLPR,RSTSHPALL,RGSCRLPPH,RARIPAWRL,STPRRGSCR,KPRPMGSPG,RPMGSPGWA,CPRPRSTSH,RPRSTSHPA,HPALLPRDA,TPRRGSCRL,LPRARIPAW,IPAWRLGSP,SPRCVRPRL,LPPHCLPRA,RLPPHCLPRA,STSHPALLPR,RPRSTSHPAL,KSTPRRGSCR,RARIPAWRLG,WASPACPRPR,LPRARIPAWR,RLGSPCCSPR,KPRPMGSPGW,RPMGSPGWAS,SPACPRPRST,IPAWRLGSPC,MGSPGWASPA	STAD
KIF26B	c.3337G>A	p.V1113M	RCKVYTQKGVLPSPAPLPPSSKDSG[p.V1113M]MASRESLLQPEVRTPPVGMSPQVLKK	GMASRESLL,SGMASRESL,SSKDSGMASR,LPPSSKDSGM,SGMASRESLL	BRCA
KIF26B	c.3341C>T	p.A1114V	CKVYTQKGVLPSPAPLPPSSKDSGV[p.A1114V]VSRESLLQPEVRTPPVGMSPQVLKKS	SSKDSGVVSR	CRC
KIF26B	c.6097G>A	p.A2033T	SKEAMCFNAKLKILEHRQQRIAEVR[p.A2033T]TKYEWLMKELEATKQYLMLDPNKWLS	RTKYEWLMK,RIAEVRTKY,EVRTKYEWL,AEVRTKYEW,QQRIAEVRTK,RTKYEWLMKE,RQQRIAEVRT,QRIAEVRTKY,AEVRTKYEWL,TKYEWLMKEL,IAEVRTKYEW	LIHC
KIF27	c.2775G>T	p.K925N	LDACNLKRRKGSFGSIDHLQKLDEQ[p.K925N]NKWLDEEVEKVLNQRQELEELEADLK	KLDEQNKWL,EQNKWLDEEV,LQKLDEQNKW	UCEC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
KIF9	c.1438G>A	p.G480R	ISAIQKAGLVDVDGHLVGEPEGQNF[p.G480R]RLGVAPFSTKPGKKAKSKKTFKEPLS	NFRLGVAPF,GQNFRLGVA,RLGVAPFSTK,QNFRLGVAPF,GEPEGQNFRL	LUAD
KIF9	c.1781G>A	p.R594Q	IRPDTPPSKPVAFEEFKNEQGSEIN[p.R594Q]QIFKENKSILNERRKRASETTQHINA	GSEINQIFK,QGSEINQIFK,EQGSEINQIF,NQIFKENKSI,NEQGSEINQI	UCEC
KIRREL	c.1003delC	p.P335fs	VDPKPTTTDIGSDVTLTCVWVGNPP[p.P335fs]SLSPGPKRTQIWS*	VWVGNPPSL,SPGPKRTQI,CVWVGNPPSL,SPGPKRTQIW	STAD
KIRREL	c.1810G>T	p.G604C	VDLKQDLRCDTIDTREEYEMKDPTN[p.G604C]CYYNVRAHEDRPSSRAVLYADYRAPG	EMKDPTNCY,PTNCYYNVR,MKDPTNCYY,YEMKDPTNC,DPTNCYYNV,EMKDPTNCYY,YEMKDPTNCY	LUAD
KIRREL2	c.1947delC	p.V649fs	PPSPLGPPGTPTFYDFNPHLGMVPP[p.V649fs]ADFTEPGQAISPHPTLELSPATSNPHPLGPQIWPPGLPPSHMLPSPHLATRVSRLTCDIFPMEESWDLQLAIMDCSDF*	HMLPSPHLA,RLTCDIFPM,HLATRVSRL,ATRVSRLTC,LPSPHLATR,ESWDLQLAI,HPTLELSPA,NPHPLGPQI,SPHLATRVS,FPMEESWDL,LAIMDCSDF,LGMVPPADF,GQAISPHPT,QAISPHPTL,SHMLPSPHL,VSRLTCDIF,MEESWDLQL,EPGQAISPH,EESWDLQLA,DIFPMEESW,AISPHPTLEL,HLATRVSRLT,IFPMEESWDL,MLPSPHLATR,ESWDLQLAIM,NPHLGMVPPA,SPATSNPHPL,WPPGLPPSHM,LPSPHLATRV,QLAIMDCSDF,HLGMVPPADF,ADFTEPGQAI,GQAISPHPTL,HMLPSPHLAT,RVSRLTCDIF,SRLTCDIFPM,EESWDLQLAI,HPTLELSPAT,NPHPLGPQIW,FPMEESWDLQ,MEESWDLQLA	STAD
KIT	c.1669T>G	p.W557G	VAGMMCIIVMILTYKYLQKPMYEVQ[p.W557G]GKVVEEINGNNYVYIDPTQLPYDHKW	PMYEVQGKV,VQGKVVEEI,EVQGKVVEEI,KPMYEVQGKV	TGCT
KIT	c.2446G>C	p.D816H	RDLAARNILLTHGRITKICDFGLAR[p.D816H]HIKNDSNYVVKGNARLPVKWMAPESI	HIKNDSNYV,RHIKNDSNY,CDFGLARHI,HIKNDSNYVV,ARHIKNDSNY,RHIKNDSNYV	TGCT
KIT	c.2446G>T	p.D816Y	RDLAARNILLTHGRITKICDFGLAR[p.D816Y]YIKNDSNYVVKGNARLPVKWMAPESI	ICDFGLARY,YIKNDSNYV,RYIKNDSNY,DFGLARYIK,CDFGLARYI,YIKNDSNYVV,KICDFGLARY,RYIKNDSNYV,ARYIKNDSNY	TGCT
KIT	c.2447A>T	p.D816V	RDLAARNILLTHGRITKICDFGLAR[p.D816V]VIKNDSNYVVKGNARLPVKWMAPESI	VIKNDSNYV,RVIKNDSNY,CDFGLARVI,RVIKNDSNYV,VIKNDSNYVV,ARVIKNDSNY	LAML,TGCT
KIT	c.2464A>T	p.N822Y	NILLTHGRITKICDFGLARDIKNDS[p.N822Y]YYVVKGNARLPVKWMAPESIFNCVYT	KNDSYYVVK,SYYVVKGNA,RDIKNDSYY,YYVVKGNAR,DIKNDSYYV,IKNDSYYVV,YYVVKGNARL,LARDIKNDSY,SYYVVKGNAR,DIKNDSYYVV,DSYYVVKGNA	TGCT
KIT	c.2466T>G	p.N822K	NILLTHGRITKICDFGLARDIKNDS[p.N822K]KYVVKGNARLPVKWMAPESIFNCVYT	KNDSKYVVK,RDIKNDSKY,IKNDSKYVV,KYVVKGNARL,LARDIKNDSK	TGCT
KLC2	c.1703delC	p.T568fs	SFGKLRDALRRSSEMLVKKLQGGTP[p.T568fs]RSPLTPG*	TPRSPLTPG,LQGGTPRSPL	STAD
KLF3	c.312delA	p.I104fs	SLKFPSSHRRASPGLSMPSSSPPIK[p.I104fs]NTHPLLQACSPSACRCPCHQ*	LLQACSPSA,QACSPSACR,PPIKNTHPL,SPSACRCPC,LQACSPSAC,SPPIKNTHPL	STAD
KLF3	c.671_672insC	p.S224fs	GIEPQRTDYYPEEMSPPLMNSVSPP[p.S224fs]ASIVARESPFGHRAAWEETFTCGIPGYSKEAEDTQM*	LMNSVSPPA,SVSPPASIV,TFTCGIPGY,NSVSPPASI,FTCGIPGYS,SPFGHRAAW,SIVARESPF,RESPFGHRA,HRAAWEETF,SKEAEDTQM,WEETFTCGI,PLMNSVSPPA,FTCGIPGYSK,VARESPFGHR,ETFTCGIPGY,NSVSPPASIV,ASIVARESPF,LMNSVSPPAS,MNSVSPPASI,RESPFGHRAA,GHRAAWEETF,YSKEAEDTQM	STAD
KLF4	c.1300A>C	p.K434Q	GRRSWPRKRTATHTCDYAGCGKTYT[p.K434Q]QSSHLKAHLRTHTGEKPYHCDWDGCG	KTYTQSSHL,TQSSHLKAH,KTYTQSSHLK,QSSHLKAHLR,GKTYTQSSHL,TQSSHLKAHL	BRCA
KLF5	c.1255G>C	p.E419Q	LRTHTGEKPYKCTWEGCDWRFARSD[p.E419Q]QLTRHYRKHTGAKPFQCGVCNRSFSR	RSDQLTRHY,FARSDQLTR,DQLTRHYRK,WRFARSDQL,RSDQLTRHYR,ARSDQLTRHY	LUAD,LUSC
KLF5	c.353C>T	p.S118L	EKYLTPQLPPVPIIPEHKKYRRDSA[p.S118L]LVVDQFFTDTEGLPYSINMNVFLPDI	KYRRDSALV,SALVVDQFF,KKYRRDSAL,YRRDSALVV,KYRRDSALVV,HKKYRRDSAL,KKYRRDSALV,RDSALVVDQF	BLCA
KLHDC2	c.962G>C	p.W321S	DAWTYCISKNEWIQFNHPYTEKPRL[p.W321S]SHTACASDEGEVIVFGGCANNLLVHH	KPRLSHTAC,KPRLSHTACA,TEKPRLSHTA	TGCT

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
KLHDC7A	c.1903G>A	p.E635K	DRWDFAPPLPSDTFALAHTATVRAK[p.E635K]KIFVTGGSLRFLLFRFSAQEQRWWAG	HTATVRAKK,TVRAKKIFV,RAKKIFVTG,KIFVTGGSL,KIFVTGGSLR,TVRAKKIFVT,RAKKIFVTGG,HTATVRAKKI,KKIFVTGGSL	SKCM
KLHL13	c.637G>A	p.E213K	FLISGVTLDNCVEVGRIANTYNLTE[p.E213K]MDKYVNSFVLKNFPALLSTGEFLKLP	NLTEMDKYV,EMDKYVNSF,ANTYNLTEM,TEMDKYVNS,EMDKYVNSFV,NTYNLTEMDK,TEMDKYVNSF,IANTYNLTEM,MDKYVNSFVL	UCEC
KLHL14	c.693delC	p.P231fs	KYLVEDVLLLNFEEMRALLDSLPPP[p.P231fs]WSRSWRSSRCPCCGWSTTARPACSMRLTS*	WSRSWRSSR,SWRSSRCPC,TARPACSMR,DSLPPPWSR,TTARPACSM,RPACSMRLT,LLDSLPPPW,LPPPWSRSW,TTARPACSMR,RSWRSSRCPC,SWRSSRCPCC,SSRCPCCGWS,STTARPACSM,TARPACSMRL,RPACSMRLTS,ALLDSLPPPW,SLPPPWSRSW,RSSRCPCCGW	STAD
KLHL15	c.554A>G	p.D185G	DNFVPLMSRPDFLSYLSFEKLMSYL[p.D185G]GNDHLSRFPEIELYEAVQSWLRHDRR	MSYLGNDHL,LMSYLGNDH,LGNDHLSRF,FEKLMSYLG,LMSYLGNDHL,YLGNDHLSRF,SYLGNDHLSR	BLCA
KLHL28	c.97G>A	p.E33K	YMLANLTHLHSEQLLQGLNLLRQHH[p.E33K]KLCDIILRVGDVKIHAHKVVLASVSP	KLCDIILRV,LNLLRQHHK,NLLRQHHKL,RQHHKLCDI,GLNLLRQHHK,RQHHKLCDII	UCEC
KLHL5	c.976C>T	p.R326C	QLSQVVEACCKFLMKQLHPSNCLGI[p.R326C]CSFADAQGCTDLHKVAHNYTMEHFME	SNCLGICSF	CRC
KLK2	c.169C>A	p.P57T	EKHSQPWQVAVYSHGWAHCGGVLVH[p.P57T]TQWVLTAAHCLKKNSQVWLGRHNLFE	VLVHTQWVL,GVLVHTQWV,HTQWVLTAA,TQWVLTAAH,VHTQWVLTAA	CRC
KLK2	c.481G>A	p.E161K	VKVLGLPTQEPALGTTCYASGWGSI[p.E161K]KPEEFLRPRSLQCVSLHLLSNDMCAR	YASGWGSIK,SIKPEEFLR,GSIKPEEFLR,GWGSIKPEEF	CESC
KLK6	c.359G>A	p.R120H	QSSVVRAVIHPDYDAASHDQDIMLL[p.R120H]HLARPAKLSELIQPLPLERDCSANTT	MLLHLARPA,LLHLARPAK,DIMLLHLAR,IMLLHLARPA,LLHLARPAKL,MLLHLARPAK,HDQDIMLLHL	GBM
KPNA4	c.86G>A	p.R29Q	NEKLDNQRLKNFKNKGRDLETMRRQ[p.R29Q]QNEVVVELRKNKRDEHLLKRRNVPHE	QQNEVVVEL,TMRRQQNEV,RRQQNEVVV,RQQNEVVVE,TMRRQQNEVV,ETMRRQQNEV,MRRQQNEVVV,RQQNEVVVEL	CRC
KPRP	c.1659_1660insC	p.E553fs	YCGPSSYNQGQESGAGCGPGDVFPE[p.E553fs]PEGSGWPWRPRQCLCWSERGSKECLFLKER*	GSKECLFLK,WPWRPRQCL,RPRQCLCWS,SERGSKECL,FPEPEGSGW,EPEGSGWPW,CLCWSERGSK,RGSKECLFLK,EGSGWPWRPR,SERGSKECLF	HNSC
KRAS	c.176C>G	p.A59G	PTIEDSYRKQVVIDGETCLLDILDT[p.A59G]GGQEEYSAMRDQYMRTGEGFLCVFAI	LDTGGQEEY,GGQEEYSAM,ILDTGGQEEY	MM
KRAS	c.180_181TC>AA	p.Q61K	IEDSYRKQVVIDGETCLLDILDTAG[p.Q61K]KEEYSAMRDQYMRTGEGFLCVFAINNT	LDTAGKEEY,AGKEEYSAM,ILDTAGKEEY,DTAGKEEYSA	CRC,THCA
KRAS	c.182A>G	p.Q61R	IEDSYRKQVVIDGETCLLDILDTAG[p.Q61R]REEYSAMRDQYMRTGEGFLCVFAINN	LDTAGREEY,AGREEYSAM,ILDTAGREEY,AGREEYSAMR,DTAGREEYSA	MM,TGCT
KRAS	c.182A>T	p.Q61L	IEDSYRKQVVIDGETCLLDILDTAG[p.Q61L]LEEYSAMRDQYMRTGEGFLCVFAINN	LDTAGLEEY,AGLEEYSAM,ILDTAGLEEY,LLDILDTAGL,DTAGLEEYSA	CRC,LUAD,TGCT
KRAS	c.183A>C	p.Q61H	IEDSYRKQVVIDGETCLLDILDTAG[p.Q61H]HEEYSAMRDQYMRTGEGFLCVFAINN	LDTAGHEEY,AGHEEYSAM,ILDTAGHEEY,DTAGHEEYSA	LUAD,PAAD,STAD
KRAS	c.183A>T	p.Q61H	IEDSYRKQVVIDGETCLLDILDTAG[p.Q61H]HEEYSAMRDQYMRTGEGFLCVFAINN	LDTAGHEEY,AGHEEYSAM,ILDTAGHEEY,DTAGHEEYSA	MM,TGCT
KRAS	c.34G>A	p.G12S	MTEYKLVVVGA[p.G12S]SGVGKSALTIQLIQNHFVDEYDPTIE	LVVVGASGV,KLVVVGASGV,YKLVVVGASG	CRC,STAD
KRAS	c.34G>C	p.G12R	MTEYKLVVVGA[p.G12R]RGVGKSALTIQLIQNHFVDEYDPTIE	ARGVGKSAL,KLVVVGARGV,VVVGARGVGK,EYKLVVVGAR,GARGVGKSAL,RGVGKSALTI	MM,PAAD,TGCT
KRAS	c.34G>T	p.G12C	MTEYKLVVVGA[p.G12C]CGVGKSALTIQLIQNHFVDEYDPTIE	LVVVGACGV,VVGACGVGK,KLVVVGACGV,VVVGACGVGK	CRC,LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
KRAS	c.35G>A	p.G12D	MTEYKLVVVGA[p.G12D]DGVGKSALT IQLIQNHFVDEYDPTIE	LVVVGADGV,VVGADGVGK,KLVVVGADGV,VVVGADGVG K	CESC,CR C,GBM,K IRP,LAM L,LUAD, MM,PAA D,STAD, UCEC,UC S
KRAS	c.35G>C	p.G12A	MTEYKLVVVGA[p.G12A]AGVGKSALTI QLIQNHFVDEYDPTIE	LVVVGAAGV,VVGAAGVGK,YKLVVVGAA,KLVVVGAAGV, VVVGAAGVGK,YKLVVVGAAG,GAAGVGKSAL	CRC,LUA D,MM,T GCT,UCE C
KRAS	c.35G>T	p.G12V	MTEYKLVVVGA[p.G12V]VGVGKSALTI QLIQNHFVDEYDPTIE	LVVVGAVGV,VVGAVGVGK,YKLVVVGAV,KLVVVGAVGV, VVVGAVGVGK,GAVGVGKSAL	BRCA,CE SC,CRC,L UAD,OV, PAAD,TG CT,UCEC ,UCS
KRAS	c.37G>T	p.G13C	MTEYKLVVVGAG[p.G13C]CVGKSALTI QLIQNHFVDEYDPTIED	VVGAGCVGK,KLVVVGAGCV,VVVGAGCVGK	LUAD
KRAS	c.38G>A	p.G13D	MTEYKLVVVGAG[p.G13D]DVGKSALT IQLIQNHFVDEYDPTIED	VVGAGDVGK,KLVVVGAGDV,VVVGAGDVGK	CESC,CLL ,CRC,DLB CL,LUAD, MM,STA D,UCEC
KRAS	c.436G>A	p.A146 T	PSRTVDTKQAQDLARSYGIPFIETS[p.A1 46T]TKTRQRVEDAFYTLVREIRQYRLKK I	ETSTKTRQR,GIPFIETSTK,ETSTKTRQRV	CRC,MM ,TGCT
KRBA 1	c.2515A>G	p.R839 G	DRLATALAGLAQEVATMRTQVNRLG[p .R839G]GRPQGPGPGMGQASWMWTL PRGPRWAH	RTQVNRLGG,TQVNRLGGR,RTQVNRLGGR	TGCT
KRT2	c.896T>G	p.L299 W	KRTAAENDFVTLKKDVDNAYMIKVE[p. L299W]WQSKVDLLNQEIEFLKVLYDAE ISQI	YMIKVEWQS,MIKVEWQSK,IKVEWQSKV,VEWQSKVDL,N AYMIKVEW,MIKVEWQSKV,YMIKVEWQSK,VEWQSKVDL L	KIRC
KRT4	c.462_463i nsC	p.F154f s	RGNKSISMSVAGSRQGACFGGAGGF[p .F154fs]RHWWLWWWIWGLLQW*	WLWWWIWGL,GGFRHWWLW,GFRHWWLWW,FRHW WLWWW,RHWWLWWWI,HWWLWWWIW,LWWWIW GLL,WWIWGLLQW,CFGGAGGFR,GGAGGFRHW,WLWW WIWGLL,AGGFRHWWLW,GFRHWWLWWW,RHWWLW WWIW,WWLWWWIWGL,WWWIWGLLQW,FGGAGGFR HW	KIRC
KRT6B	c.590T>C	p.L197 P	NKFASFIDKVRFLEQQNKVLDTKWT[p. L197P]PLQEQGTKTVRQNLEPLFEQYIN NLR	VLDTKWTPL,KVLDTKWTPL	CRC
KRT8	c.175T>G	p.S59A	TQKSYKVSTSGPRAFSSRSYTSGPG[p.S 59A]ARISSSSFSRVGSSNFRGGLGGGY GG	RSYTSGPGA,GARISSSSF,SYTSGPGAR,YTSGPGARI,RSYTS GPGAR,SYTSGPGARI,GARISSSSFS	ACC,KIR P,LIHC
KRTAP 1-1	c.346A>G	p.I116V	CGTGCGIGGGIGYGQEGSSGAVSTR[p.I 116V]VRWCRPDCRVEGTCLPPCCVVS CTPP	VSTRVRWCR,STRVRWCRP,RVRWCRPDC,GAVSTRVRW, AVSTRVRWCR,STRVRWCRPD,RVRWCRPDCR,SGAVSTR VRW	TGCT
KRTAP 27-1	c.372G>T	p.M12 4I	ACQSESSSAGLACVSQPCQSESTQQ[p. M124I]IGFVAQSCQPASLKGNSCPPKT SKSK	CQSESTQQI,ESTQQIGFV,SESTQQIGF,QSESTQQIGF,QQI GFVAQSC,SESTQQIGFV	LUAD
KRTAP 4-11	c.144C>G	p.S48R	TCCRPSCCETTCCRTTYCRPSCCVS[p.S4 8R]RCCRPQCCQSVCCQPTCCRPRCCIS S	VSRCCRPQC	GBM,PR AD
KRTAP 4-5	c.220A>T	p.S74C	VCYQPTCCHPSCCISSCCRPYCCES[p.S7 4C]CCCRPCCCQTTCCRTTCCRTTCCCP S	CESCCCRPC	KIRP
KRTAP 4-5	c.272G>T	p.C91F	CRPYCCESSCCRPCCCQTTCCRTTC[p.C 91F]FRTTCCCPSCCVSSCCRPQCCQSV CC	TCCRTTCFR,TTCCRTTCFR	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
KRTAP4-8	c.188C>G	p.T63S	TCYRPSYSVSCCCRPQCCQSVCCQP[p.T635}SCCRPSCCVSSCCKPQCCQSVCCQPT	SVCCQPSCCR	TGCT
KRTAP4-9	c.53A>T	p.D18V	MVSSCCGSVCSDQGCGQ[p.D18V]VLCQETCCRPSCCETTCCRTTCCRPS	CSDQGCGQV,SDQGCGQVL,QVLCQETCCR	PRAD
KRTAP5-1	c.578C>A	p.S193Y	GSCGGSKGGCGSCGGCKGGCGSCGG[p.S193Y}YKGGCGSGCGGCGSGCGVPVCCCSCS	GGCGSCGGY,KGGCGSCGGY	LUAD
KSR2	c.1664C>T	p.T555M	FNLPASHYYKYKQQFiFPDVVPVPE[p.T555M]MPTRAPQVILHPVTSNPILEGNPLLQ	MPTRAPQVI,FPDVVPVPEM,MPTRAPQViL,PEMPTRAPQV	HNSC
L1CAM	c.1894C>A	p.R632S	LVVGSPGPVPRLVLSDLHLLTQSQV[p.R632S]SVSWSPAEDHNAPIEKYDIEFEDKEM	LLTQSQVSV,QVSVSWSPA,TQSQVSVSW,SQVSVSWSP,HLLTQSQVSV,SQVSVSWSPA,LTQSQVSVSW	LUAD
L1CAM	c.557C>T	p.T186M	PPSAEPLRIYWMNSKILHIKQDERV[p.T186M]MMGQNGNLYFANVLTSDNHSDYICHA	MMGQNGNLY,VMMGQNGNL,HIKQDERVM,IKQDERVMM,VMMGQNGNLY,MMGQNGNLYF,RVMMGQNGNL,LHIKQDERVM	CRC
L2HGDH	c.1321_1323delCCT	p.P441del	VEDFVFDAGVGDIGNRILHVRNAPS[p.P441del}AATSSIAISGMIADEVQQRFEL*	HVRNAPSAA,SAATSSIAI,APSAATSSI,LHVRNAPSA,ILHVRNAPSA,HVRNAPSAAT,NAPSAATSSI,APSAATSSIA,LHVRNAPSAA	TGCT
L3MBTL4	c.485G>T	p.W162L	HPVGWCEKTKHELHIPKGYRKDKFV[p.W162L]LMDYLKACKLQNAPKKLFRNRSPNGP	VLMDYLKAC,LMDYLKACK,KFVLMDYLK,KDKFVLMDY,YRKDKFVLM,LMDYLKACKL,VLMDYLKACK,KGYRKDKFVL,RKDKFVLMDY	LUAD
LACTB	c.13A>C	p.M5L	MYRL[p.M5L]LSAVTARAAAPGGLASSCGRRGVHQR	LLSAVTARA,RLLSAVTAR,YRLLSAVTA,RLLSAVTARA,LLSAVTARAA,MYRLLSAVTA,LSAVTARAAA	ACC
LALBA	c.121G>A	p.A41T	AILAKQFTKCELSQLLKDIDGYGGI[p.A41T]TLPELICTMFHTSGYDTQAIVENNES	TLPELICTM,IDGYGGITL,GYGGITLPEL,TLPELICTMF,ITLPELICTM	CRC
LAMA1	c.3088G>T	p.D1030Y	NTCDPETGECVCPPHTQGVKCEECE[p.D1030Y]YGHWGYDAEVGCQACNCSLVGSTHHR	GVKCEECEY,CEYGHWGYDA,EECEYGHWGY	LUAD
LAMA4	c.1673C>T	p.A558V	SLSTSADSLTTPRLTLSELDDIIKN[p.A558V]VSGIYAEIDGAKSELQVKLSNLSNLS	ELDDIIKNV,NVSGIYAEI,IIKNVSGIY,DIIKNVSGI,IKNVSGIYA,IIKNVSGIYA,DIIKNVSGIY,KNVSGIYAEI,SELDDIIKNV	CRC
LAMA4	c.1915G>A	p.E639K	NGLVQKALDASNVYENIVNYVSEAN[p.E639K]KTAEFALNTTDRIYDAVSGIDTQIIY	VNYVSEANK,YVSEANKTA,EANKTAEFA,SEANKTAEF,IVNYVSEANK,EANKTAEFAL,VSEANKTAEF,SEANKTAEFA	BLCA
LAMA4	c.3879G>A	p.M1293I	PNGLLFYYASGSDVFSISLDNGTVI[p.M1293I]IDVKGIKVQSVDKQYNDGLSHFVISS	SLDNGTVII,VIIDVKGIK,TVIIDVKGI,VIIDVKGIKV,TVIIDVKGIK,ISLDNGTVII	LUSC
LAMA5	c.6668T>G	p.L2223R	SSMAWARLHRLNASIADLQSQLRSP[p.L2223R}RGPRHETAQQLEVLEQQSTSLGQDAR	QLRSPRGPR,LQSQLRSPR,SPRGPRHET,SQLRSPRGPR,QLRSPRGPRH,DLQSQLRSPR,SPRGPRHETA	KIRP
LAMB4	c.1762G>T	p.G588W	GLAPLGSETFGQSPAVHVVLGEPVP[p.G588W]WNPVTWTGPGFARVLPGAGLRFAVNN	GEPVPWNPV,VVLGEPVPW,HVVLGEPVPW,EPVPWNPVTW	LUAD
LAMB4	c.3715G>T	p.G1239W	EADFKDLRGNVSEIERILKHPVFPS[p.G1239W]WKFLKVKDYHDSVRRQIMQLNEQLKA	VFPSWKFLK,KHPVFPSWK,FPSWKFLKV,HPVFPSWKF,LKHPVFPSW,WKFLKVKDY,PVFPSWKFLK,KHPVFPSWKF,VFPSWKFLKV,SWKFLKVKDY,HPVFPSWKFL,ILKHPVFPSW	LUAD
LAMC3	c.521_522CC>AG	p.P174Q	KRSRADGPWEPYQFYSASCQKTYGR[p.P174Q]QEGQYLRPGEDERVAFCTSEFSDISPL	TYGRQEGQY,YGRQEGQYL,KTYGRQEGQY,TYGRQEGQYL,RQEGQYLRPG	TGCT
LARP1	c.668_669insC	p.A223fs	PRHIPANRGEIKGSESATYVPVAPP[p.A223fs]HPSLATRDQTGACLARPG*	APPHPSLAT,SLATRDQTGA,ATYVPVAPPH,ATRDQTGACL,VPVAPPHPSL	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
LARP4B	c.487delA	p.T163fs	PENSETGGNESQPDSQEDPREVLKK[p.T163fs]HWNSAYLGRTLLVTCILYHRWIVTSMCQSQRWLTSTTSRSSALMWT*	CILYHRWIV,VLKKHWNSA,YLGRTLLVT,ILYHRWIVT,VTSMCQSQR,AYLGRTLLV,RTLLVTCIL,LYHRWIVTS,SAYLGRTLL,RWLTSTTSR,STTSRSSAL,TTSRSSALM,LKKHWNSAY,TLLVTCILY,HWNSAYLGR,LVTCILYHR,YHRWIVTSM,KKHWNSAYL,NSAYLGRTL,SMCQSQRWL,CQSQRWLTS,SQRWLTSTT,TSRSSALMW,TSMCQSQRW,SAYLGRTLLV,RTLLVTCILY,LYHRWIVTSM,STTSRSSALM,VLKKHWNSAY,LLVTCILYHR,IVTSMCQSQR,EVLKKHWNSA,NSAYLGRTLL,LKKHWNSAYL,WNSAYLGRTL,CQSQRWLTST,SQRWLTSTTS,REVLKKHWNS,TTSRSSALMW	STAD
LARS	c.554_555insC	p.P185fs	MKSLGLSDEEIVKFSEAEHWLDYFP[p.P185fs]ATGYSGFKKNGFEGRLASFLHHH*	ATGYSGFKK,RLASFLHHH,GFEGRLASF,FPATGYSGF,LDYFPATGY,FEGRLASFL,WLDYFPATGY,YFPATGYSGF,NGFEGRLASF,AEHWLDYFPA,FKKNGFEGRL	KIRC
LAT2	c.53T>G	p.L18W	MSSGTELLWPGAALLVL[p.L18W]WGVAASLCVRCSRPGAKRSEKIYQQR	AALLVLWGV,VLWGVAASL,LLVLWGVAA,GAALLVLWGV,ALLVLWGVAA,LVLWGVAASL,WPGAALLVLW	GBM
LBX1	c.526C>T	p.R176W	SPADRDQIAQQLGLTNAQVITWFQN[p.R176W]WRAKLKRDLEEMKADVESAKKLGPSG	VITWFQNWR,QVITWFQNW,WFQNWRAKL,TWFQNWRAK,ITWFQNWRA,ITWFQNWRAK,QVITWFQNWR,TWFQNWRAKL,WFQNWRAKLK,NWRAKLKRDL,AQVITWFQNW	CRC
LCP1	c.1334_1335insC	p.P445fs	SDALVIFQLYEKIKVPVDWNRVNKP[p.P445fs]AIPQTGRQYEEA*	RVNKPAIPQT	KIRC
LHCGR	c.47T>A	p.L16Q	MKQRFSALQLLKLLL[p.L16Q]QLQPPLPRALREALCPEPCNCVPDGA	QLLKLLLQL,LLLQLQPPL,QLQPPLPRA,KLLLQLQPPL,QLQPPLPRAL,LQLLKLLLQL,LQLQPPLPRA	TGCT
LILRA1	c.1228C>T	p.H410Y	SPVTSAHSGTYRCYGSLSSNPYLLS[p.H410Y]YPSDSLELMVSGAAETLSPPQNKSDS	SSNPYLLSY,LLSYPSDSL,SYPSDSLEL,YPSDSLELM,NPYLLSYPS,LSSNPYLLSY,YLLSYPSDSL,SYPSDSLELM,LSYPSDSLEL,YPSDSLELMV	BLCA
LILRB1	c.1417_1419delCTC	p.L479del	GLGRHLGVVIGILVAVILLLLLLLL[p.L479del]FLILRHRRQGKHWTSTQRKADFQHPAGA	ILLLLLLLLF	BLCA
LILRB5	c.1792T>C	p.S598P	TKDRQAEEDRQMDTERVLSSPGPQA[p.S598P]PPPPPRSLPLTLPRCRLLHLKPPRM*	APPPPPRSL,PPPPPRSLPL	PRAD
LIM2	c.448T>A	p.S150T	IMAFAHQPTFSRISRPFSAGIMFFS[p.S150T]TTLFVVLALAIYTGVTVSFLGRRFGD	GIMFFSTTL,MFFSTTLFV,FFSTTLFVV,IMFFSTTLF,FSTTLFVVL,STTLFVVLA,TTLFVVLAL,IMFFSTTLFV,MFFSTTLFVV,GIMFFSTTLF,FFSTTLFVVL,FSAGIMFFST,FSTTLFVVLA,STTLFVVLAL,TTLFVVLALA,AGIMFFSTTL	LUAD
LIMK2	c.608G>A	p.R203H	TTVQVKEVNRMHISPNNRNAIHPGD[p.R203H]HILEINGTPVRTLRVEEVEDAISQTS	NAIHPGDHI,HPGDHILEI,AIHPGDHIL,HILEINGTPV	GBM
LIN9	c.547C>T	p.R183W	FCVCLKESFPNLKTRKLTRVEWGKI[p.R183W]WRLMGKPRRCSSAFFEEERSALKQKR	RVEWGKIWR,IWRLMGKPR,VEWGKIWRL,WGKIWRLMGK,KIWRLMGKPR,IWRLMGKPRR,VEWGKIWRLM	UCEC
LIN9	c.691G>A	p.E231K	QKRQKIRLLQQRKVADVSQFKDLPD[p.E231K]KIPLPLVIGTKVTARLRGVHDGLFTG	SQFKDLPDK,LPDKIPLPL,KDLPDKIPL,VSQFKDLPDK,SQFKDLPDKI,FKDLPDKIPL,LPDKIPLPLV	CESC
LINGO2	c.1228C>A	p.P410T	PDTIRERSFKDFHSTALSFYFTCKK[p.P410T]TKIREKKLQHLLVDEGQTVQLECSAD	KTKIREKKL,FTCKKTKIR,FYFTCKKTKI,SFYFTCKKTK,TCKKTKIREK,YFTCKKTKIR	HNSC
LIPJ	c.707C>A	p.P236Q	GSKLCPLQIFDKICLNILFMMFGYD[p.P236Q]QKNLNMSRLDVYFSHNPAGTSVQNML	FMMFGYDQK,DQKNLNMSR,MMFGYDQKN,MMFGYDQKNL,LFMMFGYDQK,FGYDQKNLNM	LUAD
LLGL2	c.2864_2865insG	p.P955fs	PRCLVDSAETKNHRPGNGAGPKKAP[p.P955fs]EPSQELRDSE*	KKAPEPSQEL	BLCA
LMLN	c.595G>T	p.G199C	PVIVPEEHLQQCRVYRGGKWPHGAV[p.G199C]CVPDQEGISDADFVLYVGALATERCS	GKWPHGAVC,GKWPHGAVCV	LUSC
LMX1B	c.844_846delCAG	p.Q285del	RHQQQQEQQNSQRLGQGEPGPGQGL[p.Q285del]QEVLSSRMEGMMASYTPLAPPQQQIVAM	LQEVLSSRM,GLQEVLSSRM	THCA

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
LOC100132247	c.1594A>C	p.T532P	ADDNLKTPSERQLTALPPSADDNIK[p.T532P]PPAERLRGPLPPSADDNLKTPSERQL	DNIKPPAER,NIKPPAERLR,PPAERLRGPL	LIHC
LOC151174	c.268C>T	p.P90S	AEGIAMLLGTAGPSRLPAAPDASQA[p.P90S]SLRSPWALSVAAALCSPVSCHPCGRH	SLRSPWALS,APDASQASL,SQASLRSPW,ASLRSPWAL,SLRSPWALSV,SQASLRSPWA,ASQASLRSPW	CESC
LOC401296	c.430C>A	p.L144M	CVLAPGSGSRPTPHIVYSVPAARTC[p.L144M]MGAPGSLSPCHLCVHICAHTYSGTPV	AARTCMGAPG,RTCMGAPGSL,VPAARTCMGA,YSVPAARTCM	TGCT
LOC554223	c.438_458delGCGGGCGCCGTGGATGGAGCA	p.RAPWMEQ147del	LSVGDVDDTQCVRLDSDATSPRMEP[p.RAPWMEQ147del]EGPEYWEEETGTAKAKAQFYRVNLRTLSGYYNQSEA*	RMEPEGPEY,RMEPEGPEYW	PRAD
LOC649330	c.278G>A	p.G93E	AGEDGRMIASQVVDINLAAEPKVNR[p.G93E]ENAGVKRSAAEMYGSSFDLDYGFQRD	KVNRENAGV,VNRENAGVK,KVNRENAGVK,RENAGVKRSA	SKCM
LPHN2	c.2716T>A	p.F906I	EFIFLIGIDKTKYAIACPIFAGLLH[p.F906I]IFFLAAFAWMCLEGVQLYLMLVEVFE	GLLHIFFLA,LLHIFFLAA,HIFFLAAFA,IFAGLLHIF,IFFLAAFAW,LHIFFLAAF,FAGLLHIFF,GLLHIFFLAA,IFAGLLHIFF,IFFLAAFAWM,CPIFAGLLHI,LLHIFFLAAF,PIFAGLLHIF,HIFFLAAFAW	TGCT
LPHN3	c.2220G>T	p.E740D	FPENMGHGSTIQLSANTLKQNGRNG[p.E740D]DIRVAFVLYNNLGPYLSTENASMKLG	DIRVAFVLY,KQNGRNGDI,RNGDIRVAF,GDIRVAFVL,GRNGDIRVAF,GDIRVAFVLY	LUAD
LPHN3	c.2477G>A	p.R826H	VFTVKHIKQSEENFNPNCSFWSYSK[p.R826H]HTMTGYWSTQGCRLLTTNKTHTTCSC	YSKHTMTGY,CSFWSYSKH,HTMTGYWST,FWSYSKHTM,SKHTMTGYW,SFWSYSKHTM,SYSKHTMTGY,WSYSKHTMTG,YSKHTMTGYW	PRAD
LPHN3	c.3548G>A	p.R1183Q	SGSRTPGRYSTGSQSRIRRMWNDTV[p.R1183Q]QKQSESSFITGDINSSASLNREGLLN	RMWNDTVQK,VQKQSESSF,TVQKQSESSF,RMWNDTVQKQ,VQKQSESSFI	CRC
LPIN1	c.2921C>T	p.S974L	SDTFSNFTFWREPLPPFENQDIHSA[p.S974L]LA*	FENQDIHSAL	BLCA
LPPR2	c.556G>T	p.A186S	TDQGACAGSPSLVAAARRAFPCKDA[p.A186S]SLCAYAVTYTAMYVTLVFRVKGSRLV	SLCAYAVTY,DASLCAYAV,CKDASLCAY,SLCAYAVTYT,RAFPCKDASL,ASLCAYAVTY,FPCKDASLCA,KDASLCAYAV	ACC
LPPR4	c.1579C>A	p.R527S	LKIQPGAVPGCNNSMPGGPRVSIQS[p.R527S]SPGSSQLVHIPEETQENISTSPKSSS	RVSIQSSPG,IQSSPGSSQ,QSSPGSSQLV,IQSSPGSSQL,SPGSSQLVHI	LUAD
LRBA	c.6307G>A	p.E2103K	VSLSTPAQLVAPSVVVKGTLSVTSS[p.E2103K]KLYFEVDEEDPNFKKIDPKILAYTEG	LSVTSSKLY,TLSVTSSKL,GTLSVTSSK,TSSKLYFEV,SVTSSKLYF,VTSSKLYFEV,KGTLSVTSSK,TLSVTSSKLY,LSVTSSKLYF	UCEC
LRCH2	c.2150A>G	p.D717G	SIHVPSPAVPKLSMAKCRRNVENFL[p.D717G]GACKKLGVSQERLCLPHHILEERGLV	FLGACKKLGV	KIRC
LRFN5	c.396C>A	p.N132K	NSNRLTKITNDMFSGLSNLHHLILN[p.N132K]KNQLTLISSTAFDDVFALEELDLSYN	ILNKNQLTL,NLHHLILNK,ILNKNQLTLI,SNLHHLILNK,LILNKNQLTL	LUAD
LRIG1	c.70C>G	p.L24V	MARPVRGGLGAPRRSPCLLLLWL[p.L24V]VLLRLEPVTAAAGPRAPCAAACTCAG	LLLLWLVLL,LLWLVLLRL,LVLLRLEPV,LLLWLVLLR,LLLWLVLLRL,WLVLLRLEPV,SPCLLLLWLV	ACC
LRIG1	c.76C>G	p.L26V	MARPVRGGLGAPRRSPCLLLLWLLL[p.L26V]VRLEPVTAAAGPRAPCAAACTCAGDS	LLLLWLLLV,LLWLLLVRL,LLLVRLEPV,VRLEPVTAA,CLLLLWLLLV,LLLWLLLVRL,WLLLVRLEPV	ACC
LRP1	c.3172C>A	p.P1058T	TCDGDNDCGDYSDETHANCTNQATR[p.P1058T]TPGGCHTDEFQCRLDGLCIPLRWRCD	ATRTPGGCH,ATRTPGGCHT,TPGGCHTDEF	KIRP,PRAD
LRP1	c.4462_4463insG	p.G1488fs	GSGHMEVLRGHEFLSHPFAVTLYGG[p.G1488fs]GGLLD*	TLYGGGGLL	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
LRP1	c.4462delG	p.G1488fs	GSGHMEVLRGHEFLSHPFAVTLYGG[p.G1488fs]RSTGLTGEQTHWLRPTSGPATMSPWYRGPTPSPLTCRCTTPPASPWLPIPVRPMGARAPAPTCVSSTTTGPCPAPAPTS*	WLRPTSGPA,PVRPMGARA,FAVTLYGGR,PATMSPWYR,TTPPASPWL,TTGPCPAPA,RPTSGPATM,PPASPWLPI,RPMGARAPA,YRGPTPSPL,CTTPPASPW,WLPIPVRPM,GPATMSPWY,TLYGGRSTGL,GLTGEQTHWL,TMSPWYRGPT,WYRGPTPSPL,HWLRPTSGPA,GARAPAPTCV,SGPATMSPWY,PFAVTLYGGR,LTGEQTHWLR,CTTPPASPWL,TTTGPCPAPA,SPWYRGPTPS,TPPASPWLPI,LPIPVRPMGA,IPVRPMGARA,RPMGARAPAP,APAPTCVSST,WLRPTSGPAT,LRPTSGPATM,TSGPATMSPW,RCTTPPASPW,GEQTHWLRPT	STAD
LRP10	c.15_17delCCT	p.L11del	MLLATLLLLL[p.L11del]GGALAHPDRIIFPNHACEDPPAVLLEVQ	TLLLLLGGA	PRAD
LRP11	c.275C>G	p.P92R	QQERPQEELELELRAGGGPQEDCPG[p.P92R]RGSGGYSAMPDAIIRTKDSLAAGASF	RGSGGYSAM,CPGRGSGGY,GRGSGGYSAM	ACC
LRP12	c.928G>T	p.G310C	CTWLIDTGDHRKVILRFTDFKLDGT[p.G310C]CYGDYVKIYDGLEENPHKLLRVLTAF	GTCYGDYVK,KLDGTCYGDY,TDFKLDGTCY,TCYGDYVKIY	TGCT
LRP1B	c.10687G>T	p.G3563C	FDCADGSDERNCETSCSKDQFRCSN[p.G3563C]CQCIPAKWKCDGHEDCKYGEDEKSCE	CSNCQCIPAK	LUAD
LRP1B	c.4174C>T	p.L1392F	SLRTTLIAGAMEHPRAIALDPRYGI[p.L1392F]FFWTDWDANFPRIESASMSGAGRKTI	RYGIFFWTD,ALDPRYGIF,YGIFFWTDW,DPRYGIFFW,GIFFWTDWDA,IALDPRYGIF,RYGIFFWTDW,FFWTDWDANF,ALDPRYGIFF	UCS
LRP2	c.12117G>C	p.M4039I	FGTCPQHCRNTKGSYECVCADGFTS[p.M4039I]ISDRPGKRCAAEGSSPLLLLPDNVRI	TSISDRPGK,DGFTSISDR,SISDRPGKR,FTSISDRPGK,TSISDRPGKR	LUAD
LRP2	c.1547C>T	p.A516V	IDMVNLDGSYRVTLITENLGHPRGI[p.A516V]VVDPTVGYLFFSDWESLSGEPKLERA	IVVDPTVGY,LGHPRGIVV,VVDPTVGYLF,IVVDPTVGYL,GIVVDPTVGY,HPRGIVVDPT	LUSC
LRP2	c.2210C>T	p.S737L	IFSSQVAIRGIPFTLSTQEDVMVPV[p.S737L]LGNPSFFVGIDFDAQDSTIFFSDMSK	VLGNPSFFV,VPVLGNPSF,QEDVMVPVL,VPVLGNPSFF,MVPVLGNPSF,TQEDVMVPVL	CRC
LRP2	c.7295G>T	p.R2432I	NHSPPFQTINVERTVMSLDYDSVSD[p.R2432I]IIYFTQNLASGVGQISYATLSSGIHT	SVSDIIYFT,IIYFTQNLA,DIIYFTQNL,LDYDSVSDI,YDSVSDIIY,DSVSDIIYFT,DIIYFTQNLA,LDYDSVSDII,YDSVSDIIYF,SDIIYFTQNL	UCEC
LRP2	c.9127C>T	p.R3043C	CGDYSDERGCLYQTCQQNQFTCQNG[p.R3043C]CCISKTFVCDEDNDCGDGSDELMHLC	CQNGCCISK	CRC
LRP5	c.4825T>C	p.S1609P	LSAEDSCPPSPATERSYFHLFPPPP[p.S1609P]PPCTDSS*	HLFPPPPPPC	PRAD
LRP6	c.2024G>A	p.R675Q	NNNNVAIPLTGVKEASALDFDVTDN[p.R675Q]QIYWTDISLKTISRAFMNGSALEHVV	FDVTDNQIY,QIYWTDISL,NQIYWTDISL,QIYWTDISLK	CRC
LRRC16A	c.679G>A	p.D227N	LDHRDLIPIIAALEYNQWFTKLSSK[p.D227N]NLKLSTDVCEQILRVVSRSNRLEELV	KLSSKNLKL,FTKLSSKNLK,TKLSSKNLKL	BLCA
LRRC16B	c.2359C>T	p.R787W	AVDKELQVILESMVSLTQELCPVAM[p.R787W]WVAEGHNKMLSNVAERVTVPRNFIRG	ELCPVAMWV,WVAEGHNKM,QELCPVAMW,AMWVAEGHNK,MWVAEGHNKM,ELCPVAMWVA,WVAEGHNKML,QELCPVAMWV	PRAD
LRRC18	c.652C>T	p.R218W	RRLENLYVVEEKDLCAACLRKCQNA[p.R218W]WDNLNRIKNMATTTPRKTIFPNLISP	NAWDNLNRI,CLRKCQNAW,RKCQNAWDNL	CRC
LRRC31	c.68A>C	p.K23T	RKKTSSEGETKPQTSTVNKFLR[p.K23T]ASNAESRKEDNDLKTSDSQPSDWIQK	FLRASNAES,RASNAESRK,STVNKFLRA,FLRASNAESR	CRC
LRRC37A2	c.305C>G	p.T102S	ELEQPHTQQGPEKLAGNAIYTKPSF[p.T102S]SQEHKAAVSVLTPFSKGAPSTSSPAK	FSQEHKAAV,SQEHKAAVSV	PRAD
LRRC37A3	c.1217C>A	p.A406D	ETPGQPPEHHEVTVSPPGHHQTHHL[p.A406D]DSPSVSVKPPDVQLTIAAEPSAEVGT	HLDSPSVSV,HLDSPSVSVK,QTHHLDSPSV,HQTHHLDSPS	CESC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
LRRC43	c.1674delC	p.D558fs	KEPAKEWKVLKKKKEPPKELRQDPP[p.D558fs]SSRCWAGAW*	SSRCWAGAW,ELRQDPPSSR,RQDPPSSRCW	STAD
LRRC7	c.4166G>A	p.R1389H	VPPDTITKKAGSHIQTLMGSQSLQH[p.R1389H]HSREQQPYEGNINKVTIQQFQSPLPI	HSREQQPYE,SQSLQHHSR,HHSREQQPY,LMGSQSLQHH,QHHSREQQPY	CRC
LRRCC1	c.17C>T	p.A6V	MEAAA[p.A6V]VVVAAEAEVENEDGDSSCGDVCFMDK	VVVAAEAEV,EAAAVVVAA,MEAAAVVVA,AVVVAAEAEV,MEAAAVVVAA	TGCT
LRRIQ1	c.2375G>T	p.W792L	RKRPVKCPANMTPALDKLEILRCGP[p.W792L]LDTLQQVTTVTFQDLPGCVLSTLAEC	LEILRCGPL,GPLDTLQQV,ILRCGPLDTL	LUAD
LRRIQ3	c.732_733insA	p.K244fs	LIVQRWIRGFLVRKNLSPVFFHKKK[p.K244fs]TAGKNY*	KKKTAGKNY,FFHKKKTAGK,HKKKTAGKNY	PRAD
LRRTM4	c.728C>A	p.S243Y	SKINFAHFPRLFNLRSIYLQWNRIR[p.S243Y]YISQGLTWTWSSLHNLDLSGNDIQGI	LQWNRIRYI,RIRYISQGL,YISQGLTWT,RYISQGLTW,YLQWNRIRY,YLQWNRIRYI,IYLQWNRIRY,YISQGLTWTW,RIRYISQGLT,LQWNRIRYIS,NRIRYISQGL,IRYISQGLTW	LUAD
LRTM2	c.416C>T	p.S139L	DLTNLTELQLRNNSIRTLDRDLLRH[p.S139L]LPLLRHLDLSINGLAQLPPGLFDGLL	LLRHLPLLR,LPLLRHLDL,DLLRHLPLL,RDLLRHLPL,RHLPLLRHL,DLLRHLPLLR,RDLLRHLPLL,LRHLPLLRHL	BLCA
LRTM2	c.526C>G	p.L176V	GLAQLPPGLFDGLLALRSLSLRSNR[p.L176V]VQNLDRLTFEPLANLQLLQVGDNPWE	SLSLRSNRV,VQNLDRLTF,LRSNRVQNL,SLRSNRVQNL,RSNRVQNLDR,RVQNLDRLTF,RSLSLRSNRV	CESC
LSG1	c.1550G>T	p.R517L	ITPREDEDPHRPPTSEELLTAYGYM[p.R517L]LGFMTAHGQPDQPRSARYILKDYVSG	LLTAYGYML,TAYGYMLGF,AYGYMLGFM,GYMLGFMTA,YMLGFMTAH,LTAYGYMLGF,YMLGFMTAHG,TAYGYMLGFM,YGYMLGFMTA	LUSC
LTA4H	c.319T>C	p.F107L	YKGSPMEISLPIALSKNQEIVIEIS[p.F107L]LETSPKSSALQWLTPEQTSGKEHPYL	EISLETSPK,QEIVIEISL,LETSPKSSA,NQEIVIEISL,LETSPKSSAL	KIRC
LTB4R	c.217T>C	p.F73L	QKRSVTALMVLNLALADLAVLLTAP[p.F73L]LFLHFLAQGTWSFGLAGCRLCHYVCG	VLLTAPLFL,LTAPLFLHF,LAVLLTAPL,TAPLFLHFL,AVLLTAPLF,LTAPLFLHFL,DLAVLLTAPL,LLTAPLFLHF,TAPLFLHFLA,LAVLLTAPLF	TGCT
LUC7L3	c.442T>A	p.S148T	GKNEEKIQVLTDKIDVLLQQIEELG[p.S148T]TEGKVEEAQGMMKLVEQLKEERELLR	IEELGTEGKV	TGCT
LUM	c.929G>T	p.R310L	QLEKFDIKSFCKILGPLSYSKIKHL[p.R310L]LLDGNRISETSLPPDMYECLRVANEV	SYSKIKHLL,YSKIKHLLL,SYSKIKHLLL,LSYSKIKHLL	LUSC
LUM	c.988C>T	p.R330C	KIKHLRLDGNRISETSLPPDMYECL[p.R330C]CVANEVTLN*	DMYECLCVA,YECLCVANEV	GBM
LY9	c.205A>C	p.I69L	RASGKDSAPTVVSGILGGSVTLPLN[p.I69L]LSVDTEIENVIWIGPKNALAFARPKE	VTLPLNLSV,SVTLPLNLSV	BRCA
LYPD4	c.191C>A	p.T64K	AVAFHNWKWLLMRNMVCKLQEGCEE[p.T64K]KLVFIETGTARGVVGFKGCSSSSSYP	EEKLVFIET,KLQEGCEEKL,KLVFIETGTA,QEGCEEKLVF,CEEKLVFIET	TGCT
LYST	c.2130G>T	p.Q710H	DLLWKWDALKAYQNFVFEEDRLHSI[p.Q710H]HIANHICNLIQKGNIVVQWKLYNYIF	HIANHICNL,HSIHIANHI,EEDRLHSIH,HIANHICNLI,RLHSIHIANH,FEEDRLHSIH,IHIANHICNL,EEDRLHSIHI	KIRC
LZTS1	c.1294_1341delAGGACCCAGGACCTGGAGGGCGCCCTGCGCACCAAGGGCCTGGAGCTG	p.RTQDLEGALRTKGLEL432del	AKASEILGLKAQLKDTRGKLEGLEL[p.RTQDLEGALRTKGLEL432del]EVCENELQRKKNEAELLREKVNLLEQELQELRAQAALARDMGPPTFPEDVPALQRELERLRAELREERQGHDQ	KLEGLELEV,GKLEGLELEV	PAAD
LZTS2	c.298delC	p.P100fs	VPPRKAVPVTSFTYINEDFRTESPP[p.P100fs]AQAVMLRMPESSGHTMPTSAAHHQSSSLSLESWRRTWRRS*	SSLSLESWR,HTMPTSAAH,SWRRTWRRS,ESWRRTWRR,ESSGHTMPT,SPPAQAVML,MPESSGHTM,AAHHQSSSL,TESPPAQAV,HHQSSSLSL,SSSLSLESW,SLESWRRTW,RMPESSGHTM,SSSLSLESWR,SSLSLESWRR,MLRMPESSGH,HTMPTSAAHH,SLESWRRTWR,SAAHHQSSSL,TESPPAQAVM,AHHQSSSLSL,HQSSSLSLES,QSSSLSLESW,LSLESWRRTW,MPTSAAHHQS	CRC
MAEL	c.1033C>T	p.R345C	EAHVPLQDYEASNSVTPKMVVLDAG[p.R345C]CYQKLRVGSSGFSHFNSSNEEQRSNT	VLDAGCYQK,MVVLDAGCY,DAGCYQKLR,VLDAGCYQKL,VVLDAGCYQK,KMVVLDAGCY	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
MAF	c.158delG	p.G53fs	MKFEVKKEPVETDRIISQCGRLIAG[p.G53fs]ARCPPPP*	CGRLIAGAR,SQCGRLIAGA,RLIAGARCPP	CLL
MAGEC1	c.1826T>A	p.L609H	PQGEDSLSPHYFPQSPPQGEDSMSP[p.L609H]HYFPQSPLQGEEFQSSLQSPVSICSS	GEDSMSPHY,SMSPHYFPQ,SMSPHYFPQS,QGEDSMSPHY,SPHYFPQSPL,GEDSMSPHYF	CLL
MAGEC1	c.714_716delCCC	p.P239del	FQSSPERTQSTFEGFAQSPLQIPVS[p.P239del]SSSSTLLSLFQSFSERTQSTFEGFAQSS	IPVSSSSST,VSSSSSTLL,IPVSSSSSTL	KIRC
MAGEE1	c.1138G>A	p.V380M	SVLPIPGEGLSTSVPPTASDGSDTS[p.V380M]MPPTPGEGASTLVQPTAPDGPGSSVL	ASDGSDTSM,SMPPTPGEGA,TASDGSDTSM	CRC
MAGEE2	c.133delC	p.Q45fs	GDGRGEIQATNASGSPTSMLVVDAP[p.Q45fs]SALRRQSTLSVSTLPRPFRTRMTWRS*	MLVVDAPSA,LVVDAPSAL,TLSVSTLPR,VVDAPSALR,VSTLPRPFR,TLPRPFRTR,PFRTRMTWR,SALRRQSTL,LPRPFRTRM,RPFRTRMTW,LRRQSTLSV,RQSTLSVST,QSTLSVSTL,SVSTLPRPF,SMLVVDAPSA,MLVVDAPSAL,ALRRQSTLSV,RQSTLSVSTL,STLSVSTLPR,LVVDAPSALR,VVDAPSALRR,SVSTLPRPFR,STLPRPFRTR,RPFRTRMTWR,APSALRRQST,LPRPFRTRMT,LSVSTLPRPF,RRQSTLSVST	STAD
MAGI1	c.3467G>T	p.G1156V	KGFGFSLRGGREYNMDLYVLRLAED[p.G1156V]VPAERCGKMRIGDEILEINGETTKNM	YVLRLAEDV,VPAERCGKM,RLAEDVPAER	LUAD
MAGI1	c.3592C>T	p.R1198C	INGETTKNMKHSRAIELIKNGGRRV[p.R1198C]CLFLKRGDGSVPEYDPSSDRHGPATG	GGRRVCLFL,GRRVCLFLK,GGRRVCLFLK,IKNGGRRVCL,KNGGRRVCLF	CRC
MAGI2	c.1348C>A	p.L450M	LSTTLKKSNMGFGFTIIGGDEPDEF[p.L450M]MQVKSVIPDGPAAQDGKMETGDVIVY	EFMQVKSVI,MQVKSVIPD,DEFMQVKSV,MQVKSVIPDG,DEFMQVKSVI	UCEC
MAGI2	c.3130C>A	p.P1044T	PSSEKQSPMAQQSPLAQQSPLAQPS[p.P1044T]TATPNSPIAQPAPPQPLQLQGHENSY	STATPNSPI,STATPNSPIA,SPLAQPSTAT,QQSPLAQPST	LUAD
MAML2	c.1771C>A	p.Q591K	QANQQMPSVLPSQNKPSLLHYTQQQ[p.Q591K]KQQQQQQQQQQQQQQQQQQQQQQQQQ	LLHYTQQQK,SLLHYTQQQK	KIRP
MAMLD1	c.1715A>T	p.Q572L	YLQQPTPTQASSATASSTATATLQL[p.Q572L]LQQQQQQQQQPDHSSFLLQQMMQQPQ	STATATLQLL	TGCT,UCS
MAMSTR	c.484_485insC	p.P162fs	QPHPRMKPSPLTPCPPGVPSPSPPP[p.P162fs]TQVGTSDP*	SPSPPPTQV	STAD
MAN1C1	c.1291_1292insG	p.G431fs	MEAKNMYYEALEAIETYLLNVSPGG[p.G431fs]ADLHCRVARGDSGPQDGAPGLFLRGHDRPWRRGCQGRKEGPLPRARSPDHQDVSRVIRPLRHQTWA*	LLNVSPGGA,RGHDRPWRR,VSRVIRPLR,DGAPGLFLR,DVSRVIRPL,GPQDGAPGL,RPWRRGCQG,RPLRHQTWA,FLRGHDRPW,YLLNVSPGGA,LFLRGHDRPW,QGRKEGPLPR,RARSPDHQDV,VSRVIRPLRH,FLRGHDRPWR,DVSRVIRPLR,VIRPLRHQTW	STAD
MAP1A	c.6187delC	p.P2063fs	GPTVPPRPEPGPSMEPSLTPPAVPP[p.P2063fs]VLLS*	LTPPAVPPV,SLTPPAVPPV	STAD
MAP1B	c.6138G>T	p.E2046D	EGYSYETSTKTTRTPDTSTYCYETA[p.E2046D]DKITRTPQASTYSYETSDLCYTAEKK	ETADKITRT,STYCYETADK,TYCYETADKI	CRC
MAP1S	c.1232C>G	p.S411C	EKMGVGRLDMYVLHPPSAGAERTLA[p.S411C]CVCALLVWHPAGPGEKVVRVLFPGCT	RTLACVCAL,TLACVCALL,AERTLACVC,RTLACVCALL,TLACVCALLV,LACVCALLVW,AERTLACVCA	ACC
MAP2	c.1590G>T	p.K530N	QAVTDSAMTSKTLEKAMTEPSALIE[p.K530N]NSSIQELFEMRVDDKDKIEGVGAATS	SALIENSSI,IENSSIQEL,IENSSIQELF	CRC
MAP2	c.4414_4415insA	p.K1472fs	EPSTVSRDEVRRKKAVYKKAELAKK[p.K1472fs]NRSSGPLSLQEIHFKTCYQIY*	SLQEIHFKT,LSLQEIHFK,KNRSSGPLS,HFKTCYQIY,KKNRSSGPL,NRSSGPLSL,QEIHFKTCY,IHFKTCYQI,KNRSSGPLSL,IHFKTCYQIY,EIHFKTCYQI,AKKNRSSGPL,LQEIHFKTCY	STAD
MAP2K1	c.171G>C	p.K57N	ALQKKLEELELDEQQRKRLEAFLTQ[p.K57N]NQKVGELKDDDFEKISELGAGNGGVV	TQNQKVGEL,TQNQKVGELK,EAFLTQNQKV	CLL

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
MAP2K1	c.171G>T	p.K57N	ALQKKLEELELDEQQRKRLEAFLTQ[p.K57N]NQKVGELKDDDFEKISELGAGNGGVV	TQNQKVGEL,TQNQKVGELK,EAFLTQNQKV	LUAD
MAP2K1	c.370C>T	p.P124S	IHLEIKPAIRNQIIRELQVLHECNS[p.P1245]SYIVGFYGAFYSDGEISICMEHMDGG	NSSYIVGFY,SYIVGFYGA,VLHECNSSY,HECNSSYIV,CNSSYIVGF,CNSSYIVGFY,VLHECNSSYI,SYIVGFYGAF,SSYIVGFYGA,QVLHECNSSY	SKCM
MAP2K4	c.551C>T	p.S184L	PYIVQFYGALFREGDCWICMELMST[p.S184L]LFDKFYKYVYSVLDDVIPEEILGKIT	MSTLFDKFY,STLFDKFYK,TLFDKFYKY,ELMSTLFDK,LMSTLFDKF,ICMELMSTL,CMELMSTLF,LMSTLFDKFY,STLFDKFYKY,LFDKFYKYV,TLFDKFYKYV,WICMELMSTL,MSTLFDKFYK,ICMELMSTLF,ELMSTLFDKF	BRCA
MAP2K4	c.752G>T	p.S251I	IHRDIKPSNILLDRSGNIKLCDFGI[p.S251I]IGQLVDSIAKTRDAGCRPYMAPERID	IIGQLVDSI,IKLCDFGII,GIIGQLVDSI	BRCA
MAP2K4	c.783_784delAA	p.T261fs	DRSGNIKLCDFGISGQLVDSIAKTR[p.T261fs]CWL*	SIAKTRCWL	BRCA
MAP2K4	c.860G>A	p.R287H	RDAGCRPYMAPERIDPSASRQGYDV[p.R287H]HSDVWSLGITLYELATGRFPYPKWNS	DVHSDVWSL,RQGYDVHSDV,QGYDVHSDVW,YDVHSDVWSL	CRC
MAP2K5	c.1334A>G	p.Q445R	VQFNDGNAAVVSMWVCRALEERRSQ[p.Q445R]RGPP*	RALEERRSQR	KIRC
MAP3K1	c.2281_2284delATAG	p.I761fs	LNCILGNQTESNNWQELLGRLCLID[p.I761fs]CCWNFLLNFILILSVLMFHKLSLLKSGIRSCCPS*	LIDCCWNFL,FLLNFILIL,FILILSVLM,VLMFHKLSL,LMFHKLSLL,KLSLLKSGI,ILSVLMFHK,MFHKLSLLK,CLIDCCWNF,CWNFLLNFI,NFLLNFILI,ILILSVLMF,CCWNFLLNF,WNFLLNFIL,LSVLMFHKL,CLIDCCWNFL,LIDCCWNFLL,FLLNFILILS,LLNFILILSV,ILSVLMFHKL,VLMFHKLSLL,LILSVLMFHK,LMFHKLSLLK,CWNFLLNFIL,NFLLNFILIL,NFILILSVLM,SVLMFHKLSL,LNFILILSVL,FILILSVLMF,HKLSLLKSGI	BRCA
MAP3K1	c.4036_4038delGTT	p.V1346del	LFIEWMAGGSVAHLLSKYGAFKESV[p.V1346del]INYTEQLLRGLSYLHENQIIHRDVKGAN	SVINYTEQL,AFKESVINY,SVINYTEQLL,KYGAFKESVI,GAFKESVINY,ESVINYTEQL	BRCA
MAP3K1	c.4150_4151insT	p.L1384fs	LHENQIIHRDVKGANLLIDSTGQRL[p.L1384fs]KNCRFWSCSQVGIKRNWCRRVSGTITGDNCIYGT*	WSCSQVGIK,RLKNCRFWS,GIKRNWCRR,VGIKRNWCR,GQRLKNCRF,CRFWSCSQV,SQVGIKRNW,LIDSTGQRLK,RFWSCSQVGI,RLKNCRFWSC,GIKRNWCRRV,GTITGDNCIY,STGQRLKNCR,QVGIKRNWCR,VGIKRNWCRR,GQRLKNCRFW	BRCA
MAP3K1	c.953_954insA	p.L318fs	DGFSPYSPEETNRRVNKVMRARLYL[p.L318fs]TAADRA*	VMRARLYLT,RLYLTAADR,RARLYLTAA,MRARLYLTA,VMRARLYLTA,RLYLTAADRA,KVMRARLYLT,RARLYLTAAD,MRARLYLTAA	BRCA
MAP3K1	c.971C>T	p.P324L	YSPEETNRRVNKVMRARLYLLQQIG[p.P324L]LNSFLIGGDSPDNKYRVFIGPQNCSC	QQIGLNSFL,LYLLQQIGL,LQQIGLNSF,RLYLLQQIGL,QQIGLNSFLI,LLQQIGLNSF,LQQIGLNSFL	GBM
MAP3K12	c.1345_1347delAGG	p.R449del	KLHFEKIKSEGTCLHRLEEELVMRR[p.R449del]EELRHALDIREHYERKLERANNLYMELN	LVMRREELR,ELVMRREEL,ELVMRREELR,MRREELRHAL,EELVMRREEL	STAD
MAP3K4	c.824G>A	p.R275Q	ENTSGFWLNRSNELIWLELQAWHAG[p.R275Q]QTINDQDFFLYTARQAIPDIINEILT	LQAWHAGQT,QAWHAGQTI,GQTINDQDF,LQAWHAGQTI,QTINDQDFFL,GQTINDQDFF,LELQAWHAGQ	CRC
MAP3K7	c.1570G>C	p.E524Q	AYLTLDHQLQPLAPCPNSKESMAVF[p.E524Q]QQHCKMAQEYMKVQTEIALLLQRKQE	MAVFQQHCK,AVFQQHCKM,SMAVFQQHCK,QQHCKMAQEY,MAVFQQHCKM,KESMAVFQQH	HNSC
MAP4K2	c.1021C>G	p.R341G	SRGQHGPAERTPSEIQFHQVKFGAP[p.R341G]GRKETDPLNEPWEEEWTLLGKEELSG	QVKFGAPGR,HQVKFGAPG,QVKFGAPGRK,HQVKFGAPGR,APGRKETDPL	TGCT
MAP4K3	c.1970delC	p.P657fs	LFDYARQMQKLPVAIPAHKLPDRIL[p.P657fs]QGNFLYQQKSLKPNGARSVVL*	RILQGNFLY,FLYQQKSLK,KSLKPNGAR,KPNGARSVV,YQQKSLKPN,SLKPNGARSV,NFLYQQKSLK,KPNGARSVVL,GNFLYQQKSL,YQQKSLKPNG,LPDRILQGNF	HNSC
MAP7D1	c.239_240insC	p.A80fs	ATSSKQLPLEPESPSGQVGPRPAPP[p.A80fs]AGRVPFL*	RPAPPAGRV,APPAGRVPF,PPAGRVPFL,RPAPPAGRVP,APPAGRVPFL	STAD
MAP7D2	c.1459C>T	p.R487C	ERLEKEEQDRLEREELKRKAEEERL[p.R487C]CLEEEARKQEEERKRQEEEKKKQEGE	RKAEEERLCL,EERLCLEEEA	CRC

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
MAP7D3	c.922delC	p.Q308fs	PQTKVEESPLEKVETPPKASVDAPP[p.Q308fs]R*	KASVDAPPR	STAD
MAP9	c.1455G>T	p.K485N	QKKAAKREEALASFEAWKAMKEKEA[p.K485N]NKIAAKKRLEEKNKKKTEEENAARKG	AMKEKEANK,KEANKIAAK,KEKEANKIA,AMKEKEANKI,KAMKEKEANK,EANKIAAKKR,KEKEANKIAA	HNSC
MAPK1	c.964G>A	p.E322K	NPHKRIEVEQALAHPYLEQYYDPSD[p.E322K]KPIAEAPFKFDMELDDLPKEKLKELI	YYDPSDKPI,KPIAEAPFK,QYYDPSDKPI,SDKPIAEAPF,KPIAEAPFKF	CESC,HNSC
MAPK13	c.943G>A	p.E315K	ELDVDKRLTAAQALTHPFFEPFRDP[p.E315K]KEETEAQQPFDDSLEHEKLTVDEWKQ	KEETEAQQPF	BRCA
MAPK15	c.1533delG	p.Q511fs	PPRLPPEARPGRRMFSTSALQGAQG[p.Q511fs]VPGLCLEATPKPTGLSATRHWATCPCWRGTMCEPPYSLHLALCSCPSPFPRPLSSLLHPLALPALPGPLKFQGACPGLLGGADEGPAPAPLTSSNKVMSAPN	TMCEPPYSL,PLSSLLHPL,LLHPLALPA,GLSATRHWA,SLHLALCSC,ALPALPGPL,GLCLEATPK,CSCPSPFPR,KFQGACPGL,RGTMCEPPY,HWATCPCWR,EPPYSLHLA,TPKPTGLSA,PPYSLHLAL,CPSPFPRPL,SPFPRPLSS,FPRPLSSLL,APLTSSNKV,SSLLHPLAL,ALCSCPSPF,LQGAQGVPG,AQGVPGLCL,RHWATCPCW,LKFQGACPG,FQGACPGLL,DEGPAPAPL,CEPPYSLHL,GTMCEPPYSL,SLLHPLALPA,LLHPLALPAL,GLSATRHWAT,ALPALPGPLK,PFPRPLSSLL,KFQGACPGLL,ATRHWATCPC,TSALQGAQGV,TPKPTGLSAT,EPPYSLHLAL,SPFPRPLSSL,FPRPLSSLLH,RPLSSLLHPL,LPALPGPLKF,APLTSSNKVM,LALCSCPSPF,LQGAQGVPGL,LEATPKPTGL,WRGTMCEPPY,LSSLLHPLAL,LALPALPGPL,LKFQGACPGL,CEPPYSLHLA	STAD
MAPK4	c.298G>A	p.V100M	DNIVKVYEVLGPKGTDLQGELFKFS[p.V100M]MAYIVQEYMETDLARLLEQGTLAEEH	LFKFSMAYI,ELFKFSMAY,SMAYIVQEY,MAYIVQEYM,FKFSMAYIV,GELFKFSMA,FSMAYIVQEY,ELFKFSMAYI,SMAYIVQEYM,LQGELFKFSM,GELFKFSMAY,FKFSMAYIVQ	BRCA
MAPK7	c.1502C>A	p.A501D	KAALKAALLKSLRSRLRDGPSAPLE[p.A501D]DPEPRKPVTAQERQREREEKRRRRQE	LEDPEPRKPV	KIRP,TGCT
MAPK8IP1	c.651_652insCC	p.L217fs	SSSPLKTGEQTPPHEHICLSDELPP[p.L217fs]PRAAPPPPQIEAPPPTALAAAAQPPRWHLRVVPLLPRLGVGATRIETESTTRPMCD*	RVVPLLPRL,LLPRLGVGA,RLGVGATRI,RWHLRVVPL,RAAPPPPQI,AQPPRWHLR,LAAAAQPPR,EAPPPTALA,APPPTALAA,PPRWHLRVV,VPLLPRLGV,LPRLGVGAT,IEAPPPTAL,AAQPPRWHL,WHLRVVPLL,DELPPPRAA,ETESTTRPM,QPPRWHLRV,ALAAAAQPPR,HLRVVPLLPR,AAQPPRWHLR,RWHLRVVPLL,CLSDELPPPR,EAPPPTALAA,APPPTALAAA,IEAPPPTALA,LAAAAQPPRW,AAAQPPRWHL,LRVVPLLPRL,IETESTTRPM,DELPPPRAAP,QPPRWHLRVV	CRC
MAPKAPK2	c.640_641insC	p.T214fs	ENLLYTSKRPNAILKLTDFGFAKET[p.T214fs]HQPQLFDHSLLYTVLCGSRSAGSREV*	QLFDHSLLY,LLYTVLCGS,QPQLFDHSL,AKETHQPQL,KETHQPQLF,FDHSLLYTV,QLFDHSLLYT,GSRSAGSREV,PQLFDHSLLY,LLYTVLCGSR,YTVLCGSRSA,QPQLFDHSLL,FAKETHQPQL,AKETHQPQLF,HQPQLFDHSL,FDHSLLYTVL	KIRC
11-Mar	c.578G>T	p.R193L	PICKICFQGAEQGELLNPCRCDGSV[p.R193L]LYTHQLCLLKWISERGSWTCELCCYR	VLYTHQLCL,LYTHQLCLL,GSVLYTHQL,VLYTHQLCLL,NPCRCDGSVL	LUAD
5-Mar	c.508C>T	p.R170C	GLPTIPVMLILGKMIRWEDYVLRLW[p.R170C]CKYSNKLQILNSIFPGIGCPVPRIPA	RLWCKYSNK,LWCKYSNKL,YVLRLWCKY,DYVLRLWCK,CKYSNKLQI,RLWCKYSNKL,CKYSNKLQIL	BRCA
MARCKS	c.454delA	p.K152fs	ASSTSSPKAEDGATPSPSNETPKKK[p.K152fs]RSAFPSRSLSS*	KKRSAFPSR,RSAFPSRSL,SAFPSRSLS,TPKKKRSAF,KKKRSAFPSR,RSAFPSRSLS,KRSAFPSRSL,SAFPSRSLSS	KIRC
MARS2	c.1442G>A	p.R481Q	LPKQVADHYDNFRIYKALEAVSSCV[p.R481Q]QQTNGFVQRHAPWKLNWESPVDAPWL	SCVQQTNGF,VQQTNGFVQ,SSCVQQTNGF,QQTNGFVQRH	HNSC
MAS1L	c.970A>G	p.R324G	ISLFLIINSSANPIIYFFVGSLRKK[p.R324G]GLKESLRVILQRALADKPEVGRNKKA	GLKESLRVI,GSLRKKGLK,RKKGLKESL,GLKESLRVIL,VGSLRKKGLK	PRAD,THCA
MAT2A	c.497A>G	p.E166G	YATDETEECMPLTIVLAHKLNAKLA[p.E166G]GLRRNGTLPWLRPDSKTQVTVQYMQD	KLNAKLAGL,KLNAKLAGLR,LAGLRRNGTL,GLRRNGTLPW,HKLNAKLAGL	TGCT
MAX	c.106A>T	p.R36W	SDEEQPRFQSAADKRAHHNALERKR[p.R36W]WDHIKDSFHSLRDSVPSLQGEKASRA	RWDHIKDSF,KRWDHIKDSF	MM

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
MAX	c.83A>G	p.H28R	DNDDIEVESDEEQPRFQSAADKRAH[p.H28R]RNALERKRRDHIKDSFHSLRDSVPSL	RAHRNALER,SAADKRAHR,AHRNALERK,DKRAHRNAL,RAHRNALERK,QSAADKRAHR	UCEC
MB21D2	c.931C>G	p.Q311E	EWRLSFARSEVQLKKCISSSLMQAY[p.Q311E]EACKAIIIKLLSRPKAISPYHLRSMM	SLMQAYEAC,MQAYEACKA,LMQAYEACK,QAYEACKAI,YEACKAIII,LMQAYEACKA,MQAYEACKAI,SLMQAYEACK,EACKAIIIKL,QAYEACKAII	HNSC,LUSC
MBD6	c.2194delC	p.P732fs	SVTTATTDPGASSLGKAPSNSGRPP[p.P732fs]NSLALCWVPACWVTCLH*	SLALCWVPA,SGRPPNSLA,VPACWVTCL,PPNSLALCW,SLALCWVPAC,ALCWVPACWV,SGRPPNSLAL,NSLALCWVPA,WVPACWVTCL,RPPNSLALCW,LALCWVPACW	STAD
MBD6	c.2338_2339insG	p.G780fs	LPSLLQPPGPLLSGQLGLQLLPGGG[p.G780fs]SSSTPLRGF*	SSSTPLRGF,LLPGGGSSST,LQLLPGGGSS,GSSSTPLRGF	STAD
MBOAT2	c.128G>A	p.R43Q	AVQLPIDQVNFVVCQLFALLAAIWF[p.R43Q]QTYLHSSKTSSFIRHVVATLLGLYLA	LAAIWFQTY,LLAAIWFQT,AIWFQTYLH,AAIWFQTYL,FQTYLHSSK,LLAAIWFQTY,ALLAAIWFQT,WFQTYLHSSK,LAAIWFQTYL,FQTYLHSSKT	CRC,UCEC
MBOAT7	c.1270C>T	p.R424W	HWFLKMRAYDYMCMGFVLLSLADTL[p.R424W]WYWASIYFCIHFLALAALGLGLALGG	LSLADTLWY,SLADTLWYW,TLWYWASIY,LWYWASIYF,WYWASIYFC,DTLWYWASI,LLSLADTLW,LLSLADTLWY,SLADTLWYWA,LSLADTLWYW,TLWYWASIYF,WYWASIYFCI,DTLWYWASIY,VLLSLADTLW,ADTLWYWASI	HNSC
MC5R	c.325G>A	p.A109T	LVSMSSAWETITIYLLNNKHLVIAD[p.A109T]TFVRHIDNVFDSMICISVVASMCSLL	HLVIADTFV,LVIADTFVR,KHLVIADTF,TFVRHIDNV,VIADTFVRHI,TFVRHIDNVF,HLVIADTFVR,DTFVRHIDNV,NKHLVIADTF	UCEC
MCF2L2	c.2777G>A	p.R926Q	KTMKLMTLSIRQLGRGSHRKFEIAS[p.R926Q]QNGLEKYILQAASKEIRDCWFSEISK	ASQNGLEKY,IASQNGLEK,FEIASQNGL,SQNGLEKYI,IASQNGLEKY,RKFEIASQNG,SQNGLEKYIL	CRC
MCHR1	c.917C>T	p.S306F	QFFLAFALPFVVITAAYVRILQRMT[p.S306F]FSVAPASQRSIRLRTKRVTRTAIAIC	ILQRMTFSV,RMTFSVAPA,RILQRMTFS,LQRMTFSVA,MTFSVAPAS,VRILQRMTF,RILQRMTFSV,ILQRMTFSVA,TFSVAPASQR,YVRILQRMTF,LQRMTFSVAP,QRMTFSVAPA,RMTFSVAPAS	LUSC
MCOLN3	c.421G>A	p.V141I	VYTQSDVYDQLIFAVNQYLQLYNVS[p.V141I]IGNHAYENKGTKQSAMAICQHFYKRG	YLQLYNVSI,NVSIGNHAY,LQLYNVSIG,SIGNHAYENK,QYLQLYNVSI,YNVSIGNHAY	GBM
MECOM	c.2744G>A	p.R915Q	SELLQSVPSMFNFRAPPNALPENLL[p.R915Q]QKGKERYTCRYCGKIFPRSANLTRHL	LLQKGKERY,NALPENLLQK	PRAD
MECOM	c.2905C>T	p.R969C	TGEQPYRCKYCDRSFSISSNLQRHV[p.R969C]CNIHNKEKPFKCHLCDRCFGQQTNLD	NLQRHVCNI,RHVCNIHNK,LQRHVCNIH,HVCNIHNKEK,CNIHNKEKPF	CRC
MED12	c.107T>G	p.L36R	HRPLKRPRLGPPDVYPQDPKQKEDE[p.L36R]RTALNVKQGFNNQPAVSGDEHGSAKN	QKEDERTAL,KQKEDERTAL,RTALNVKQGF,KEDERTALNV	CLL
MED12	c.130G>A	p.G44S	LGPPDVYPQDPKQKEDELTALNVKQ[p.G44S]SFNNQPAVSGDEHGSAKNVSFNPAKI	KQSFNNQPA,TALNVKQSF,QSFNNQPAV,KQSFNNQPAV,LTALNVKQSF,VKQSFNNQPA	CLL
MED12	c.3670C>T	p.L1224F	IRSSCDRHLLAASQNRIVDGAVFAV[p.L1224F]FKAVFVLGDAELKGSGFTVTGGTEEL	AVFAVFKAV,FAVFKAVFV,AVFKAVFVL,VFAVFKAVF,VDGAVFAVF,FAVFKAVFVL,AVFAVFKAVF,IVDGAVFAVF	PRAD
MED12L	c.3875G>A	p.C1292Y	LCTDKELILDPVLSNMQAQKLLQLI[p.C1292Y]YYPHGIKECTEGDNLQRQHIKRILQN	QLIYYPHGI,LIYYPHGIK,AQKLLQLIY,QKLLQLIYY,QAQKLLQLIY,LQLIYYPHGI,QLIYYPHGIK,AQKLLQLIYY	TGCT
MED12L	c.6211C>T	p.P2071S	QDPMRPRQPQVRQQQRLLQMQQPQQ[p.P2071S]SQPQQPPQPQQSSQSQSQTLGLQAMQ	LQMQQPQQS,MQQPQQSQP,LQMQQPQQSQ,MQQPQQSQPQ	KIRC
MED12L	c.6331_6333delCAG	p.Q2115del	LGLQAMQPQQPLFPRQGLQQTQQQQ[p.Q2115del]TAALVRQLQKQLSSNQPQQGVTPYGHPS	QQTQQQQTA,TQQQQTAAL,TQQQQTAALV,LQQTQQQQTA,QQTQQQQTAA	PRAD
MED15	c.104G>T	p.S35I	WRSTAFRQKLVSQIEDAMRKAGVAH[p.S35I]IKSSKDMESHVFLKAKTRDEYLSLVA	GVAHIKSSK,MRKAGVAHI,AHIKSSKDM,AMRKAGVAHI,MRKAGVAHIK,AGVAHIKSSK	THCA
MED16	c.1347C>G	p.H449Q	TAGPAVHLKAMQLSWTSLALVGIDS[p.H449Q]QGKLSVLRLSPSMGHPLEVGLALRHL	DSQGKLSVLR,IDSQGKLSVL,SQGKLSVLRL	KIRP

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
MEF2A	c.295C>T	p.P99S	EPHESRTNSDIVEALNKKEHRGCDS[p.P99S]SDPDTSYVLTPHTEEKYKKINEEFDN	SSDPDTSYV,DSSDPDTSY,DSSDPDTSYV,CDSSDPDTSY	KIRP
MEF2A	c.380G>A	p.R127Q	DTSYVLTPHTEEKYKKINEEFDNMM[p.R127Q]QNHKIAPGLPPQNFSMSVTVPVTSPN	NMMQNHKIA,MMQNHKIAP,MQNHKIAPG,MQNHKIAPGL,MMQNHKIAPG,EEFDNMMQNH	TGCT
MEFV	c.1130G>A	p.R377H	CPRCQDSHERKSPGSLSPQPLPQCK[p.R377H]HHLKQVQLLFCEDHDEPICLICSLSQ	KHHLKQVQL,HHLKQVQLL,HHLKQVQLLF,QPLPQCKHHL,CKHHLKQVQL,KHHLKQVQLL	BRCA
MEGF10	c.3158C>T	p.S1053L	NPYATIKDPPVLIPKSSECGYVEMK[p.S1053L]LPARRDSPYAEINNSTSANRNVYEVE	YVEMKLPAR,LPARRDSPY,KLPARRDSPY,YVEMKLPARR,LPARRDSPYA,SECGYVEMKL	UCEC
MEGF6	c.1178A>G	p.Y393C	RTCIDVDDCADSPCCQQVCTNNPGG[p.Y393C]CECGCYAGYRLSADGCGCEDVDECAS	CECGCYAGY,NPGGCECGCY	THCA
MEGF6	c.1746_1747insC	p.A582fs	DTFGKNCSFSCSCQNGGTCDSVTGA[p.A582fs]LPLPPGCQWN*	LPLPPGCQW,CDSVTGALPL	KIRC
MET	c.3280C>T	p.H1094Y	VVIGPSSLIVHFNEVIGRGHFGCVY[p.H1094Y]YGTLLDNDGKKIHCAVKSLNRITDIG	RGHFGCVYY,HFGCVYYGTL	KIRP
MET	c.3749T>C	p.M1250T	LARDMYDKEYYSVHNKTGAKLPVKW[p.M1250T]TALESLQTQKFTTKSDVWSFGVLLWE	KLPVKWTAL,VKWTALESL,TALESLQTQK,AKLPVKWTAL,LPVKWTALES	KIRP
METTL15	c.157C>G	p.Q53E	VWPNRIHTTAEKYREYEAREQTDQT[p.Q53E]EAQELHRSQDRDFETMAKLHIPVMVD	REQTDQTEA	BRCA
METTL16	c.599G>A	p.R200Q	EIIYDFCMCNPPFFANQLEAKGVNS[p.R200Q]QNPRRPPPSSVNTGGITEIMAEGGEL	SQNPRRPPP,SQNPRRPPPS	CRC
METTL21A	c.521G>A	p.R174Q	EETFTDLLQTLEHLCSNHSVILLAC[p.R174Q]QIRYERDNNFLAMLERQFTVRKVHYD	ILLACQIRY,LACQIRYER,VILLACQIRY,SVILLACQIR,LLACQIRYER	CRC
METTL6	c.168C>A	p.F56L	DFKQQKLEQEAQKNWDLFYKRNSTN[p.F56L]LFKDRHWTTREFEELRSCREFEDQKL	FYKRNSTNL,KRNSTNLFK,YKRNSTNLF,LFYKRNSTNL,FYKRNSTNLF,YKRNSTNLFK,LFKDRHWTTR	CRC
METTL9	c.170A>T	p.Y57F	LYVNMTSGPGGPAAAAGGRKENHQW[p.Y57F]FVCNREKLCESLQAVFVQSYLDQGTQ	QWFVCNREK,NHQWFVCNR,GRKENHQWF,KENHQWFVC,HQWFVCNREK,ENHQWFVCNR	CLL
MEX3C	c.1600C>A	p.R534S	IWTPFEPVNPLSGFGSDPSGNMKTQ[p.R534S]SRGSQPSTPRLSPTFPESIEHPLARR	TQSRGSQPS,KTQSRGSQPS,TQSRGSQPST	TGCT
MEX3C	c.537_545delCGCGGCGGC	p.179_182AAAA>A	IPGGSLGSVLLPAARFDAREAAAAA[p.179_182AAAA>A]GVLYGGDDAQGMMAAMLSHAYGPGGCGAAAAALN	EAAAAAGVL,REAAAAAGV,EAAAAAGVLY,REAAAAAGVL	ACC
MFF	c.19_20AG>TT	p.S7F	MSKGTS[p.S7F]FDTSLGRVSRAAFPSPTAAEMAEISRI	TSFDTSLGR,KGTSFDTSL,GTSFDTSLGR,TSFDTSLGRV,SKGTSFDTSL	TGCT
MFF	c.484C>T	p.R162C	TTPQNEEIRAVGRLKRERSMSENAV[p.R162C]CQNGQLVRNDSLWHRSDSAPRNKISR	RSMSENAVC,SENAVCQNG,NAVCQNGQLV	CRC
MFGE8	c.508G>A	p.D170N	GASRLASHEYLKAFKVAYSLNGHEF[p.D170N]NFIHDVNKKHKEFVGNWNKNAVHVNL	SLNGHEFNF,HEFNFIHDV,SLNGHEFNFI,YSLNGHEFNF,EFNFIHDVNK,HEFNFIHDVN	UCEC
MFSD5	c.839G>A	p.R280Q	FEAWYIHEHVERHDFPAEWIPATFA[p.R280Q]QAAFWNHVLAVVAGVAAEAVASWIGL	WIPATFAQA,AQAAFWNHV,QAAFWNHVL,IPATFAQAA,ATFAQAAFW,FAQAAFWNHV,AQAAFWNHVL,WIPATFAQAA,QAAFWNHVLA,IPATFAQAAF,AEWIPATFAQ	CRC
MGA	c.7304G>A	p.R2435Q	WSDKLQKEAEAFAYYRRTHTANERR[p.R2435Q]QRGEMRDLFEKLKITLGLLHSSKVSK	HTANERRQR,NERRQRGEM,RQRGEMRDL,RQRGEMRDLF	OV
MGAT4B	c.1330A>C	p.T444P	STSLKTYQHFTLEKAYLREDFFWAF[p.T444P]PPAAGDFIRFRFFQPLRLERFFFRSG	FFWAFPPAA,AFPPAAGDF,DFFWAFPPA,FPPAAGDFI,AFPPAAGDFI,WAFPPAAGDF,PPAAGDFIRF,REDFFWAFPP,EDFFWAFPPA	GBM

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
MGAT4C	c.1034C>T	p.T345M	LAQKNVIRFKPSLFQHMGYYSSYKG[p.T345M]MENKLKDDDFEEESFDIPDNPPASLY	SSYKGMENK,SYKGMENKL,GYYSSYKGM,YSSYKGMENK,SYKGMENKLK,MGYYSSYKGM,SSYKGMENKL,MENKLKDDDF	PRAD
MGST2	c.304delA	p.K102fs	FATCLGLVYIYGRHLYFWGYSEAAK[p.K102fs]NGSPVSD*	EAAKNGSPV,SEAAKNGSPV	STAD
MGST3	c.429_430insT	p.G143fs	SIALLGLVGTTVCSAFQHLGWVKSG[p.G143fs]FGQWTQMLPLKNYRGLKTLIHFK*	GQWTQMLPL,GLKTLIHFK,QMLPLKNYR,GFGQWTQML,RGLKTLIHF,QWTQMLPLK,PLKNYRGLK,TQMLPLKNY,LPLKNYRGL,HLGWVKSGF,WVKSGFGQW,SGFGQWTQM,KNYRGLKTL,WTQMLPLKNY,MLPLKNYRGL,GQWTQMLPLK,RGLKTLIHFK,TQMLPLKNYR,GWVKSGFGQW,QHLGWVKSGF,KSGFGQWTQM,SGFGQWTQML,FGQWTQMLPL,LKNYRGLKTL,KNYRGLKTLI,YRGLKTLIHF	KIRC
MICA	c.952delG	p.G318fs	HPVPSGKVLVLQSHWQTFHVSAVAA[p.G318fs]LLFLLLLFSMSVVVRRKHQLQRVQSS*	VSAVAALLF,AVAALLFLL,LLLLFSMSV,LLLFSMSVV,LLFSMSVVV,HVSAVAALL,SMSVVVRRK,FSMSVVVRR,ALLFLLLLF,LFLLLLFSM,VVRRKHQLQ,LFSMSVVVR,SAVAALLFL,VVVRRKHQL,FHVSAVAAL,VAALLFLLL,HQLQRVQSS,SAVAALLFLL,AVAALLFLLL,LLFLLLLFSM,FLLLLFSMSV,LLLLFSMSVV,LLLFSMSVVV,LLFSMSVVVR,FSMSVVVRRK,AALLFLLLLF,VVRRKHQLQR,HVSAVAALLF,LFSMSVVVRR,SVVVRRKHQL,FHVSAVAALL	CESC
MIER2	c.391C>T	p.L131F	ESEGGDVAPNLPDMTLDKEQIAKDL[p.L131F]FSGEEEEETQSSADDLTPSVTSHEAS	KEQIAKDLF	TGCT
MKI67	c.3241C>A	p.R1081S	REPAGDGKSIRTFKESPKQILDPAA[p.R1081S]SVTGMKKWPRTPKEEAQSLEDLAGFK	AASVTGMKK,DPAASVTGM,SVTGMKKWPR,AASVTGMKKW	LUAD
MKI67	c.4991_4992insCA	p.T1664fs	VGVKEELLAVGKLTQTSGETTHTHT[p.T1664fs]KSQQEMVRA*	HTKSQQEMV,HTHTKSQQEM,HTKSQQEMVR	STAD
MKI67	c.4992_4993insCA	p.T1664fs	VGVKEELLAVGKLTQTSGETTHTHT[p.T1664fs]QSQQEMVRA*	HTQSQQEMV,THTQSQQEM,HTHTQSQQEM,HTQSQQEMVR	UCEC
MKI67	c.6637C>G	p.H2213D	AQPLEDLAGLKELFQTPICTDKPTT[p.H2213D]DEKTTKIACRSPQPDPVGTPTIFKPQ	CTDKPTTDEK	CLL
MKL1	c.920delC	p.P307fs	HHNYQAHLPAPPKSAGEALGSSGTP[p.P307fs]QYAASPLPIAAPARAPLGPVGWHVRTAPH*	PLGPVGWHV,QYAASPLPI,GWHVRTAPH,LGSSGTPQY,YAASPLPIA,IAAPARAPL,TPQYAASPL,SPLPIAAPA,LPIAAPARA,ALGSSGTPQY,YAASPLPIAA,APARAPLGPV,PQYAASPLPI,ARAPLGPVGW,APLGPVGWHV	STAD
MKLN1	c.1455C>A	p.F485L	CMLFHSKNRCLYVFGGQRSKTYLND[p.F485L]LFSYDVDSDHVDIISDGTKKDSGMVP	YLNDLFSYD,TYLNDLFSY,RSKTYLNDL,KTYLNDLFS,SKTYLNDLF,KTYLNDLFSY,YLNDLFSYDV,RSKTYLNDLF	UCEC
MKRN3	c.1343C>A	p.P448H	PEGWGDEPPGPGGGSFSAYWHQLVE[p.P448H]HVRMGEGNMLYKSIKKELVVLRLASL	YWHQLVEHV,HVRMGEGNM,HQLVEHVRM,AYWHQLVEHV,HVRMGEGNML,YWHQLVEHVR,SAYWHQLVEH,WHQLVEHVRM	LUAD
MKRN3	c.809G>T	p.G270V	YYASRGVCFRGESCMYLHGDICDMC[p.G270V]VLQTLHPMDAAQREEHMRACIEAHEK	CVLQTLHPM,CDMCVLQTL,MCVLQTLHPM	LUSC
MLL2	c.1939_1940insC	p.P647fs	ASRLSPPPEDSPMSPPPEESPMSPP[p.P647fs]T*	EESPMSPPT	STAD

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
MLL2	c.1940delC	p.P647fs	EASRLSPPPEDSPMSPPPEESPMSP[p.P647fs]HLRYRAYPPCLWCHACLHRLRNLPCPHRLRSLPRPLHLRLHASPHHLRTPPHPHHLRTHLLPHHRRTRSCPCRWRSHPCCHYLRSRNSAPGPRGRTCHPGLRSRTCPPGLRSHTYLRRLRSHTCPPSLRSHAYALCLRSHTCPPRLRDHICPLSLRNCTCPPRLRSRTCLLCLRSHACPPNLRNHTCPPSLRSHACPPGLRNRICPLSLRSHPCPLGLKSPLRSQANALHLRSCPCSLPLGNHPYLPCLESQPCLSLGNHLCPLCPRSCRCPHLGSHPCRLS*	RLHASPHHL,SLRSHAYAL,RLRDHICPL,SLGNHLCPL,RLRSRTCLL,GLRNRICPL,SLRSHPCPL,HLRSCPCSL,HLGSHPCRL,HLRTHLLPH,GLRSHTYLR,RTHLLPHHR,SQANALHLR,RYRAYPPCL,HLRYRAYPP,RLRNLPCPH,RLRSLPRPL,RSLPRPLHL,HLRLHASPH,HLRTPPHPH,RTPPHPHHL,RTRSCPCRW,RWRSHPCCH,RSHPCCHYL,HYLRSRNSA,RSRNSAPGP,RGRTCHPGL,RSRTCPPGL,RSHTYLRRL,HTYLRRLRS,RLRSHTCPP,RSHTCPPSL,RSHAYALCL,RSHTCPPRL,RSRTCLLCL,RSHACPPNL,RNHTCPPSL,RSHACPPGL,RNRICPLSL,RSHPCPLGL,RSQANALHL,RSCPCSLPL,SPMSPHLRY,SLPLGNHPY,ESPMSPHLR,PMSPHLRYR,NLPCPHRLR,SLPRPLHLR,LLPHHRRTR,SHAYALCLR,DHICPLSLR,MSPHLRYRA,SPHLRYRAY,LPRPLHLRL,RPLHLRLHA,SPHHLRTPP,HPHHLRTHL,LPHHRRTRS,APGPRGRTC,CPLGLKSPL,LPLGNHPYL,CPRSCRCPH,CPHLGSHPC,YLRSRNSAP,NLRNHTCPP,WRSHPCCHY,RDHICPLSL,LESQPCLSL,EESPMSPHL,PPSLRSHAY,CPPRLRDHI,CPPGLRNRI,ESPMSPHLRY,CSLPLGNHPY,SLPLGNHPYL,SLPRPLHLRL,GLKSPLRSQA,YLPCLESQPC,RLRNLPCPHR,RLRSLPRPLH,RLHASPHHLR,GLRSHTYLRR,RSHAYALCLR,CLRSHTCPPR,SLRNCTCPPR,RSRTCLLCLR,RSHPCPLGLK,RSLPRPLHLR,RTHLLPHHRR,RSHPCCHYLR,RTCHPGLRSR,RSHTCPPSLR,RSHTCPPRLR,CTCPPRLRSR,RSHACPPNLR,RSHACPPGLR,RSQANALHLR,RYRAYPPCLW,LWCHACLHRL,HLRYRAYPPC,RNLPCPHRLR,HLRLHASPHH,HLRTPPHPHH,RTPPHPHHLR,HLRTHLLPHH,HLLPHHRRTR,RTRSCPCRWR,RSCPCRWRSH,RWRSHPCCHY,RSRNSAPGPR,RGRTCHPGLR,GLRSRTCPPG,RSRTCPPGLR,RSHTYLRRLR,HTYLRRLRSH,RLRSHTCPPS,SLRSHAYALC,RLRDHICPLS,RLRSRTCLLC,RNHTCPPSLR,SLRSHACPPG,GLRNRICPLS,RNRICPLSLR,SLRSHPCPLG,KSPLRSQANA,MSPHLRYRAY,SPMSPHLRYR,CLWCHACLHR,CPHRLRSLPR,HPCCHYLRSR,HACPPGLRNR,LPCPHRLRSL,RPLHLRLHAS,SPHHLRTPPH,HPHHLRTHLL,LPHHRRTRSC,PPRLRSRTCL,SPLRSQANAL,CPRSCRCPHL,YLRSRNSAPG,YLRRLRSHTC,HAYALCLRSH,LRYRAYPPCL,RAYPPCLWCH,HRLRSLPRPL,LRSLPRPLHL,LHLRLHASPH,LRLHASPHHL,LRTPPHPHHL,HHLRTHLLPH,WRSHPCCHYL,CHYLRSRNSA,LRSHTYLRRL,LRSHTCPPSL,LRSHAYALCL,LRSHTCPPRL,LRNCTCPPRL,LRSHACPPNL,LRNHTCPPSL,LRSHACPPGL,LRNRICPLSL,LSLRSHPCPL,LRSQANALHL,SQANALHLRS,LHLRSCPCSL,LRSCPCSLPL,LSLGNHLCPL,CPPGLRSHTY,CPPSLRSHAY	STAD

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
MLL2	c.1966delC	p.L656fs	EDSPMSPPPEESPMSPPPEVSRLSP[p.L656fs]CLWCHACLHRLRNLPCPHRLRSLPRPLHLRLHASPHHLRTPPHPHHLRTHLLPHHRRTRSCPCRWRSHPCCHYLRSRN5APGPRGRTCHPGLRSRTCPPGLRSHTYLRRLRSHTCPPSLRSHAYALCLRSHTCPPRLRDHICPLSLRNCTCPPRLRSRTCLLCLRSHACPPNLRNHTCPPSLRSHACPPGLRNRICPLSLRSHPCPLGLKSPLRSQANALHLRSCPCSLPLGNHPYLPCLESQPCLSLGNHLCPLCPRSCRCPHLGSHPCRLS*	RLHASPHHL,SLRSHAYAL,RLRDHICPL,SLGNHLCPL,RLRSRTCLL,GLRNRICPL,SLRSHPCPL,HLRSCPCSL,HLGSHPCRL,HLRTHLLPH,GLRSHTYLR,RTHLLPHHR,SQANALHLR,RLRNLPCPH,RLRSLPRPL,RSLPRPLHL,HLRLHASPH,HLRTPPHPH,RTPPHPHHL,RTRSCPCRW,RWRSHPCCH,RSHPCCHYL,HYLRSRNSA,RSRNSAPGP,RGRTCHPGL,RSRTCPPGL,RSHTYLRRL,HTYLRRLRS,RLRSHTCPP,RSHTCPPSL,RSHAYALCL,RSHTCPPRL,RSRTCLLCL,RSHACPPNL,RNHTCPPSL,RSHACPPGL,RNRICPLSL,RSHPCPLGL,RSQANALHL,RSCPCSLPL,SLPLGNHPY,NLPCPHRLR,SLPRPLHLR,LLPHHRRTR,SHAYALCLR,DHICPLSLR,EVSRLSPCL,LPRPLHLRL,RPLHLRLHA,SPHHLRTPP,HPHHLRTHL,LPHHRRTRS,APGPRGRTC,CPLGLKSPL,LPLGNHPYL,CPRSCRCPH,CPHLGSHPC,YLRSRNSAP,NLRNHTCPP,VSRLSPCLW,WRSHPCCHY,RDHICPLSL,LESQPCLSL,PPSLRSHAY,CPPRLRDHI,CPPGLRNRI,CSLPLGNHPY,RLSPCLWCHA,SLPLGNHPYL,SLPRPLHLRL,GLKSPLRSQA,YLPCLESQPC,RLRNLPCPHR,RLRSLPRPLH,RLHASPHHLR,GLRSHTYLRR,RSHAYALCLR,CLRSHTCPPR,SLRNCTCPPR,RSRTCLLCLR,RSHPCPLGLK,RSLPRPLHLR,RTHLLPHHRR,RSHPCCHYLR,RTCHPGLRSR,RSHTCPPSLR,RSHTCPPRLR,CTCPPRLRSR,RSHACPPNLR,RSHACPPGLR,RSQANALHLR,LWCHACLHRL,RNLPCPHRLR,HLRLHASPHH,HLRTPPHPHH,RTPPHPHHLR,HLRTHLLPHH,HLLPHHRRTR,RTRSCPCRWR,RSCPCRWRSH,RWRSHPCCHY,RSRNSAPGPR,RGRTCHPGLR,GLRSRTCPPG,RSRTCPPGLR,RSHTYLRRLR,HTYLRRLRSH,RLRSHTCPPS,SLRSHAYALC,RLRDHICPLS,RLRSRTCLLC,RNHTCPPSLR,SLRSHACPPG,GLRNRICPLS,RNRICPLSLR,SLRSHPCPLG,KSPLRSQANA,CLWCHACLHR,CPHRLRSLPR,HPCCHYLRSR,HACPPGLRNR,LPCPHRLRSL,RPLHLRLHAS,SPHHLRTPPH,HPHHLRTHLL,LPHHRRTRSC,PPRLRSRTCL,SPLRSQANAL,CPRSCRCPHL,YLRSRNSAPG,YLRRLRSHTC,HAYALCLRSH,HRLRSLPRPL,LRSLPRPLHL,LHLRLHASPH,LRLHASPHHL,LRTPPHPHHL,HHLRTHLLPH,WRSHPCCHYL,CHYLRSRNSA,LRSHTYLRRL,LRSHTCPPSL,LRSHAYALCL,LRSHTCPPRL,LRNCTCPPRL,LRSHACPPNL,LRNHTCPPSL,LRSHACPPGL,LRNRICPLSL,LSLRSHPCPL,LRSQANALHL,SQANALHLRS,LHLRSCPCSL,LRSCPCSLPL,LSLGNHLCPL,CPPGLRSHTY,CPPSLRSHAY	STAD
MLL2	c.7061delC	p.P2354fs	APLTPRASQVEPQSPGLGLRPQEPP[p.P2354fs]LPRLWHLLLQVTQTSFALAPTLTHML5PH*	RLWHLLLQV,ALAPTLTHM,LQVTQTSFA,VTQTSFALA,QVTQTSFAL,QTSFALAPT,LPRLWHLLL,LLQVTQTSF,GLRPQEPPL,TQTSFALAP,TSFALAPTL,FALAPTLTH,RLWHLLLQVT,ALAPTLTHML,LLQVTQTSFA,LQVTQTSFAL,LLLQVTQTSF,QVTQTSFALA,QTSFALAPTL,RPQEPPLPRL,FALAPTLTHM,TQTSFALAPT	STAD
MLL3	c.1066C>A	p.Q356K	IDQAPERSKEDANCAVCDSPGDLLD[p.Q356K]KFFCTTCGQHYHGMCLDIAVTPLKRA	LLDKFFCTT,SPGDLLDKF,SPGDLLDKFF	LUAD
MLL3	c.1179C>A	p.N393K	GMCLDIAVTPLKRAGWQCPECKVCQ[p.N393K]KCKQSGEDSKMLVCDTCDKGYHTFCL	KCKQSGEDSK	LUAD
MLL3	c.13488delT	p.F4496fs	TSGCHRFRCTNIYHFTCAIKAQCMF[p.F4496fs]LRTKLCFAPCTNQREFMSKN*	FLRTKLCFA,AIKAQCMFL,AQCMFLRTK,MFLRTKLCF,RTKLCFAPC,CFAPCTNQR,AIKAQCMFLR,KAQCMFLRTK,CTNQREFMSK,CMFLRTKLCF,RTKLCFAPCT,FLRTKLCFAP,AQCMFLRTKL,FAPCTNQREF	STAD
MLL5	c.197A>G	p.Y66C	YPHQLYTSSSHHSHSYIGLPYADHN[p.Y66C]CGARPPPTPPASPPPSVLISKNEVGI	LPYADHNCGA	TGCT
MLXIPL	c.2368A>C	p.S790R	NWKFWVFSILIRPLFESFNGMVSTA[p.S790R]RVHTLRQTSLAWLDQYCSLPALRPTV	STARVHTLR,RVHTLRQTS,GMVSTARVH,VSTARVHTL,MVSTARVHTL,VSTARVHTLR,RVHTLRQTSL,SFNGMVSTAR	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
MMAA	c.976C>T	p.R326C	RIQAEYVSALKLLRKRSQVWKPKVI[p.R326C]CISARSGEGISEMWDKMKDFQDLMLA	CISARSGEGI	CRC
MMP3	c.190delA	p.I64fs	ENYYDLKKDVKQFVRRKDSGPVVKK[p.I64fs]SEKCRSSLDWR*	KSEKCRSSL,KCRSSLDWR,KKSEKCRSSL,SEKCRSSLDW	STAD
MMRN1	c.2751C>A	p.F917L	QALQLQVLNSRFKALEAKSIHLSIN[p.F917L]LFSLNKTLHEVLTMCHNASTSVSELN	HLSINLFSL,NLFSLNKTL,SINLFSLNK,SIHLSINLF,KSIHLSINL,LSINLFSLNK,KSIHLSINLF,AKSIHLSINL,IHLSINLFSL	UCEC
MMRN1	c.3037G>T	p.A1013S	RSLPGSLANVVKSQKQVKSLPKKIN[p.A1013S]SLKKPTVNLTTVLIGRTQRNTDNIIY	SLPKKINSL,SLKKPTVNL,KSLPKKINS,LPKKINSLK,SLPKKINSLK,KSLPKKINSL,KINSLKKPTV	LUAD
MMS19	c.3013G>A	p.D1005N	ALTRLPTPVLLPYKPQVIRALAKPL[p.D1005N]NDKKRLVRKEAVSARGEWFLLGSPGS	ALAKPLNDK,LAKPLNDKK,RALAKPLNDK,ALAKPLNDKK	TGCT
MN1	c.1415C>T	p.S472L	APPYMNVAKRPRFDFPGSAGVDRCA[p.S472L]LWNGSMHNGALDNHLSPSAYPGLPGE	RCALWNGSM	BLCA
MOCOS	c.2545T>C	p.S849P	NQHVFQKLSESRETKVNFGMYLMHA[p.S849P]PLDLSSPCFLSVGSQVLPVLKENVEG	GMYLMHAPL,YLMHAPLDL,FGMYLMHAPL,YLMHAPLDLS,MYLMHAPLDL,APLDLSSPCF,LMHAPLDLSS	KIRC
MOCS2	c.65delC	p.P22fs	MSSLEISSSCFSLETKLPLSP[p.P22fs]H*	LETKLPLSPH	STAD
MOGAT2	c.197_198insG	p.Q66fs	TRFWLLTVLYAAWWYLDRDKPRQGG[p.Q66fs]PAHPGHQVLDYMEVHEGLFPHLAGQDC*	HQVLDYMEV,GLFPHLAGQ,DYMEVHEGL,KPRQGGPAH,GPAHPGHQV,RQGGPAHPG,YMEVHEGLF,HPGHQVLDY,EVHEGLFPH,HEGLFPHLA,DYMEVHEGLF,EVHEGLFPHL,GPAHPGHQVL,RQGGPAHPGH,AHPGHQVLDY,HQVLDYMEVH,LDYMEVHEGL,MEVHEGLFPH,HPGHQVLDYM	LUAD
MORC1	c.337G>T	p.D113Y	KRLSTLKFIGQYGNGLKSGSMRIGK[p.D113Y]YFILFTKKEETMTCVFFSQTFCEEES	SMRIGKYFI,RIGKYFILF,KYFILFTKK,SGSMRIGKY,MRIGKYFIL,GSMRIGKYF,IGKYFILFTK,MRIGKYFILF,GSMRIGKYFI,SMRIGKYFIL,KSGSMRIGKY,SGSMRIGKYF	CRC
MORC2	c.2219G>A	p.R740H	SDSAGEEDSADLKRAQKDKGLHVEV[p.R740H]HVNREWYTGRVTAVEVGKHVVRWKVK	VEVHVNREW,HVNREWYTGR,VEVHVNREWY	CRC
MPDZ	c.2410C>A	p.L804I	VRIGVAKPLPLSPEEGYVSAKEDSF[p.L804I]IYPPHSCEEAGLADKPLFRADLALVG	SAKEDSFIY,KEDSFIYPP,VSAKEDSFIY,YVSAKEDSFI	CRC
MPDZ	c.4745delA	p.K1582fs	KLTIHAENPDSQAVPSAAGAASGEK[p.K1582fs]RTAPSL*	GEKRTAPSL	STAD
MPRIP	c.1052delC	p.A351fs	SSDTRQGRSEKRAFPRKRDFTNEAP[p.A351fs]QLLSQTPRLPPCLHTEEPSHWTGGPRSPP*	FTNEAPQLL,QLLSQTPRL,SQTPRLPPC,RDFTNEAPQL,SQTPRLPPCL,CLHTEEPSHW,NEAPQLLSQT	STAD
MR1	c.137C>T	p.S46L	DSRTHSLRYFRLGVSDPIHGVPEFI[p.S46L]LVGYVDSHPITTYDSVTRQKEPRAPW	VPEFILVGY,GVPEFILVGY,VPEFILVGYV	CRC
MRPL47	c.700C>A	p.L234I	LRLEREKRARIKARKENLERKKAKI[p.L234I]ILKKFPHLAEAQKSSLV*	ILKKFPHLA,RKKAKIILK,IILKKFPHL,KAKIILKKF,RKKAKIILKK,KIILKKFPHL,LERKKAKIIL,KKAKIILKKF	CRC
MRPS25	c.355_357delGAG	p.E119del	SNKEIMEHIRKILGKNEETLREEEE[p.E119del]KKQLSHPANFGPRKYCLRECICEVEGQV	REEEEKKQL	TGCT
MS4A4A	c.295G>A	p.V99M	ALMSLSMGITMMCMASNTYGSNPIS[p.V99M]MYIGYTIWGSVMFIISGSLSIAAGIR	ISMYIGYTI,TYGSNPISM,SMYIGYTIW,MYIGYTIWG,YGSNPISMY,NPISMYIGY,ISMYIGYTIW,MYIGYTIWGS,TYGSNPISMY,NTYGSNPISM	BRCA
MS4A8B	c.8C>T	p.S3L	MN[p.S3L]LMTSAVPVANSVLVVAPHNGYPVTPG	NLMTSAVPV,LMTSAVPVA,NLMTSAVPVA,MNLMTSAVPV	CRC,UCEC
MSH4	c.1392G>T	p.K464N	KNCNTPLLRAYYGSLEDKRFGIILE[p.K464N]NIKTVINDDARYMKGCLNMRTQKCYA	IILENIKTV,RFGIILENI,GIILENIKTV,RFGIILENIK,KRFGIILENI	CRC
MSH4	c.2188G>A	p.E730K	YVPAEYSSFRIAKQIFTRISTDDDI[p.E730K]KTNSSTFMKEMKEIAYILHNANDKSL	KTNSSTFMK,IKTNSSTFM	UCEC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
MSH6	c.1727A>C	p.D576A	GHTRAYGVCFVDTSLGKFFIGQFSD[p.D576A]ARHCSRFRTLVAHYPPVQVLFEKGNL	FSDARHCSR,DARHCSRFR,GQFSDARHC,SDARHCSRF,FSDARHCSRF,KFFIGQFSDA,FFIGQFSDAR,QFSDARHCSR,GQFSDARHCS,ARHCSRFRTL	TGCT
MSH6	c.3254_3255insC	p.T1085fs	LANYSRGGDGPMCRPVILLPEDTPP[p.T1085fs]LLRA*	LLPEDTPPL,LPEDTPPLL,ILLPEDTPPL,LLPEDTPPLL	CRC,STAD
MSH6	c.3284G>A	p.R1095H	GDGPMCRPVILLPEDTPPFLELKGS[p.R1095H]HHPCITKTFFGDDFIPNDILIGCEEE	GSHHPCITK,KGSHHPCITK,ELKGSHHPCI,SHHPCITKTF,LELKGSHHPC	CRC
MSLNL	c.202A>C	p.T68P	MTSARRRTDVGPRVAFTYPCTQLSP[p.T68P]PRAHRHLPVHTVTYPCTQLSPTRAHS	QLSPPRAHR,SPPRAHRHL,TQLSPPRAH,PPRAHRHLPV	PRAD
MST1	c.1304delA	p.N435fs	AETPHKPQFTFTSEPHAQLEENFCR[p.N435fs]TQMGIAMGPGATRWTQGPHSTTVPCDAALMTSRHQSWTPQTRCSLRSVARGWIGWISGVPSCAWLGAIRATHPGQSACGIGRASISAGGL*	GWIGWISGV,WISGVPSCA,RTQMGIAMG,QTRCSLRSV,RCSLRSVAR,AIRATHPGQ,HQSWTPQTR,HPGQSACGI,EENFCRTQM,CRTQMGIAM,SLRSVARGW,ISGVPSCAW,RATHPGQSA,SLRSVARGWI,SVARGWIGWI,QTRCSLRSVA,RGWIGWISGV,AIRATHPGQS,WTPQTRCSLR,VPSCAWLGAI,FCRTQMGIAM,LEENFCRTQM,CSLRSVARGW,RSVARGWIGW,WISGVPSCAW	KIRP
MST1R	c.1390A>G	p.M464V	FNGLLGPVQVTALYVTRLDNVTVAH[p.M464V]VGTMDGRILQVELVRSLNYLLYVSNF	VTVAHVGTM,RLDNVTVAHV	KIRC
MTG1	c.315delA	p.L105fs	LNKMDLADLTEQQKIMQHLEGEGLK[p.L105fs]MSFLPTV*	HLEGEGLKM,LKMSFLPTV,GEGLKMSFL,GLKMSFLPTV,LEGEGLKMSF	STAD
MTG1	c.981delC	p.H327fs	DFLQTFRRGLLGSVMLDLDVLRGHP[p.H327fs]RLRLCPELVRVGRAGGGMWPPRPPDLGG*	RLCPELVRV,RLRLCPELV,RAGGMWPPR,MWPPRPPDL,VLRGHPRLR,RGHPRLRLC,LVRVGRAGG,HPRLRLCPE,RVGRAGGMW,GMWPPRPPDL,RLRLCPELVR,VLRGHPRLRL,LVRVGRAGGM,DLDVLRGHPR,DVLRGHPRLR,HPRLRLCPEL	STAD
MTIF2	c.326delA	p.N109fs	STKSKKVVEVWIGMTIEELARAMEK[p.N109fs]TQIMYMKLY*	AMEKTQIMY,KTQIMYMKL,RAMEKTQIM,TQIMYMKLY,MEKTQIMYM,KTQIMYMKLY,RAMEKTQIMY,MEKTQIMYMK,ARAMEKTQIM,AMEKTQIMYM	STAD
MTMR9	c.577delA	p.K193fs	DEALRKVATFRHGGRFPVLSYYHKK[p.K193fs]MGW*	SYYHKKMGW,VLSYYHKKM,LSYYHKKMGW	KICH
MTOR	c.4379T>C	p.L1460P	YAMKHFGELEIQATWYEKLHEWEDA[p.L1460P]PVAYDKKMDTNKDDPELMLGRMRCLE	APVAYDKKM,HEWEDAPVA,KLHEWEDAPV,HEWEDAPVAY	KIRC
MTOR	c.4448G>T	p.C1483F	DALVAYDKKMDTNKDDPELMLGRMR[p.C1483F]FLEALGEWGQLHQQCCEKWTLVNDET	LMLGRMRFL,RFLEALGEW,LGRMRFLEA,RMRFLEALG,ELMLGRMRF,GRMRFLEAL,MLGRMRFLEA,RMRFLEALGE,ELMLGRMRFL,LGRMRFLEAL,MRFLEALGEW	KIRC
MTOR	c.6644C>A	p.S2215Y	EDLRQDERVMQLFGLVNTLLANDPT[p.S2215Y]YLRKNLSIQRYAVIPLSTNSGLIGWV	LLANDPTYL,LANDPTYLR,TYLRKNLSI,TLLANDPTY,TLLANDPTYL,LLANDPTYLR,LANDPTYLRK,NTLLANDPTY,YLRKNLSIQR	UCEC
MTUS2	c.3013C>T	p.R1005W	YPKQRTAAARNGFPPKPDPQAREAE[p.R1005W]WQLVLRLKERCEQQTRQLGVAQGELK	EAEWQLVLR,REAEWQLVL,AEWQLVLRL,DPQAREAEW,AEWQLVLRLK	STAD
MUC16	c.15355C>T	p.P5119S	LPNFSSTSDKILATSKDSKDTKEIF[p.P5119S]SSINTEETNVKANNSGHESHSPALAD	DTKEIFSSI,KEIFSSINT,KDTKEIFSSI	SKCM
MUC16	c.18466G>A	p.A6156T	PDISPEASSSHSNSPPLTISTHKTI[p.A6156T]TTQTGPSGVTSLGQLTLDTSTIATSA	TTQTGPSGV,TTQTGPSGV	STAD
MUC16	c.25817G>A	p.R8606H	ESISSSPHPVTALLTLGPVKTTDML[p.R8606H]HTSSEPETSSPPNLSSTSAEILATSE	MLHTSSEPET	CRC
MUC16	c.31355_31356insC	p.P10452fs	GIMEHITKIPNEAAHRGTIRPVKGP[p.P10452fs]SDIHFACQS*	RPVKGPSDI,VKGPSDIHF	KICH
MUC16	c.33014C>T	p.T11005I	VLPEVPGMVTSLVASSRAVTSTTLP[p.T11005I]ILTLSPGEPETTPSMATSHGAEASST	AVTSTTLPI,LPILTLSPG,RAVTSTTLPI	CLL
MUC16	c.33778C>G	p.P11260A	IDSWVAHPGTEASSVVPTLTVSTGE[p.P11260A]AFTNISLVTHPAESSSTLPRTTSRFS	STGEAFTNI,EAFTNISLV,LTVSTGEAF,GEAFTNISL,TLTVSTGEAF,GEAFTNISLV	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
MUC16	c.34782C>A	p.N11594K	YEPETTATWLTHPAETSTTVSGTIP[p.N11594K]KFSHRGSDTAPSMVTSPGVDTRSGVP	TTVSGTIPK,GTIPKFSHR,STTVSGTIPK,TTVSGTIPKF	LUSC
MUC16	c.38321G>A	p.R12774H	SGCRLTLLRSEKDGAATGVDAICTH[p.R12774H]HLDPKSPGVDREQLYWELSQLTNGIK	HLDPKSPGV,AICTHHLDPK	HNSC
MUC17	c.13244G>A	p.R4415H	LVYGLVGAGVVLMLIILVALLMLVF[p.R4415H]HSKREVKRQKYRLSQLYKWQEEDSGP	LLMLVFHSK,VFHSKREVK,LMLVFHSKR,MLVFHSKREV,ALLMLVFHSK,LVFHSKREVK,HSKREVKRQK,LLMLVFHSKR,VFHSKREVKR	BRCA
MUC17	c.229G>A	p.V77M	CQQLSQHVRTGSAANTATGTTSTNV[p.V77M]MEPRMYLSCSTNPEMTSIESSVTSDT	NVMEPRMYL,TSTNVMEPR,MEPRMYLSC,STNVMEPRMY,TTSTNVMEPR,NVMEPRMYLS,ATGTTSTNVM	GBM
MUC17	c.3680_3681insC	p.R1227fs	PTAEVTSMPTSTPGERSTPLTSMPV[p.R1227fs]STHASGQF*	TSMPVSTHA,VSTHASGQF,MPVSTHASG,LTSMPVSTHA,MPVSTHASGQ	KIRC
MUC17	c.3683delA	p.H1228fs	TAEVTSMPTSTPGERSTPLTSMPVR[p.H1228fs]PRQWPVLRLAPFQHLPLTPAHL*	FQHLPLTPA,HLPLTPAHL,LTSMPVRPR,PVRPRQWPV,RPRQWPVLR,RQWPVLRLA,WPVLRLAPF,LRLAPFQHL,LAPFQHLPL,RLAPFQHLPL,VLRLAPFQHL,QWPVLRLAPF,PVRPRQWPVL,MPVRPRQWPV,RPRQWPVLRL,FQHLPLTPAH,TSMPVRPRQW,RQWPVLRLAP	KIRC
MUC17	c.6836C>A	p.T2279N	STEATSSPTTAEGTSIPTSTLSEGT[p.T2279N]NPLTSIPVSHTLVANSEVSTLSTTPV	TLSEGTNPL,TLSEGTNPLT,GTNPLTSIPV,STLSEGTNPL,SEGTNPLTSI,NPLTSIPVSH	TGCT
MUC2	c.4703C>T	p.T1568M	TTTVTPTPTPTGTQTPTTTPITTTT[p.T1568M]MVTPTPTPTGTQTPTSTPITTTTTVT	TTPITTTTM,TPITTTTMV,TTTTMVTPT,TTMVTPTPT,MVTPTPTPT,TTTPITTTTM,TTPITTTTMV,TMVTPTPTPT,TPITTTTMVT	TGCT
MUC2	c.4739C>A	p.T1580N	TQTPTTTPITTTTTVTPTPTPTGTQ[p.T1580N]NPTSTPITTTTTVTPTPTPTGTQTPT	TQNPTSTPI,TQNPTSTPIT	TGCT
MUC2	c.4745C>G	p.T1582R	TPTTTPITTTTTVTPTPTPTGTQTP[p.T1582R]RSTPITTTTTVTPTPTPTGTQTPTTT	TQTPRSTPI,GTQTPRSTPI,TPRSTPITTT	KIRP
MUC2	c.4790C>T	p.T1597I	TPTPTGTQTPTSTPITTTTTVTPTP[p.T1597I]IPTGTQTPTTTPITTTTTVTPTPTPT	TTTVTPTPI,TTTTVTPTPI,TTVTPTPIPT	TGCT
MUC2	c.5111C>T	p.T1704I	TTTTTVTPTPTPTGTQTPTSTPITT[p.T1704I]ITTVTPTPTPTGTQTPTPTPISTTTT	TTITTVTPT,TPITTITTV,STPITTITTV,TPITTITTVT,TPTSTPITTI	TGCT
MUC2	c.5117C>T	p.T1706M	TTTVTPTPTPTGTQTPTSTPITTTT[p.T1706M]MVTPTPTPTGTQTPTPTPISTTTTVT	TPITTTTMV,TTTTMVTPT,TTMVTPTPT,MVTPTPTPT,STPITTTTMV,TSTPITTTTM,TMVTPTPTPT,TPITTTTMVT	TGCT
MUC2	c.5143G>A	p.G1715S	PTGTQTPTSTPITTTTTVTPTPTPT[p.G1715S]STQTPTPTPISTTTTVTPTPTPTGTQ	STQTPTPTPI	TGCT
MUC2	c.5165C>T	p.T1722I	TSTPITTTTTVTPTPTPTGTQTPTP[p.T1722I]IPISTTTTVTPTPTPTGTQTPTTTPI	IPISTTTTV,TQTPTPIPI,TPIPISTTT,TPIPISTTTT,IPISTTTTVT	KIRP
MUC5B	c.2041A>G	p.S681G	YMGIFLVIETHGMAVSWDRKTSVFI[p.S681G]GLHQDYKGRVCGLCGNFDDNAINDFA	KTSVFIGLH,FIGLHQDYK,VFIGLHQDY,RKTSVFIGL,GLHQDYKGRV,VFIGLHQDYK,SVFIGLHQDY	ACC
MUC5B	c.2045A>G	p.D682G	MGIFLVIETHGMAVSWDRKTSVFIR[p.D682G]RHQDYKGRVCGLCGNFDDNAINDFAT	FIRRHQDYK,KTSVFIRRH,VFIRRHQDY,VFIRRHQDYK,SVFIRRHQDY	ACC,KIRP

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
MUC6	c.4707_4708insA	p.P1569fs	ITPNPTSTRTRTPVAHTNSATSSRP[p.P1569fs]TTTLHHTLPTYREQSLLFHRSHDGNILQDHHYLSNPITPSDHTSHSRSTFLHLFGDSKYSHSHHPYPCTDGHFCLHPLNANRHDSSTDNAQGHRVHPHSANNDADHQRDQPSPELIKHSQNLYIPTFTHFLHTPC*	CTDGHFCLH,YLSNPITPS,YIPTFTHFL,FLHLFGDSK,CLHPLNANR,TYREQSLLF,SRSTFLHLF,KYSHSHHPY,SQNLYIPTF,LYIPTFTHF,SSRPTTTLH,TSHSRSTFL,HSRSTFLHL,RSTFLHLFG,RVHPHSANN,TLHHTLPTY,LHLFGDSKY,LIKHSQNLY,FTHFLHTPC,LPTYREQSL,HPHSANNDA,ELIKHSQNL,HTSHSRSTF,TSSRPTTTL,HRSHDGNIL,GNILQDHHY,HHYLSNPIT,SKYSHSHHP,AQGHRVHPH,IKHSQNLYI,HPYPCTDGH,IPTFTHFLH,TTLHHTLPTY,STDNAQGHRV,LIKHSQNLY!,TLHHTLPTYR,TSHSRSTFLH,TFLHLFGDSK,PTYREQSLLF,HSRSTFLHLF,HSQNLYIPTF,NLYIPTFTHF,LYIPTFTHFL,ATSSRPTTTL,SSRPTTTLHH,HTSHSRSTFL,RVHPHSANND,HQRDQPSPEL,FLHLFGDSKY,SKYSHSHHPY,ELIKHSQNLY,RPTTTLHHTL,LPTYREQSLL,HPYPCTDGHF,EQSLLFHRSH,FHRSHDGNIL,SHSRSTFLHL,HLFGDSKYSH,YSHSHHPYPC,KHSQNLYIPT,SQNLYIPTFT,YPCTDGHFCL,REQSLLFHRS,QDHHYLSNPI,IPTFTHFLHT	KIRC
MUC6	c.5930C>A	p.P1977H	AHTTSASSSRLPTPFTTHSPPTGSS[p.P1977H]HFSSTGPMTATSFQTTTTYPTPSHPQ	SHFSSTGPM,SSHFSSTGPM,HSPPTGSSHF,SHFSSTGPMT	TGCT
MUC6	c.6000C>G	p.H2000Q	SSPFSSTGPMTATSFQTTTTYPTPS[p.H2000Q]QPQTTLPTHVPPFSTSLVTPSTHTVI	TPSQPQTTL,SQPQTTLPT,SQPQTTLPTH,QPQTTLPTHV	TGCT
MUC6	c.6387_6389delCTC	p.2129_2130SS>S	SPITTQLPHLSSATTPVSTTNQLSS[p.2129_2130SS>S]FSPSPSAPSTVSSYVPSSHSSPQTSSPS	STTNQLSSF,NQLSSFSPS,VSTTNQLSSF,NQLSSFSPSP	STAD
MUC7	c.1007C>T	p.S336L	PNSSPTTLAPDTSETSAAPTHQTTT[p.S336L]LVTTQTTTTKQPTSAPGQNKISRFLL	APTHQTTTL,HQTTTLVTT,LVTTQTTTTK,APTHQTTTLV,HQTTTLVTTQ	UCEC
MVK	c.412delC	p.P138fs	YLSICRKQRALPSLDIVVWSELPPG[p.P138fs]RAWAPAPPTRCVWQQPS*	RAWAPAPPT,APAPPTRCV,SELPPGRAW,RAWAPAPPTR,VVWSELPPGR,WAPAPPTRCV,LPPGRAWAPA,APAPPTRCVW,SELPPGRAWA	STAD
MXRA5	c.970G>T	p.D324Y	EEDGGSQLILEKFQLPQWSISLNMT[p.D324Y]YEHGNMVNLVCDIKKPMDVYKIHLNQ	WSISLNMTY,MTYEHGNMV,NMTYEHGNM,YEHGNMVNL,NMTYEHGNMV,TYEHGNMVNL,QWSISLNMTY,LNMTYEHGNM,YEHGNMVNLV	LUAD
MYB	c.1443delA	p.R481fs	ESSLDPPKVLPPARHSTIPLVILRK[p.R481fs]NGARPAP*	ViLRKNGAR,ILRKNGARPA,LVILRKNGAR	STAD
MYBPC2	c.1937G>A	p.R646H	TNPVGEDVASIFLQVVDVPDPPEAV[p.R646H]HITSVGEDWAILVWEPPMYDGGKPVT	PEAVHiTSV,VPDPPEAVHI	UCEC
MYD88	c.719T>C	p.M240T	TCVWSIASELIEKRLARRPRGGCRR[p.M240T]TVVVVSDDYLQSKECDFQTKFALSLS	TVVVVSDDY,RPRGGCRRT,RTVVVVSDDY,TVVVVSDDYL,RPRGGCRRTV	CLL
MYD88	c.752G>A	p.S251N	EKRLARRPRGGCRRMVVVVSDDYLQ[p.S251N]NKECDFQTKFALSLSPGAHQKRLIPI	YLQNKECDF,VVSDDYLQNK,NKECDFQTKF	DLBCL
MYD88	c.818T>C	p.L273P	YLQSKECDFQTKFALSLSPGAHQKR[p.L273P]PIPIKYKAMKKEFPSILRFITVCDYT	HQKRPIPIK,RPIPIKYKA,QKRPIPIKY,AHQKRPIPIK,QKRPIPIKYK,HQKRPIPIKY,SPGAHQKRPI,RPIPIKYKAM	CLL,DLBCL
MYEF2	c.967A>G	p.K323E	LFDRPMHVKMDDKSVPHEEYRSHDG[p.K323E]ETPQLPRGLGGIGMGLGPGGQPISAS	ETPQLPRGL,RSHDGETPQL,GETPQLPRGL	TGCT
MYEOV	c.807delG	p.L269fs	CSTWGLPLRVAGSWLTVVTVEALGG[p.L269fs]GAWELGGLARWGPLCTHPQCQVLLLSSSTTSSSSSSSSSLVEDVLCAKWFICPASFNPQNDSMR*	ALGGGAWEL,SLVEDVLCA,GLARWGPLC,LVEDVLCAK,KWFICPASF,SSSSSSSLV,CAKWFICPA,DVLCAKWFI,HPQCQVLLL,VEALGGGAW,WELGGLARW,CQVLLLSSS,SFNPQNDSM,SLVEDVLCAK,SSSSSSSSLV,SFNPQNDSMR,VTVEALGGGA,EALGGGAWEL,LARWGPLCTH,CQVLLLSSST,AKWFICPASF,ASFNPQNDSM,WELGGLARWG	STAD
MYEOV	c.905T>A	p.L302H	RRTGQVGPTMHPPPVSGASPLLLHH[p.L302H]HLLLLLIIILTC*	LLLHHHLLL,LLHHHLLLL,SPLLLHHHL,LHHHLLLLL,LLLHHHLLLL,LLHHHLLLLL,SPLLLHHHLL,LHHHLLLLLI,HHHLLLLLII	TGCT
MYH10	c.3271_3272insC	p.L1091fs	MISDLEERLKKEEKTRQELEKAKRK[p.L1091fs]PRRGDDRPAGPDRRAAGAD*	KAKRKPRRG,RPAGPDRRA,KPRRGDDRPA,RPAGPDRRAA	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
MYH11	c.2977G>A	p.E993K	EEEAARQKLQLEKVTAEAKIKKLED[p.E993K]KILVMDDQNNKLSKERKLLEERISDL	KLEDKILVM,KKLEDKILVM	HNSC
MYH11	c.3787_3789delAAG	p.K1263del	KENADLAGELRVLGQAKQEVEHKKK[p.K1263del]LEAQVQELQSKCSDGERARAELNDKVHK	VEHKKKLEA,KQEVEHKKKL	STAD
MYH13	c.931G>A	p.D311N	HIFYQIMSNKKPELIDLLLISTNPF[p.D311N]NFPFVSQGEVTVASIDDSEELLATDN	LISTNPFNF,STNPFNFPF,TNPFNFPFV,NPFNFPFVS,STNPFNFPFV,LLISTNPFNF,ISTNPFNFPF	CRC
MYH4	c.2369C>T	p.T790M	TKVFFKAGLLGTLEEMRDEKLAQLI[p.T790M]MRTQAICRGFLMRVEFRKMMERRESI	KLAQLIMRT,QLIMRTQAI,IMRTQAICR,AQLIMRTQA,DEKLAQLIM,LIMRTQAICR,IMRTQAICRG,RDEKLAQLIM,AQLIMRTQAI,MRTQAICRGF	LUAD
MYH6	c.2540C>T	p.T847M	AFMGVKNWPWMKLYFKIKPLLKSAE[p.T847M]MEKEMATMKEEFGRIKETLEKSEARR	LLKSAEMEK,KPLLKSAEM,KSAEMEKEM,AEMEKEMAT,EMEKEMATM,IKPLLKSAEM,LKSAEMEKEM,AEMEKEMATM	BRCA
MYH7	c.4459G>A	p.A1487T	ESQSELESSQKEARSLSTELFKLKN[p.A1487T]TYEESLEHLETFKRENKNLQEEISDL	TYEESLEHL,ELFKLKNTY,LKNTYEESL,KLKNTYEESL,NTYEESLEHL,TELFKLKNTY	KIRP
MYH7	c.5065C>T	p.R1689C	NDDLKENIAIVERRNNLLQAELEEL[p.R1689C]CAVVEQTERSRKLAEQELIETSERVQ	AELEELCAV,EELCAVVEQ,AELEELCAVV,EELCAVVEQT	CRC
MYH8	c.2354C>T	p.A785V	KFGHTKVFFKAGLLGLLEEMRDEKL[p.A785V]VQIITRTQAVCRGFLMRVEYQKMLQR	KLVQIITRT,VQIITRTQA,DEKLVQIIT,VQIITRTQAV,EMRDEKLVQI	TGCT
MYH8	c.3016C>A	p.H1006N	LTEEMAGLDETIAKLSKEKKALQET[p.H1006N]NQQTLDDLQAEEDKVNILTKAKTKLE	LQETNQQTL,ALQETNQQTL	LUAD
MYH8	c.3143G>A	p.R1048Q	LTKAKTKLEQQVDDLEGSLEQEKKL[p.R1048Q]QMDLERAKRKLEGDLKLAQESTMDME	KLQMDLERA,LEQEKKLQM,LQMDLERAK,QEKKLQMDL,KLQMDLERAK	CRC
MYH8	c.3349C>T	p.R1117C	NLISKIEDEQAVEIQLQKKIKELQA[p.R1117C]CIEELGEEIEAERASRAKAEKQRSDL	KIKELQACI,KKIKELQAC,KKIKELQACI,KELQACIEEL	LUAD
MYO18A	c.627delC	p.P209fs	PRPGHRSRAPELVTKKFPVDLRLPP[p.P209fs]WCPCPHLPSGSWSCNDGPLETLASPCGAQPCWIGAPRARPVGVWSTLLSLVQAPRTWPWGWCQEIDWWRLMGTMWRASPGMRLWR*	GVWSTLLSL,RLMGTMWRA,TMWRASPGM,VWSTLLSLV,VQAPRTWPW,WWRLMGTMW,RARPVGVWS,GTMWRASPG,MWRASPGMR,QPCWIGAPR,CWIGAPRAR,LLSLVQAPR,ETLASPCGA,CPHLPSGSW,APRARPVGV,RPVGVWSTL,SLVQAPRTW,QEIDWWRLM,WRASPGMRL,RASPGMRLW,LPPWCPCPH,SPCGAQPCW,WPWGWCQEI,GVWSTLLSLV,WIGAPRARPV,TMWRASPGMR,TLLSLVQAPR,RASPGMRLWR,TWPWGWCQEI,DWWRLMGTMW,MWRASPGMRL,RARPVGVWST,GTMWRASPGM,WWRLMGTMWR,FPVDLRLPPW,APRARPVGVW,RPVGVWSTLL,GSWSCNDGPL,VGVWSTLLSL,LSLVQAPRTW,LVQAPRTWPW,CQEIDWWRLM,IDWWRLMGTM,WRASPGMRLW,LETLASPCGA,LPPWCPCPHL	STAD
MYO1D	c.326C>T	p.T109M	AAYKAMKRRSKDTCIVISGESGAGK[p.T109M]MEASKYIMQYIAAITNPSQRAEVERV	GAGKMEASK,AGKMEASKY,GKMEASKYI,KMEASKYIM,SGAGKMEASK,GAGKMEASKY,MEASKYIMQY,GKMEASKYIM,GESGAGKMEA	GBM
MYO1D	c.736G>A	p.E246K	LQKSLSSYNYIHVGAQLKSSINDAA[p.E246K]KFRVVADAMKVIGFKPEEIQTVYKIL	KSSINDAAK,SINDAAKFR,KFRVVADAM,DAAKFRVVA,SSINDAAKF,SINDAAKFRV,SSINDAAKFR,AAKFRVVADA,KFRVVADAMK,KSSINDAAKF,AKFRVVADAM	CRC
MYO3A	c.1573A>C	p.N525H	AVVGAQISEYLLEKSRVIHQAIGEK[p.N525H]HFHIFYYIYAGLAEKKKLAHYKLPEN	AIGEKHFHI,IGEKHFHIF,KHFHIFYYI,HFHIFYYIY,HQAIGEKHF,GEKHFHIFY,EKHFHIFYY,HFHIFYYIYA,IGEKHFHIFY,GEKHFHIFYY,KHFHIFYYIY,QAIGEKHFHI,IHQAIGEKHF,AIGEKHFHIF	CRC
MYO3A	c.1574A>G	p.N525S	AVVGAQISEYLLEKSRVIHQAIGEK[p.N525S]SFHIFYYIYAGLAEKKKLAHYKLPEN	AIGEKSFHI,KSFHIFYYI,GEKSFHIFY,SFHIFYYIY,HQAIGEKSF,IGEKSFHIF,EKSFHIFYY,KSFHIFYYIY,SFHIFYYIYA,IGEKSFHIFY,GEKSFHIFYY,QAIGEKSFHI,IHQAIGEKSF,HQAIGEKSFH,AIGEKSFHIF	KIRC,OV

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
MYO5B	c.1214C>T	p.A405V	KLVTTSETYVKTMSLQQViNARNAL[p.A405V]VKHIYAQLFGWIVEHINKALHTSLKQ	VINARNALV,LVKHIYAQL,RNALVKHIY,VKHIYAQLF,ALVKHIYAQL,QVINARNALV,VINARNALVK,RNALVKHIYA;LVKHIYAQLF,ARNALVKHIY	BRCA
MYO5B	c.2123G>T	p.R708L	VLETIRISAAGYPSRWAYHDFFNRY[p.R708L]LVLVKKRELANTDKKAICRSVLENLI	FFNRYLVLV,DFFNRYLVL,FNRYLVLVK,HDFFNRYLV,AYHDFFNRYL,HDFFNRYLVL	LUAD
MYO6	c.2742_2743insA	p.Q914fs	EQIQKEYDALVKSSEELLSALQKKK[p.Q914fs]TAGRGSRKAEAYSRRNGKGKKKT*	KTAGRGSRK,LQKKKTAGR,GSRKAEAYS,EAYSRRNGK,YSRRNGKGK,RGSRKAEAY,KTAGRGSRKA,GSRKAEAYSR,AYSRRNGKGK,YSRRNGKGKK	GBM
MYO6	c.3538G>A	p.D1180N	IPARQREIEMNRQQRFFRIPFIRPA[p.D1180N]NQYKDPQSKKKGWWYAHFDGPWIARQ	FIRPANQYK,IPFIRPANQY	CRC
MYO7B	c.6119C>A	p.P2040H	KQTSEPSYPDVILIAINRHGVLLIH[p.P2040H]HKTKDLLTTYPFTKISSWSSGSTYFH	VLLIHHKTK,LLIHHKTKDL,GVLLIHHKTK,RHGVLLIHHK,HKTKDLLTTY	LUAD
MYO9A	c.500G>A	p.R167Q	QPQQKDFDDLCSLPDLNEKTLLENL[p.R167Q]QNRFKHEKIYTYVGSILIVINPFKFL	LQNRFKHEK,TLLENLQNR,LLENLQNRF,KTLLENLQNR,TLLENLQNRF,LQNRFKHEKI	CRC
MYO9A	c.6536G>A	p.R2179Q	FLRAMGLQERKETIRGVYSVIDQLS[p.R2179Q]QTHLNTLERLIFHLVRIALQEDTNRM	SVIDQLSQT,QTHLNTLER,LSQTHLNTL,QLSQTHLNTL	CRC
MYO9B	c.281G>T	p.R94L	KESGGEEWVLDANDSPVHRVLLWPR[p.R94L]LAQDEHPQEDGYYFLLQERNADGTIK	RVLLWPRLA,HRVLLWPRL	LUAD
MYOCD	c.1478C>T	p.T493M	AGSLPDTFNDASPSFGLHPSPVHVC[p.T493M]MEESLMSSLNGGSVPSELDGLDSEKD	HPSPVHVCM,MEESLMSSL,CMEESLMSSL,VHVCMEESLM	HNSC
MYOCD	c.678delC	p.G226fs	ENDRNDSASQPSHQSDAGKQGLGPP[p.G226fs]APP*	GKQGLGPPA	STAD
MYOCD	c.910_912delCAG	p.Q310del	AYARLLQQQQLFLQLQILSQQQQQQ[p.Q310del]HRFSYLGMHQAQLKEPNEQMVRNPNSSS	SQQQQQQHRF	PRAD
MYOF	c.495_496insG	p.G165fs	PGMGGDGEEDEGDEDRLDNAVRGPG[p.G165fs]AQGASWDGVGSSACSEAHQSKEQPADAVK*	GPGAQGASW,SACSEAHQSK,AVRGPGAQGA	LUAD
MYOM1	c.188G>A	p.R63Q	VYTQGSTAYSSRSSAAHRRESEAFR[p.R63Q]QASASSSQQQASQHALSSEVSRKAAS	AFRQASASS,RESEAFRQA,SEAFRQASA,RQASASSSQ,AFRQASASSS,RESEAFRQAS,RQASASSSQQ,SEAFRQASAS	HNSC
MYOM2	c.2962G>A	p.D988N	DHSKLYLKNPDKEDLGTYSVSVSDT[p.D988N]NGVSSSFVLDPEELERLMALSNEIKN	VSVSDTNGV,DTNGVSSSF,NGVSSSFVL,SVSVSDTNGV,DTNGVSSSFV,SDTNGVSSSF	CESC
MYOZ2	c.751G>A	p.E251K	LSGRRSFNRTPKGWISENIPIVITT[p.E251K]KPTDDTTVPESEDL*	TTKPTDDTTV	CRC
MYT1	c.676G>A	p.E226K	AAEGAASEEGEKGLFIQPEDAEEVV[p.E226K]KVTTERSQDLCPQSLEDAASEESSKQ	EVVKVTTER,AEEVVKVTT	CRC
MYT1L	c.1052C>A	p.P351Q	SLECLRNQCFDLARKLSETNPQERN[p.P351Q]QQQNMNIRQHVRPEEDFPGRTPDRNY	QERNQQQNM,QQQNMNIRQH	LUAD
N4BP2L2	c.1516C>T	p.R506C	STKNKKRRKKRIFNLVPNFDLLGQS[p.R506C]CIGVKEREKCDLLTKNHGLKITLGEE	LLGQSCIGV,FDLLGQSCI,LLGQSCIGVK	UCEC
NAA11	c.551C>A	p.T184K	RRQMDLKKGGYVVLGSRENQETQGS[p.T184K]KLSDSEEACQQKNPATEESGSDSKEP	NQETQGSKL	LUAD
NAA16	c.1542delT	p.H514fs	CISAYQRLGRYGDALKKCHEVERHF[p.H514fs]LR*	HEVERHFLR	STAD
NAA25	c.2420C>A	p.S807Y	DIYELDTSGLEDTMEIQERIENSFK[p.S807Y]YLLDQLKDVFSKCKGDLLEVKDGNLK	YLLDQLKDV,RIENSFKYL,IENSFKYLL,KYLLDQLKDV,YLLDQLKDVF,SFKYLLDQLK,QERIENSFKY,NSFKYLLDQL	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
NAB1	c.216G>C	p.L72F	EEFLEIMALVGMASKPLHVRRLQKA[p.L72F]FRDWVTNPGLFNQPLTSLPVSSIPIY	RLQKAFRDW,HVRRLQKAF,LQKAFRDWV,RLQKAFRDWV,HVRRLQKAFR,LHVRRLQKAF,RRLQKAFRDW,LQKAFRDWVT	LUAD
NANOS3	c.548C>T	p.S183L	KTQDTGHRRGGGGGAGFRGAGKSEP[p.S183L]LPSCSPSMST*	RGAGKSEPL,EPLPSCSPSM,FRGAGKSEPL	HNSC
NAP1L3	c.1058C>G	p.P353R	MIQKYDEPILKFLSDVSLKFSKPGQ[p.P353R]RVSYTFEFHFLPNPYFRNEVLVKTYI	RVSYTFEFH,PGQRVSYTF,QRVSYTFEF,SKPGQRVSY,RVSYTFEFHF,SLKFSKPGQR,FSKPGQRVSY,KPGQRVSYTF,GQRVSYTFEF,LKFSKPGQRV	TGCT
NAP1L4	c.854_855CC>AA	p.P285Q	VTVKTIKKKQKHKGRGTVRTITKQV[p.P285Q]QNESFFNFFNPLKASGDGESLDEDSEF	VQNESFFNF,KQVQNESFF,TKQVQNESF,QVQNESFFNF,VQNESFFNFF,ITKQVQNESF,TKQVQNESFF	SKCM
NAPSA	c.362G>A	p.R121Q	DTGSSNLWVPSRRCHFFSVPCWLHH[p.R121Q]QFDPKASSSFQANGTKFAIQYGTGRV	WLHHQFDPK,VPCWLHHQF,HQFDPKASS,WLHHQFDPKA,CWLHHQFDPK,SVPCWLHHQF,QFDPKASSSF,HQFDPKASSS	UCEC
NARS2	c.719C>G	p.P240R	AFLTVSGQLHLEVMSGAFTQVFTFG[p.P240R]RTFRAENSQSRRHLAEFYMIEAEISF	FTFGRTFRA,FTQVFTFGR,VFTFGRTFR,QVFTFGRTF,QVFTFGRTFR,AFTQVFTFGR,TQVFTFGRTF	BRCA
NAT10	c.1178T>C	p.I393T	IQYIHPADAVKLGQAELVVIDEAAA[p.I393T]TPLPLVKSLLGPYLVFMASTINGYEG	AAATPLPLV,AATPLPLVK,EAAATPLPL,TPLPLVKSL,IDEAAATPL,DEAAATPLP,VIDEAAATPL,AAATPLPLVK,EAAATPLPLV,TPLPLVKSLL,DEAAATPLPL	TGCT
NBPF1	c.2428G>A	p.E810K	SSSHVEWEDAVHIIPENESDDEEEE[p.E810K]KKGPVSPRNLQESEEEEVPQESWDEG	KKGPVSPRNL	MM
NBPF14	c.73C>T	p.R25C	MVVSAGPWSSEKAEMNILEINEKL[p.R25C]CPQLAENKQQFGNLKERCFVTQLAGF	KLCPQLAENK	PAAD
NBPF16	c.1347delT	p.D449fs	RELLDEKEPEVLQDSLDRCYSTPSD[p.D449fs]ILNCLT*	RCYSTPSDI,TPSDILNCL,STPSDILNCL,RCYSTPSDIL	PAAD
NBPF3	c.1472A>T	p.D491V	QEEEEDQGPPCPRLSRELPEVVEPE[p.D491V]VLQDSLDRWYSTPFSYPELPDSCQPY	LPEVVEPEV,ELPEVVEPEV	KIRC
NCAM2	c.2092G>T	p.G698C	GYSEPTVYEFSMPPKPNIIKDTLFN[p.G698C]CLGLGAVIGLGVAALLLILVVTDVSC	DTLFNCLGL,TLFNCLGLGA,IIKDTLFNCL,KDTLFNCLGL	LUAD
NCAPD2	c.659G>T	p.R220L	VSLVTGCCYRLLENPTINHQKNRPT[p.R220L]LEAITHLLGVALTRYNHMLSATVKII	TLEAITHLL,KNRPTLEAI,LEAITHLLG,HQKNRPTLEA,RPTLEAITHL,INHQKNRPTL,QKNRPTLEAI,LEAITHLLGV	LUAD
NCAPD3	c.2725delC	p.Q909fs	ASSADADHSPSSQGSSEAPASQPPP[p.Q909fs]RSEVLSCPL*	QPPPRSEVL,RSEVLSCPL,EAPASQPPPR,SQPPPRSEVL	STAD
NCAPH	c.1398delA	p.T466fs	HWRFRPRRKQDAPSQSENKKKSTKK[p.T466fs]ILKLTLKMILTLMYILEKQRLLLF*	KMILTLMYI,MILTLMYIL,YILEKQRLL,ILKLTLKMI,TLKMILTLM,LTLMYILEK,MYILEKQRL,KKSTKKILK,KILKLTLKM,LKMILTLMY,LMYILEKQR,LKLTLKMIL,LTLKMILTL,LEKQRLLLF,KLTLKMILTL,KMILTLMYIL,YILEKQRLLL,ILTLMYILEK,MYILEKQRLL,ILEKQRLLLF,KKKSTKKILK,STKKILKLTL,TLKMILTLMY,TLMYILEKQR,ILKLTLKMIL,KKSTKKILKL,KKILKLTLKM,LTLKMILTLM,LKMILTLMYI,LMYILEKQRL	STAD
NCOA3	c.3759_3760delGC	p.Q1253fs	RSRELLSHHFRQQRVAMMMQQQQQQ[p.Q1253fs]TAAAAAAAAATATATATAATAANPGLQPTS*	QTAAAAAAA,MQQQQQQTA,QQQQQQTAA,QQQQQTAAA,QQQQTAAAA,QQQTAAAAA,QQTAAAAAA,MMMQQQQQQT,MMQQQQQQTA,ATATATATAA,ATATATAATA,QTAAAAAAAA,TAATAANPGL,MQQQQQQTAA,QQQQQQTAAA,QQQQQTAAAA,QQQQTAAAAA,QQQTAAAAAA,QQTAAAAAAA	PAAD
NCOA4	c.1685G>A	p.R562Q	ADWVLPGKKMGNLSQLSSGEDKWLL[p.R562Q]QKKAQEVLLNSPLQEEHNFPPDHYGL	LLQKKAQEV,LQKKAQEVL,WLLQKKAQEV,LLQKKAQEVL,LQKKAQEVLL	CRC
NCOA7	c.1107G>T	p.E369D	DSRPIVPLEKSTGHTPTKPSGSSVS[p.E369D]DKLKKLDSSRETSHGSPTVTKLSKEP	SSVSDKLKK,GSSVSDKLKK	UCEC
NCOR1	c.4682G>A	p.R1561Q	PGVDPVVSHSPFDPHHRGSTAGEVY[p.R1561Q]QSHLPTHLDPAMPFHRALDPAAAAYL	YQSHLPTHL,EVYQSHLPT,VYQSHLPTHL,EVYQSHLPTH,GEVYQSHLPT	HNSC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
NCR1	c.772C>T	p.R258W	TYLLTTETGLQKDHALWDHTAQNLL[p.R258W]WMGLAFLVLVALVWFLVEDWLSRKRT	LLWMGLAFL,WMGLAFLVL,AQNLLWMGL,LWMGLAFLV,HTAQNLLWM,NLLWMGLAF,NLLWMGLAFL,LLWMGLAFLV,WMGLAFLVLV,AQNLLWMGLA,LWMGLAFLVL,QNLLWMGLAF	UCEC
NDST3	c.1279G>A	p.V427I	LNKKFALEHGIPTDMGYAVAPHHSG[p.V427I]IYPVHVQLYEAWKKVWNIKITSTEEY	GIYPVHVQL,AVAPHHSGI,IYPVHVQLY,VAPHHSGIY,GIYPVHVQLY,AVAPHHSGIY,YAVAPHHSGI,APHHSGIYPV,SGIYPVHVQL	LUAD
NEDD4L	c.570_572delTCC	p.P194del	DMEHGWEVVDSNDSASQHQEELPPP[p.P194del]LPPGWEEKVDNLGRTYYVNHNNRTTQWH	HQEELPPPL,LPPPLPPGW	CLL
NEDD9	c.2392G>A	p.A798T	RNKVMNSSNQLCEQLKTIVMATKMA[p.A798T]TLHYPSTTALQEMVHQVTDLSRNAQL	VMATKMATL,TLHYPSTTA,ATKMATLHY,KMATLHYPS,MATKMATLHY,IVMATKMATL,KMATLHYPST,TLHYPSTTAL,ATKMATLHYP,ATLHYPSTTA,VMATKMATLH,TKMATLHYPS	CRC
NEDD9	c.946G>A	p.A316T	ARRHQSLSPNHPPPQLGQSVGSQND[p.A316T]TYDVPRGVQFLEPPAETSEKANPQER	SVGSQNDTY,DTYDVPRGV,TYDVPRGVQF,QSVGSQNDTY	CRC
NEFH	c.1933G>A	p.E645K	SPVKEEAKSPAEVKSPEKAKSPTKE[p.E645K]KAKSPEKAKSPEKEEAKSPEKAKSPV	KAKSPTKEK,KSPTKEKAK,KEKAKSPEK,KAKSPTKEKA,KEKAKSPEKA	KIRP
NEFH	c.1993_1994insAGGAAG	p.665_666insEE	PTKEEAKSPEKAKSPEKEEAKSPEK[p.665_666insEE]EEAKSPVKAEAKSPEKAKSPVKAEAKSPEKA	EEAKSPVKA,KEEAKSPVKA	ACC,KIRP
NEFH	c.2009T>A	p.V670E	EAKSPEKAKSPEKEEAKSPEKAKSP[p.V670E]EKAEAKSPEKAKSPVKAEAKSPEKAK	KSPEKAEAK,KAKSPEKAEA	TGCT
NEFM	c.638C>T	p.A213V	RFEEEARLRDDTEAAIRALRKDIEE[p.A213V]VSLVKVELDKKVQSLQDEVAFLRSNH	ALRKDIEEV,EVSLVKVEL,RKDIEEVSL,IEEVSLVKV,VSLVKVELDK,EEVSLVKVEL	STAD
NEK1	c.1822C>T	p.R608C	EVYLARLRQIRLQNFNERQQIKAKL[p.R608C]CGEKKEANHSEGQEGSEEADMRRKKI	KAKLCGEKK,QIKAKLCGEK	CRC
NEK11	c.1121G>A	p.R374Q	KLQAADEKARKLKKIVEEKYEENSK[p.R374Q]QMQELRSRNFQQLSVDVLHEKTHLKG	NSKQMQELR,QMQELRSRNF,EKYEENSKQM,KQMQELRSRN	UCEC
NEK2	c.715C>A	p.R239S	PPFTAFSQKELAGKIREGKFRRIPY[p.R239S]SYSDELNEIITRMLNLKDYHRPSVEE	KFRRIPYSY,SYSDELNEI,IPYSYSDEL,SYSDELNEII,KFRRIPYSYS,GKFRRIPYSY,YSYSDELNEI	LUAD
NEK8	c.2070delC	p.V690fs	VTSVSCCHGNTLLAVRSVTDEPVPP[p.V690fs]EAPGFTSGPP*	EPVPPEAPGF	STAD
NELL2	c.509G>A	p.G170D	QTHLNSGVILSIHHLDHRYLELESS[p.G170D]DHRNEVRLHYRSGSHRPHTEVFPYIL	ESSDHRNEV,ESSDHRNEVR,LESSDHRNEV	TGCT
NES	c.1831G>C	p.V611L	LKSLEKENKELLKDVEVVRPLEKEA[p.V611L]LGQLKPTGKEDTQTLQSLQKENQELM	LEKEALGQL,ALGQLKPTGK,KEALGQLKPT	KIRC
NF1	c.2027_2028insC	p.T676fs	PGASLRKGKGNSSMDSAAGCSGTPP[p.T676fs]DLPTSPDQTRSGPVHVSVEP*	QTRSGPVHV,RSGPVHVSV,SPDQTRSGPV	STAD
NF1	c.4974_4977delTCTC	p.F1658fs	AKPYEIVVDLTHTGPSNRFKTDFLS[p.F1658fs]GLLFFLALLTTTSPQSISITVTPGSGSTPSIMSGC*	KTDFLSGLL,FLSGLLFFL,GLLFFLALL,FLALLTTTS,DFLSGLLFF,RFKTDFLSG,TTSPQSISI,STPSIMSGC,SPQSISITV,FKTDFLSGL,TDFLSGLLF,SGLLFFLAL,GSGSTPSIM,KTDFLSGLLF,FLSGLLFFLA,LLFFLALLTT,FLALLTTTSP,LLTTTSPQSI,DFLSGLLFFL,RFKTDFLSGL,TTTSPQSISI,TSPQSISITV,TPGSGSTPSI,FKTDFLSGLL,TDFLSGLLFF,LSGLLFFLAL	GBM
NFASC	c.766G>A	p.V256I	QFEEDQFQPGVWHDHSKYPGSVNSA[p.V256I]ILRLSPYVNYQFRVIAINEVGSSHPS	AILRLSPYV,GSVNSAILR,SAILRLSPY,YPGSVNSAI,NSAILRLSPY,SAILRLSPYV,KYPGSVNSAI,ILRLSPYVNY,YPGSVNSAIL	CRC
NFAT5	c.2716C>G	p.Q906E	QQQQQQQQVMESSAAMVMEMQQSIC[p.Q906E]EAAAQIQSELFPSTASANGNLQQSPV	EMQQSICEA,SICEAAAQI,MQQSICEAA,CEAAAQIQS,QSICEAAAQI,EAAAQIQSEL,MEMQQSICEA,MQQSICEAAA	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
NFE2L2	c.100C>G	p.R34G	PGLPSQQDMDLIDILWRQDIDLGVS[p.R34G]GEVFDFSQRRKEYELEKQKKLEKERQ	IDLGVSGEVF,LGVSGEVFDF	BLCA
NFE2L2	c.101G>A	p.R34Q	PGLPSQQDMDLIDILWRQDIDLGVS[p.R34Q]QEVFDFSQRRKEYELEKQKKLEKERQ	IDLGVSQEVF,LGVSQEVFDF	LUSC
NFE2L2	c.235G>A	p.E79K	LEKERQEQLQKEQEKAFFAQLQLDE[p.E79K]KTGEFLPIQPAQHIQSETSGSANYSQ	QLDEKTGEFL,LQLDEKTGEF,DEKTGEFLPI	BLCA,HNSC
NFE2L2	c.235G>C	p.E79Q	LEKERQEQLQKEQEKAFFAQLQLDE[p.E79Q]QTGEFLPIQPAQHIQSETSGSANYSQ	AQLQLDEQT,QLDEQTGEF,EQTGEFLPI,QLDEQTGEFL,LQLDEQTGEF,DEQTGEFLPI	HNSC,LUSC
NFE2L2	c.241G>A	p.G81S	KERQEQLQKEQEKAFFAQLQLDEET[p.G81S]SEFLPIQPAQHIQSETSGSANYSQVA	QLDEETSEF,EETSEFLPI,SEFLPIQPA,QLDEETSEFL,LQLDEETSEF,DEETSEFLPI,SEFLPIQPAQ	LUSC
NFE2L2	c.85G>C	p.D29H	LELPPPGLPSQQDMDLIDILWRQDI[p.D29H]HLGVSREVFDFSQRRKEYELEKQKKL	ILWRQDIHL,HLGVSREVF,DIHLGVSREV,IHLGVSREVF	CESC,HNSC,LUSC
NFE2L2	c.88C>T	p.L30F	ELPPPGLPSQQDMDLIDILWRQDID[p.L30F]FGVSREVFDFSQRRKEYELEKQKKLE	ILWRQDIDF,IDFGVSREV,IDFGVSREVF,FGVSREVFDF	LUSC
NFE2L2	c.92G>C	p.G31A	LPPPGLPSQQDMDLIDILWRQDIDL[p.G31A]AVSREVFDFSQRRKEYELEKQKKLEK	DLAVSREVF,WRQDIDLAV,AVSREVFDF,ILWRQDIDLA,IDLAVSREVF,LAVSREVFDF	LUSC
NFIA	c.882G>C	p.L294F	SVTELVRVSQTPIAAGTGPNFSLSD[p.L294F]FESSSYYSMSPGAMRRSLPSTSSTSS	LSDFESSSY,SDFESSSYY,FESSSYYSM,GPNFSLSDF,LSDFESSSYY,SLSDFESSSY,FESSSYYSMS	LUAD
NHEJ1	c.326G>A	p.R109Q	LKDAAHPSEATFSCDCVADALILRV[p.R109Q]QSELSGLPFYWNFHCMLASPSLVSQH	RVQSELSGL,QSELSGLPF,QSELSGLPFY,ALILRVQSEL,VQSELSGLPF,LRVQSELSGL	UCEC
NHLRC1	c.612delT	p.F204fs	DVTITNDCHVVVTDAGDRSIKVFDF[p.F204fs]LARSSLSLEANSPYLGVWRPPLRMGLW*	LSLEANSPY,FLARSSLSL,SLEANSPYL,YLGVWRPPL,RSIKVFDFL,SIKVFDFLA,LGVWRPPLR,EANSPYLGV,FDFLARSSL,ANSPYLGVW,SIKVFDFLAR,DFLARSSLSL,PYLGVWRPPL,RSIKVFDFLA,LARSSLSLEA,VWRPPLRMGL,SLSLEANSPY,YLGVWRPPLR,LSLEANSPYL,LEANSPYLGV,LGVWRPPLRM,EANSPYLGVW	STAD
NHP2L1	c.250C>T	p.R84C	DAEPLEIILHLPLLCEDKNVPYVFV[p.R84C]CSKQALGRACGVSRPVIACSVTIKEG	YVFVCSKQAL,NVPYVFVCSK,FVCSKQALGR	GBM
NHS	c.4681G>A	p.D1561N	ATEILKSPILPKPPGELTAESPQST[p.D1561N]NDAHQGSQGAEALSPLSPCSPRVNAE	AESPQSTNDA	TGCT
NID2	c.3103delC	p.R1035fs	EPTQRPPTICERWRENLLEHYGGTP[p.R1035fs]GMTSTCPSAMTWATSSPCSATERATSAGVWTKMAERCRAPAPSQAPPLRVYPPSLHPWSGPRPGQM*	GMTSTCPSA,ATSAGVWTK,SLHPWSGPR,GVWTKMAER,VYPPSLHPW,RVYPPSLHP,MTSTCPSAM,SQAPPLRVY,WTKMAERCR,MTWATSSPC,TSAGVWTKM,HPWSGPRPG,PLRVYPPSL,LEHYGGTPG,EHYGGTPGM,STCPSAMTW,AMTWATSSP,TERATSAGV,CPSAMTWAT,AERCRAPAP,KMAERCRAPA,GMTSTCPSAM,AMTWATSSPC,TSSPCSATER,RATSAGVWTK,RVYPPSLHPW,WTKMAERCRA,RCRAPAPSQA,MTSTCPSAMT,MTWATSSPCS,TSAGVWTKMA,APAPSQAPPL,APSQAPPLRV,LEHYGGTPGM,TERATSAGVW,ATSAGVWTKM,SQAPPLRVYP,CPSAMTWATS,AERCRAPAPS,TSTCPSAMTW	STAD
NINL	c.4096C>T	p.R1366C	VRALQATEEKQRGAEKQSRLLEEKV[p.R1366C]CALNKLVSRIAPAALSV*	LLEEKVCAL,KVCALNKLV,CALNKLVSR,RLLEEKVCAL	CRC
NKD1	c.856_857insC	p.P286fs	AGIENYTSQFGPGSPSVAQKSELPP[p.P286fs]PHLQSHSISLP*	HLQSHSISL,AQKSELPPP,LQSHSISLP,AQKSELPPPH,QKSELPPPHL	STAD
NKD2	c.1315_1317delCAC	p.H447del	GYAVPVIQRHEHHHHHEHHHHHHHH[p.H447del]FHPS*	EHHHHHHHHF	TGCT

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
NLK	c.570delT	p.C190fs	KKMPNVFQNLVSCKRVFRELKMLCF[p.C190fs]LSMIMYSLPLTYSNLHTLTILKKYMLSQN*	IMYSLPLTY,YSNLHTLTI,KMLCFLSMI,FLSMIMYSL,SMIMYSLPL,MIMYSLPLT,LTYSNLHTL,SLPLTYSNL,NLHTLTILK,HTLTILKKY,LTILKKYML,MLCFLSMIM,RELKMLCFL,LKMLCFLSM,LCFLSMIMY,SNLHTLTIL,LPLTYSNLH,MIMYSLPLTY,KMLCFLSMIM,SMIMYSLPLT,IMYSLPLTYS,FLSMIMYSLP,MLCFLSMIMY,NLHTLTILKK,SNLHTLTILK,CFLSMIMYSL,YSLPLTYSNL,TYSNLHTLTI,ELKMLCFLSM,LSMIMYSLPL,LKMLCFLSMI,YSNLHTLTIL,LHTLTILKKY,RELKMLCFLS,LPLTYSNLHT	STAD
NLRC4	c.1225G>A	p.E409K	SDFIRSLDHCGDLALEGVFSHKFDF[p.E409K]KLQDVSSVNEDVLLTTGLLCKYTAQR	VFSHKFDFK,FSHKFDFKL,FKLQDVSSV,GVFSHKFDFK,VFSHKFDFKL,HKFDFKLQDV	CRC
NLRC4	c.1777G>A	p.D593N	KSALSQEFEAFFQGKSLYINSGNIP[p.D593N]NYLFDFFEHLPNCASALDFIKLDFYG	NIPNYLFDF,INSGNIPNY,IPNYLFDFF,SGNIPNYLF,NSGNIPNYLF,GNIPNYLFDF,NIPNYLFDFF,NYLFDFFEHL,YINSGNIPNY	CRC
NLRC4	c.862C>T	p.R288W	ALIKENHRFKNMVIVTTTTECLRHI[p.R288W]WQFGALTAEVGDMTEDSAQALIREVL	ECLRHIWQF,RHIWQFGAL,WQFGALTAE,WQFGALTAEV,CLRHIWQFGA,TECLRHIWQF,LRHIWQFGAL,RHIWQFGALT,HIWQFGALTA	BRCA
NLRP3	c.469C>T	p.R157C	MKKDYRKKYRKYVRSRFQCIEDRNA[p.R157C]CLGESVSLNKRYTRLRLIKEHRSQQE	RNACLGESV,CLGESVSLNK	LUAD
NLRP4	c.685G>A	p.V229I	LISREWPDPAAPITEIVSQPERLLF[p.V229I]IIDSFEELQGGLNEPDSDLCGDLMEK	SQPERLLFI,FIIDSFEEL,RLLFIIDSF,QPERLLFII,SQPERLLFII,LFIIDSFEEL	CRC
NLRP5	c.1175G>A	p.R392H	LGSVLNNDTKLCKDWAEKQPPFTLI[p.R392H]HSLLRKVLLPESFLIVTVRDVGTEKL	LIHSLLRKV,TLIHSLLRK,FTLIHSLLR,PFTLIHSLL,HSLLRKVLL,PPFTLIHSL,KQPPFTLIH,TLIHSLLRKV,FTLIHSLLRK,QPPFTLIHSL,LIHSLLRKVL	CRC
NLRP5	c.2209C>T	p.R737W	LPINQNLDLIASSFCLQHCPYLRKI[p.R737W]WVDVKGIFPRDESAEACPVVPLWMRD	YLRKIWVDV,IWVDVKGIF,CPYLRKIWV,YLRKIWVDVK,PYLRKIWVDV,WVDVKGIFPR,RKIWVDVKGI,KIWVDVKGIF	GBM
NLRP6	c.1832A>G	p.E611G	CPGVAPEVTEGAKGLEDTEEPEEEE[p.E611G]GGEEPNYPLELLYCLYETQEDAFVRQ	EEGGEEPNY,EEEGGEEPNY	THCA
NME9	c.223G>A	p.E75K	QKMRIEVGLDLLHFALAEADRLDVL[p.E75K]KKYRGKCEPTFLFYAGGELVAVVRGA	KKYRGKCEPT	CRC
NMU	c.53C>A	p.A18E	MLRTESCRPRSPAGQVA[p.A18E]EASPLLLLLLLLAWCAGACRGAPILP	QVAEASPLL,EASPLLLLL,GQVAEASPL,AEASPLLLL,QVAEASPLLL,EASPLLLLLL,GQVAEASPLL,AEASPLLLLL	ACC
NMU	c.56C>A	p.A19E	MLRTESCRPRSPAGQVAA[p.A19E]ESPLLLLLLLLAWCAGACRGAPILPQ	QVAAESPLL,GQVAAESPL,VAAESPLLL,AESPLLLLL,QVAAESPLLL,GQVAAESPLL,VAAESPLLLL,AESPLLLLLL	ACC
NNMT	c.697G>A	p.E233K	EQKFSSLPLGREAVEAAVKEAGYTI[p.E233K]KWFEVISQSYSSTMANNEGLFSLVAR	YTIKWFEVI,GYTIKWFEV,KEAGYTIKW,AVKEAGYTIK,GYTIKWFEVI,KWFEVISQSY,KEAGYTIKWF	UCEC
NOL9	c.172T>G	p.S58A	PRRRLGSLRWCGRRRLRWRLLQAQA[p.S58A]AGVDWREGARQVSRAAAARRPNTATP	WRLLQAQAA,RWRLLQAQAA	ACC
NOLC1	c.1283C>T	p.T428M	VTTKSPAVKPAAAPKQPVGGGQKLL[p.T428M]MRKADSSSSEEESSSSEEEKTKKMVA	LMRKADSSS,LMRKADSSSS	CRC
NOM1	c.70C>G	p.R24G	MAASRSAGEAGPGGSQGRVVRMK[p.R24G]GRGGRGPRRGPAGGGEKALKRLKLAV	RMKGRGGRG,KGRGGRGPR,QGRVVRMKGR,VVRMKGRGGR,KGRGGRGPRR	ACC
NOS1AP	c.901_903delCAG	p.Q306del	LGTETPLSTHHQMQLLQQLLQQQQQ[p.Q306del]TQVAVAQVHLLKDQLAAEAAARLEAQAR	LQQQQQTQV,LLQQQQQTQV,LQQQQQTQVA	BLCA
NOTCH1	c.7541_7542delCT	p.P2514fs	SYSSPVDNTPSHQLQVPEHPFLTPS[p.P2514fs]RVP*	HPFLTPSRV	CLL

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
NOTCH2	c.17_18delCC	p.P6fs	MPALR[p.P6fs]RSAVGAAGALAVLRGPRACIAVSRWL*	ALRRSAVGA,AAGALAVLR,RSAVGAAGA,VLRGPRACI,ALAVLRGPR,MPALRRSAV,SAVGAAGAL,LRRSAVGAA,GAAGALAVL,RACIAVSRW,ALRRSAVGAA,AVGAAGALAV,ALAVLRGPRA,RSAVGAAGAL,GALAVLRGPR,VLRGPRACIA,RACIAVSRWL,MPALRRSAVG,VGAAGALAVL	BLCA
NOTCH2	c.57C>G	p.C19W	MPALRPALLWALLALWLC[p.C19W]WAAPAHALQCRDGYEPCVNEGMCVTY	LLALWLCWA,CWAAPAHAL,ALLALWLCW,WLCWAAPAH,ALLALWLCWA,LLALWLCWAA,ALWLCWAAPA,WLCWAAPAHA,WALLALWLCW,LCWAAPAHAL	ACC
NOTCH2	c.6314G>T	p.R2105L	LSPVICGPNRSFLSLKHTPMGKKSR[p.R2105L]LPSAKSTMPTSLPNLAKEAKDAKGSR	KSRLPSAKS,TPMGKKSRL,RLPSAKSTM,MGKKSRLPSA,KSRLPSAKST,LPSAKSTMPT,SRLPSAKSTM	LUAD
NOTCH2	c.6892C>T	p.R2298W	APAEGTHPGIAPQSRPPEGKHITTP[p.R2298W]WEPLPPIVTFQLIPKGSIAQPAGAPQ	HITTPWEPL,TPWEPLPPI,WEPLPPIVT,TTPWEPLPPI,KHITTPWEPL,WEPLPPIVTF,TPWEPLPPIV	CESC
NOX3	c.1210_1211delTG	p.C404fs	SLPRLAVDGPFGTALTDVFHYPVCV[p.C404fs]RCRGDRSHSLRCSSEIYMVQMQ*	RSHSLRCSS,SLRCSSEIY,VFHYPVCVR,HSLRCSSEI,LRCSSEIYM,SLRCSSEIYM,CVRCRGDRSH,RSHSLRCSSE,HSLRCSSEIY,DVFHYPVCVR,RCRGDRSHSL,CSSEIYMVQM	PRAD
NOX5	c.1401delT	p.P467fs	AVCIMEVNLLPSKVTHLLIKRPPFF[p.P467fs]TIDLVTTCI*	FTIDLVTTC,RPPFFTIDL,IKRPPFFTI,PPFFTIDLV,LLIKRPPFFT,FTIDLVTTCI,LIKRPPFFTI	STAD
NOXA1	c.18C>G	p.D6E	MASLG[p.D6E]ELVRAWHLGAQAVDRGDWARALHLFS	SLGELVRAW,GELVRAWHL,ELVRAWHLGA,ASLGELVRAW,GELVRAWHLG	ACC
NOXO1	c.8_9insG	p.G3fs	MAGP[p.G3fs]PIPSFSARGSPGADQEAPNVCLLCALVRRQRHLRAQELGRIQAAQEDPQGDLPGGGGPAAEI*	FSARGSPGA,LVRRQRHLR,RQRHLRAQE,HLRAQELGR,CLLCALVRR,NVCLLCALV,LPGGGGPAA,ALVRRQRHL,QRHLRAQEL,MAGPPIPSF,QEAPNVCLL,AQELGRIQA,QELGRIQAA,HLRAQELGRI,SFSARGSPGA,LVRRQRHLRA,RQRHLRAQEL,RAQELGRIQA,NVCLLCALVR,LLCALVRRQR,ALVRRQRHLR,APNVCLLCAL,CALVRRQRHL,AQELGRIQAA	KIRC
NPAS2	c.602A>G	p.Q201R	DSITPLLGHLPSDVMDQNLLNFLPE[p.Q201R]REHSEVYKILSSHMLVTDSPSPEYLK	NLLNFLPER,PEREHSEVY,REHSEVYKI,LPEREHSEV,FLPEREHSEV,LPEREHSEVY,REHSEVYKIL	OV
NPC1	c.1351G>A	p.E451K	GADVPFGPPLDIQILHQVLDLQIAI[p.E451K]KNITASYDNETVTLQDICLAPLSPYN	AIKNITASY,LQIAIKNIT,QVLDLQIAIK,IAIKNITASY,LQIAIKNITA	CRC
NPIP	c.812C>T	p.A271V	QPPPPTQQHSIIDNSLSLKTPSELS[p.A271V]VHSPSTLSSTLSG*	LKTPSELSV,SELSVHSPS,LSVHSPSTL,SLKTPSELSV,LKTPSELSVH,SELSVHSPST	PRAD
NPM1	c.859_860insTCTG	p.L287fs	KVEAKFINYVKNCFRMTDQEAIQDL[p.L287fs]CLAVEEVSLRK*	AIQDLCLAV,AVEEVSLRK,EAIQDLCLA,QEAIQDLCL,LAVEEVSLRK,EAIQDLCLAV,QEAIQDLCLA	LAML
NPM1	c.861_862insCTGC	p.L287fs	KVEAKFINYVKNCFRMTDQEAIQDL[p.L287fs]LLAVEEVSLRK*	AIQDLLLAV,LLAVEEVSL,AVEEVSLRK,EAIQDLLLA,QEAIQDLLL,LLLAVEEVSL,LAVEEVSLRK,EAIQDLLLAV,QEAIQDLLLA	LAML
NPM1	c.863_864insTCTG	p.W288fs	KVEAKFINYVKNCFRMTDQEAIQDL[p.W288fs]CLAVEEVSLRK*	AIQDLCLAV,AVEEVSLRK,EAIQDLCLA,QEAIQDLCL,LAVEEVSLRK,EAIQDLCLAV,QEAIQDLCLA	LAML
NPR3	c.412T>C	p.Y138H	LFSLVDRVAAARGAKPDLILGPVCE[p.Y138H]HAAAPVARLASHWDLPMLSAGALAAG	ILGPVCEHA,HAAAPVARL,CEHAAAPVA,GPVCEHAAA,ILGPVCEHAA,HAAAPVARLA	STAD
NPSR1	c.704G>A	p.R235Q	YMTIVAFLVYFIPLTIISIMYGIVI[p.R235Q]QTIWIKSKTYETVISNCSDGKLCSSY	IMYGIVIQT,IVIQTIWIK,MYGIVIQTI,QTIWIKSKT,YGIVIQTIW,IMYGIVIQTI,SIMYGIVIQT,VIQTIWIKSK,GIVIQTIWIK,MYGIVIQTIW,QTIWIKSKTY	CRC
NPTX1	c.787G>A	p.A263T	YMYAKVKKSLPEMYAFTVCMWLKSS[p.A263T]TTPGVGTPFSYAVPGQANELVLIEWG	LKSSTTPGV,WLKSSTTPGV,STTPGVGTPF	GBM
NPY1R	c.1111G>A	p.A371T	DYETIAMSTMHTDVSKTSLKQASPV[p.A371T]TFKKINNNDDNEKI*	KQASPVTFK,QASPVTFKK,LKQASPVTF,KQASPVTFKK,SLKQASPVTF	UCEC
NR2C1	c.809G>T	p.S270I	HPSGVKTESAVLMTSDKAESCQGDL[p.S270I]ITLANVVTSLANLGKTKDLSQNSNEM	AESCQGDLI,ITLANVVTSL,GDLITLANVV,AESCQGDLIT	KIRC
NR4A2	c.941G>T	p.R314L	RTVQKNAKYVCLANKNCPVDKRRRN[p.R314L]LCQYCRFQKCLAVGMVKEVVRTDSLK	RNLCQYCRF,KRRRNLCQY,NLCQYCRFQK,CPVDKRRRNL,RRNLCQYCRF	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
NR5A2	c.238G>A	p.E80K	SHGEQGQMPENMQVSQFKMVNYSYD[p.E80K]KDLEELCPVCGDKVSGYHYGLLTCES	KMVNYSYDK,KDLEELCPV,YSYDKDLEEL	CESC
NRAP	c.979G>A	p.E327K	YEEHRGKGSFPAMITPAYQNAKKAH[p.E327K]KLASDIKYRQDFNKMKGAAHYHSLPA	YQNAKKAHK,KAHKLASDI,KLASDIKYR,HKLASDIKY,YQNAKKAHKL,KAHKLASDIK,AYQNAKKAHK,KKAHKLASDI,AHKLASDIKY	CRC
NRAS	c.181C>A	p.Q61K	IEDSYRKQVVIDGETCLLDILDTAG[p.Q61K]KEEYSAMRDQYMRTGEGFLCVFAINN	LDTAGKEEY,AGKEEYSAM,ILDTAGKEEY,DTAGKEEYSA	CRC,LAML,MM,SKCM,THCA
NRAS	c.182A>G	p.Q61R	IEDSYRKQVVIDGETCLLDILDTAG[p.Q61R]REEYSAMRDQYMRTGEGFLCVFAINN	LDTAGREEY,AGREEYSAM,ILDTAGREEY,AGREEYSAMR,DTAGREEYSA	CLL,MM,OV,SKCM,TGCT,THCA,UCEC
NRAS	c.182A>T	p.Q61L	IEDSYRKQVVIDGETCLLDILDTAG[p.Q61L]LEEYSAMRDQYMRTGEGFLCVFAINN	LDTAGLEEY,AGLEEYSAM,ILDTAGLEEY,LLDILDTAGL,DTAGLEEYSA	CRC,LUAD,MM,SKCM
NRAS	c.183A>C	p.Q61H	IEDSYRKQVVIDGETCLLDILDTAG[p.Q61H]HEEYSAMRDQYMRTGEGFLCVFAINN	LDTAGHEEY,AGHEEYSAM,ILDTAGHEEY,DTAGHEEYSA	MM
NRAS	c.183A>T	p.Q61H	IEDSYRKQVVIDGETCLLDILDTAG[p.Q61H]HEEYSAMRDQYMRTGEGFLCVFAINN	LDTAGHEEY,AGHEEYSAM,ILDTAGHEEY,DTAGHEEYSA	LAML
NRAS	c.34G>T	p.G12C	MTEYKLVVVGA[p.G12C]CGVGKSALTIQLIQNHFVDEYDPTIE	LVVVGACGV,VVGACGVGK,KLVVVGACGV,VVVGACGVGK	CRC
NRAS	c.35G>A	p.G12D	MTEYKLVVVGA[p.G12D]DGVGKSALTIQLIQNHFVDEYDPTIE	LVVVGADGV,VVGADGVGK,KLVVVGADGV,VVVGADGVGK	CRC,LAML,MM
NRAS	c.37G>C	p.G13R	MTEYKLVVVGAG[p.G13R]RVGKSALTIQLIQNHFVDEYDPTIED	VVGAGRVGK,RVGKSALTI,KLVVVGAGR,AGRVGKSAL,KLVVVGAGRV,VVVGAGRVGK,GRVGKSALTI	CRC,MM
NRAS	c.38G>A	p.G13D	MTEYKLVVVGAG[p.G13D]DVGKSALTIQLIQNHFVDEYDPTIED	VVGAGDVGK,KLVVVGAGDV,VVVGAGDVGK	LAML
NRG1	c.1441G>T	p.V481L	VSSMTVSMPSMAVSPFMEEERPLLL[p.V481L]LTPPRLREKKFDHHPQQFSSFHHNPA	LLLLTPPRL,LTPPRLREK,LLLTPPRLR,EEERPLLLL,EERPLLLLT,LLTPPRLREK,MEEERPLLLL	LUAD
NRG2	c.737C>T	p.T246M	LKKEVGKILCTDCATRPKLKKMKSQ[p.T246M]MGQVGEKQSLKCEAAAGNPQPSYRWF	KMKSQMGQV,SQMGQVGEK,KLKKMKSQM,MKSQMGQVG,KSQMGQVGEK,KLKKMKSQMG,KMKSQMGQVG,KKMKSQMGQV	CRC
NRG4	c.63_64insG	p.G21fs	ANRSRRALWSQSQVVLPEWGA[p.G21fs]VVM*	VLPEWGAVV,LPEWGAVVM,VVLPEWGAVV,VLPEWGAVVM,QVVLPEWGAV	CLL
NRXN3	c.307C>T	p.R103C	FETPEAYISLPKWNTKRMGSISFDF[p.R103C]CTTEPNGLILFTHGKPQERKDARSQK	CTTEPNGLI	LUAD
NRXN3	c.68C>A	p.P23H	MLGSDDFFYVGGSPSTADLPGS[p.P23H]HVSNNFMGCLKEVVYKNNDIRLELSR	GSHVSNNFM,STADLPGSH,STADLPGSHV,HVSNNFMGCL,LPGSHVSNNF	LUAD
NSMCE1	c.730G>A	p.D244N	YFQSNAEPRCPHCNDYWPHEIPKVF[p.D244N]NPEKERESGVLKSNKKSLRSRQH*	KVFNPEKER,HEIPKVFNP,HEIPKVFNPE	UCEC
NSMCE2	c.91_92insA	p.Q31fs	SNSGSTGFSFSGVESALSSLKNFQ[p.Q31fs]SLYQLWYGHSF*	FQSLYQLWY,YQLWYGHSF,SLKNFQSLY,SSLKNFQSL,NFQSLYQLW,KNFQSLYQL,SLYQLWYGH,SSLKNFQSLY,KNFQSLYQLW,LYQLWYGHSF,NFQSLYQLWY,LSSLKNFQSL,LKNFQSLYQL	KIRC
NT5C3	c.7G>C	p.A3P	MR[p.A3P]PPSMDRAAVARVGAVASASVCALVAG	RPPSMDRAA,PPSMDRAAV,RPPSMDRAAV	TGCT
NT5M	c.616delC	p.P206fs	AEPTPSWEHVLFTACHNQHLQLQPP[p.P206fs]AAGCTRGRTTGRPFWTASGPAELDCASGSSVGL*	LQLQPPAAG,NQHLQLQPPA	STAD
NTM	c.997G>T	p.G333C	IMLFEVKTTALTPWKGPGAVSEVSN[p.G333C]CTSRRAGCVWLLPLLVLHLLLKF*	EVSNCTSRR	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
NTN4	c.175G>A	p.E59K	CNPRMGNLALGRKLWADTTCGQNAT[p.E59K]KLYCFYSENTDLTCRQPKCDKCNAAY	TTCGQNATK,ATKLYCFYS,CGQNATKLY,NATKLYCFY,KLYCFYSENT,QNATKLYCFY,DTTCGQNATK,GQNATKLYCF	CRC
NUAK1	c.517G>T	p.G173C	RRLSERETRHFFRQIVSAVHYCHKN[p.G173C]CVVHRDLKLENILLDDNCNIKIADFG	AVHYCHKNCV,KNCVVHRDLK,VHYCHKNCVV,HKNCVVHRDL	LUAD
NUB1	c.1118G>A	p.R373Q	RLVHIKGNCGKEKVLFLRLYLLQGI[p.R373Q]QNYHSGNDVEAYEYLNKARQLFKELY	YLLQGIQNY,IQNYHSGNDV	CRC
NUDT15	c.248C>A	p.S83Y	ECAQRETWEEAALHLKNVHFASVVN[p.S83Y]YFIEKENYHYVTILMKGEVDVTHDSE	FASVVNYFI,SVVNYFIEK,HFASVVNYF,VHFASVVNY,ASVVNYFIEK,VHFASVVNYF,HFASVVNYFI,YFIEKENYHY,NVHFASVVNY,VNYFIEKENY	CRC
NUDT21	c.39_40insG	p.W13fs	MSVVPPNRSQTGW[p.W13fs]APGGHSVRQQVHPADEAPHPGAHHQPVPSYQLYFWYKRAPLREGQLCCSQISAHEGRI*	QLYFWYKRA,SYQLYFWYK,YQLYFWYKR,YFWYKRAPL,RSQTGWAPG,SVRQQVHPA,FWYKRAPLR,AHHQPVPSY,PSYQLYFWY,HPGAHHQPV,QPVPSYQLY,HQPVPSYQL,DEAPHPGAH,VPSYQLYFW,YQLYFWYKRA,PSYQLYFWYK,SYQLYFWYKR,LYFWYKRAPL,GAHHQPVPSY,HQPVPSYQLY,YFWYKRAPLR,VPSYQLYFWY,RQQVHPADEA,HHQPVPSYQL,QPVPSYQLYF,REGQLCCSQI,GQLCCSQISA,SQISAHEGRI,DEAPHPGAHH	KIRC
NUF2	c.1019C>T	p.S340L	KESLNLEDQIESDESELKKLKTEEN[p.S340L]LFKRLMIVKKEKLATAQFKINKKHED	NLFKRLMIV,KTEENLFKR,LFKRLMIVK,KKLKTEENL,KLKTEENLF,EENLFKRLM,TEENLFKRL,KLKTEENLFK,NLFKRLMIVK,LFKRLMIVKK,KKLKTEENLF,TEENLFKRLM,EENLFKRLMI	CRC
NUFIP2	c.670delA	p.R224fs	TNGYMGKGADNDGSGSESGYTTPKK[p.R224fs]GKLGAIVPRVVKTLI*	KLGAIVPRV,GAIVPRVVK,VPRVVKTLI,KKGKLGAIV,KLGAIVPRVV,AIVPRVVKTL,SGYTTPKKGK,KGKLGAIVPR,LGAIVPRVVK,TPKKGKLGAI	STAD
NUFIP2	c.86_88delAGC	p.Q29del	KPGQPQPQHHHSHHHPHHHPQQQQQ[p.Q29del]PHHHHHYYFYNHSHNHHHHHHQQPHQY	HPQQQQQPH	GBM
NUP210	c.403delC	p.L135fs	DAIVDLIHDIQIVSTTRELYLEDSP[p.L135fs]WS*	ELYLEDSPW,RELYLEDSPW	STAD
NUP88	c.905C>T	p.A302V	FLTYISLLHSPGNIGKLLGPLPMHP[p.A302V]VAEDNYGYDACAVLCLPCVPNILVIA	PVAEDNYGY,LLGPLPMHPV,PMHPVAEDNY,HPVAEDNYGY	CRC
NUP93	c.40G>A	p.E14K	MDTEGFGELLQQA[p.E14K]KQLAAETEGISELPHVERNLQEIQQA	LQQAKQLAA,KQLAAETEG,KQLAAETEGI,LLQQAKQLAA,GELLQQAKQL	BRCA
NYAP1	c.1438C>T	p.P480S	DKAVSYTMVYSAVKVTTHSVLPAGP[p.P480S]SLGAGEPKTEKEISVLHGMLCTSSRP	SVLPAGPSL,LPAGPSLGA,VLPAGPSLGA,HSVLPAGPSL	TGCT
NYAP2	c.1310C>T	p.P437L	SSPPPPSTLYRTQSPHGYPKSHSTS[p.P437L]LSPVSMGRSLTPLSLKRPPPYDAVHS	SLSPVSMGR,KSHSTSLSP,YPKSHSTSL,SHSTSLSPV,STSLSPVSM,TSLSPVSMGR,KSHSTSLSPV,HSTSLSPVSM	LUAD
NYAP2	c.590G>A	p.R197Q	RTEASAKPRPHSDEYSKKIPPPKPK[p.R197Q]QNPNTQLSTSFDETYIKKHGPRRTSL	KQNPNTQLS,KPKQNPNTQL,KQNPNTQLST	CESC
NYNRIN	c.339delC	p.G113fs	AFLGAQGLFLDCLCWSTLAYLVPGP[p.G113fs]LAP*	LAYLVPGPL,TLAYLVPGPL	STAD
OBSCN	c.13546C>T	p.R4516W	LLLRSAQPHHAGEVTFACRDAVASA[p.R4516W]WLTVLGLPDPPEDAEVVARSSHTVTL	AVASAWLTV,VASAWLTVL,SAWLTVLGL,AVASAWLTVL,DAVASAWLTV,ACRDAVASAW,ASAWLTVLGL	ACC
OBSCN	c.2721_2722TG>CA	p.A908T	VSEPKVVFAKEQLARRKLQAEAGAS[p.A908T]TTLSCEVAQAQTEVTWYKDGKKLSSSS	LQAEAGAST,AEAGASTTL,LQAEAGASTT,QAEAGASTTL,AEAGASTTLS	TGCT
OBSCN	c.2989_2990insG	p.G997fs	LDVKEPKVVFAKDQVAHSEVQAEAG[p.G997fs]GQCHAELRGGPGPDGGDVVQRWEEAELQLESACRGQGLQTEAGGAAGRQDRCRGLQLRGQGPEGLLPPAHHRAQDDVCKGAVSA*	LLPPAHHRA,AEAGGQCHA,VQRWEEAEL,LQTEAGGAA,EEAELQLES,AELRGGPGP,AELQLESAC,GLLPPAHHRA,VQAEAGGQCH,QRWEEAELQL,LESACRGQGL,LQTEAGGAAG,RQDRCRGLQL,LQLRGQGPEG,EEAELQLESA	STAD
OBSL1	c.4924G>A	p.E1642K	RCAARLIVREVPVTIVRGPHDLEVT[p.E1642K]KGDTATFECELSQALADVTWEKDGNA	VTKGDTATF,LEVTKGDTA,EVTKGDTATF	CESC

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
ODF2L	c.1221delA	p.K407fs	TTLAALKDEVVSVENELSELQEVEK[p.K407fs]NRKPLLKCIKLRYKSCKKQLK*	KLRYKSCKK,RYKSCKKQL,LLKCIKLRY,ELQEVEKNR,KPLLKCIKL,CIKLRYKSC,VEKNRKPLL,LLKCIKLRYK,VEKNRKPLLK,KNRKPLLKCI,CIKLRYKSCK,RYKSCKKQLK,QEVEKNRKPL,LRYKSCKKQL	KICH
ODF2L	c.880G>A	p.E294K	DQEAKLSETISASNAWKSHYEKIVI[p.E294K]KKTELEVQIETMKKQIINLLEDLKKM	KKTELEVQI,YEKIVIKKT,IVIKKTELEV,KSHYEKIVIK	MM
ODF4	c.181C>T	p.R61C	TGELGQDGRLLSSTLSLSSNRSLGQ[p.R61C]CQNSPLPFQWRITHSFRWMAQVLASE	QCQNSPLPF,SLGQCQNSPL,GQCQNSPLPF,CQNSPLPFQW	GBM
ODZ1	c.1097G>T	p.R366M	HLFGLTWQLQPVEGELYANGVSKGN[p.R366M]MGTESMDTTYSPIGGKVSDKSEKKVF	KGNMGTESM,MGTESMDTTY,YANGVSKGNM,SKGNMGTESM	HNSC
ODZ1	c.7666C>T	p.R2556W	KGIKFAIKDGIVTADIIGVANEDSR[p.R2556W]WLAAILNNAHYLENLHFTIEGRDTHY	WLAAILNNA,NEDSRWLAA,RWLAAILNNA,WLAAILNNAH,NEDSRWLAAI	CRC
ODZ2	c.1882_1883insG	p.W628fs	KAACPVLCSGNGQYSKGTCQCYSGW[p.W628fs]ERCRVRRAHESVHRSFLRGPRLLH*	SFLRGPRLL,RVRRAHESV,SVHRSFLRG,RSFLRGPRL,CYSGWERCR,SGWERCRVR,ESVHRSFLR,AHESVHRSF,HESVHRSFL,WERCRVRRA,RVRRAHESVH,RAHESVHRSF,VHRSFLRGPR,RSFLRGPRLL,SGWERCRVRR,WERCRVRRAH	KIRC
ODZ3	c.653C>A	p.P218Q	SAQHHPSITSLNRNSLTNRRNQSPA[p.P218Q]QPAALPAELQTTPESVQLQDSWVLGS	QPAALPAEL,NQSPAQPAA,SPAQPAALPA,RRNQSPAQPA,NQSPAQPAAL,AQPAALPAEL	LUAD
OGDH	c.233delT	p.I78fs	NYVEEMYCAWLENPKSVHKSWDIFF[p.I78fs]ATRMPEPHRALPTRVPFP*	RMPEPHRAL,RALPTRVPF,ATRMPEPHR,SWDIFFATR,WDIFFATRM,FATRMPEPH,KSWDIFFATR,ATRMPEPHRA,RALPTRVPFP,FATRMPEPHR,MPEPHRALPT,TRMPEPHRAL,HRALPTRVPF,EPHRALPTRV	GBM
OGDH	c.2844_2845insC	p.Y948fs	VAITRIEQLSPFPFDLLLKEVQKYP[p.Y948fs]QC*	KEVQKYPQC	STAD
OGDHL	c.1279G>A	p.A427T	TKAEQFYRGDAQGKKVMSILVHGDA[p.A427T]TFAGQGVVYETFHLSDLPSYTTNGTV	LVHGDATFA,ATFAGQGVV,TFAGQGVVY,DATFAGQGV,ILVHGDATF,ATFAGQGVVY,ILVHGDATFA,SILVHGDATF	CRC
OGDHL	c.169C>T	p.R57C	RLLPSRLGVQAARLLAAHDVPVFGW[p.R57C]CSRSSGPPATFPSSKGGGGSSYMEEM	CSRSSGPPA,VPVFGWCSR,CSRSSGPPAT,DVPVFGWCSR	UCEC
OGFOD1	c.1430_1431insGTTTTTT	p.G477fs	SKAEFALDLILYCGCEGWEPEYGGF[p.G477fs]FFLLLTLPKVKMKSC*	FLLLTLPKV,FFLLLTLPK,LTLPKVKMK,EYGGFFFLL,YGGFFFLLL,GFFFLLLTL,LPKVKMKSC,WEPEYGGFF,PEYGGFFFL,EPEYGGFFF,FFFLLLTLPK,GWEPEYGGFF,EYGGFFFLLL,WEPEYGGFFF,GGFFFLLLTL,LLLTLPKVKM,PEYGGFFFLL,EPEYGGFFFL	PAAD
OGFR	c.1670G>C	p.S557T	DEPAESPSETPGPRPAGPAGDEPAE[p.S557T]TPSETPGPRPAGPAGDEPAESPSETP	ETPSETPGPR	ACC
OIT3	c.1522C>A	p.R508S	FVGKDHKEVFLHCRVLVCGVLDERS[p.R508S]SCAQGCHRRMRRGAGGEDSAGLQGQT	VLDERSSCA,RSSCAQGCHR	LUAD
OLFM4	c.396G>T	p.K132N	HVLSQKFEKELSKVREYVQLISVYE[p.K132N]NKLLNLTVRIDIMEKDTISYTELDFE	QLISVYENK,VYENKLLNL,YENKLLNLT,QLISVYENKL,SVYENKLLNL,VQLISVYENK,YENKLLNLTV	CRC
OMA1	c.1334G>A	p.R445Q	MEFVDSLHGQPKMPEWLSTHPSHGN[p.R445Q]QVEYLDRLIPQALKIREMCNCPPLSN	NQVEYLDRL,PSHGNQVEY,STHPSHGNQV,HPSHGNQVEY,NQVEYLDRLI	UCEC
ONECUT1	c.1270T>A	p.L424M	TLHAIFKENKRPSKELQITISQQLG[p.L424M]MELSTVSNFFMNARRRSLDKWQDEGS	QLGMELSTV,ITISQQLGM,MELSTVSNF,ISQQLGMEL,QQLGMELST,QQLGMELSTV,GMELSTVSNF,MELSTVSNFF,SQQLGMELST	KIRC
OOEP	c.301C>T	p.R101C	TSQALLTVDIVDSGNLVEITVFGRP[p.R101C]CVQNRVKSMLLCLAWFHREHRARAEK	ITVFGRPCV,CVQNRVKSM,EITVFGRPCV,VEITVFGRPC	LUAD
OPLAH	c.2699C>A	p.A900D	QQEGAVFLSFKLVQGGVFQEEAVTE[p.A900D]DLRAPGKVPNCSGTRNLHDNLSDLRA	QEEAVTEDL,VTEDLRAPGK,FQEEAVTEDL,EEAVTEDLRA	TGCT

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
OPN1LW	c.848C>A	p.P283H	STQKAEKEVTRMVVVMIFAYCVCWG[p.P283H]HYTFFACFAAANPGYAFHPLMAALPA	CVCWGHYTF,VCWGHYTFF,AYCVCWGHY,GHYTFFACF,YCVCWGHYTF,CVCWGHYTFF,FAYCVCWGHY,WGHYTFFACF	LUAD
OPN1MW	c.853G>A	p.A285T	QKAEKEVTRMVVVMVLAFCFCWGPY[p.A285T]TFFACFAAANPGYPFHPLMAALPAFF	CFCWGPYTF,FCWGPYTFF,FCWGPYTFFA,FCFCWGPYTF,CFCWGPYTFF	HNSC
OPRD1	c.80G>T	p.C27F	EPAPSAGAELQPPLFANASDAYPSA[p.C27F]FPSAGANASGPPGARSASSLALAIAI	ASDAYPSAF,AYPSAFPSA,FPSAGANAS,YPSAFPSAG,DAYPSAFPSA,YPSAFPSAGA,NASDAYPSAF,SAFPSAGANA,FPSAGANASG	ACC
OPRM1	c.1058G>A	p.R353H	KICVFIFAFIMPVLIITVCYGLMIL[p.R353H]HLKSVRMLSGSKEKDRNLRRITRMVL	LMILHLKSV,YGLMILHLK,CYGLMILHL,HLKSVRMLS,MILHLKSVR,ILHLKSVRM,LHLKSVRML,GLMILHLKSV,ILHLKSVRML,HLKSVRMLSG,LMILHLKSVR,MILHLKSVRM	CRC
OPRM1	c.1384C>T	p.R462C	NFKRCFREFCIPTSSNIEQQNSTRI[p.R462C]CQNTRDHPSTANTVDRTNHQLENLEA	STRICQNTR,NSTRICQNTR	UCEC
OPTN	c.70delC	p.P24fs	MSHQPLSCLTEKEDSPSESTGNGPP[p.P24fs]TWPTQTWTRLPRRSCCSR*	TQTWTRLPR,QTWTRLPRR,TWPTQTWTR,WPTQTWTRL,PPTWPTQTW,TWPTQTWTRL,RLPRRSCCSR,PTWPTQTWTR,PTQTWTRLPR,TQTWTRLPRR,SESTGNGPPT,ESTGNGPPTW	STAD
OR10A3	c.217T>G	p.F73V	IISLNQSLHVPMYLFLLNLSVVEVS[p.F73V]VSAVITPEMLVVLSTEKTMISFVGCF	NLSVVEVSV,SVVEVSVSA,VEVSVSAVI,VSAVITPEM,SVVEVSVSAV,SVSAVITPEM,VEVSVSAVIT	KIRC
OR10A3	c.278C>A	p.S93Y	VVEVSFSAVITPEMLVVLSTEKTMI[p.S93Y]YFVGCFAQMYFILLFGGTECFLLGAM	LSTEKTMIY,STEKTMIYF,MIYFVGCFA,YFVGCFAQM,KTMIYFVGC,TMIYFVGCF,TEKTMIYFV,TMIYFVGCFA,KTMIYFVGCF,IYFVGCFAQM,VLSTEKTMIY,YFVGCFAQMY,STEKTMIYFV,LSTEKTMIYF	CRC
OR10H4	c.597G>T	p.M199I	VIHHFFCHVLSLLKLACENKTSSVI[p.M199I]IGVMLVCVTALIGCLFLIILSYVFIV	KTSSVIIGV,SVIIGVMLV,IIGVMLVCV,TSSVIIGVM,VIIGVMLVCV,KTSSVIIGVM,SSVIIGVMLV,CENKTSSVII	LUAD
OR10J1	c.470T>A	p.L157Q	DRYVAICNPLRYMVIMNKRLRIQLV[p.L157Q]QGACSIGLIVAITQVTSVFRLPFCAR	QLVQGACSI,RLRIQLVQG,VQGACSIGL,RLRIQLVQGA,IQLVQGACSI,VQGACSIGLI	LUAD
OR10J1	c.731G>A	p.R244Q	VPMGLVFISYVLIISTILKIASVEG[p.R244Q]QKKAFATCASHLTVVIVHYSCASIAY	KIASVEGQK,KIASVEGQKK,ASVEGQKKAF	TGCT
OR10X1	c.892C>A	p.L298I	IVYLKPEASGDDTLIAVPYTVITPF[p.L298I]ISPIIFSLRNKDMKNAFRRMMGNTVA	VITPFISPI,FISPIIFSL,ISPIIFSLR,PYTVITPFI,ITPFISPII,TPFISPIIF,TVITPFISPI,VITPFISPII,FISPIIFSLR,ITPFISPIIF,PFISPIIFSL,VPYTVITPFI	LUAD
OR10Z1	c.615G>C	p.L205F	DTPPVLSLACGDTGPSELRIFILSL[p.L205F]FVLLVSFFFITISYAYILAAILRIPS	RIFILSLFV,FILSLFVLL,ILSLFVLLV,LRIFILSLF,IFILSLFVL,SLFVLLVSF,LFVLLVSFF,FILSLFVLL,LSLFVLLVSF,SLFVLLVSFF,LFVLLVSFFF,ELRIFILSLF	LUAD
OR11H12	c.461A>C	p.H154P	LLTVMAFDQYLAICRPLLYPNIMTG[p.H154P]PLCAKLVILCWVCGFLWFLIPIVLIS	IMTGPLCAK,MTGPLCAKL,YPNIMTGPL,GPLCAKLVI,IMTGPLCAKL,LLYPNIMTGP,NIMTGPLCAK,LYPNIMTGPL,MTGPLCAKLV,GPLCAKLVIL,YPNIMTGPLC	GBM
OR13C2	c.25C>G	p.L9V	MEWENHTI[p.L9V]VVEFFLKGLSGHPRLELLFFVLIFIM	TIVVEFFLK,HTIVVEFFL,MEWENHTIV,IVVEFFLKGL,HTIVVEFFLK,MEWENHTIVV,WENHTIVVEF	CESC
OR13G1	c.773G>A	p.R258H	KAFSTCSSHLTVVTLYYSPVIYTYI[p.R258H]HPASSYTFERDKVVAALYTLVTPTLN	VIYTYIHPA,YIHPASSYT,IHPASSYTF,TYIHPASSY,YTYIHPASS,SPVIYTYIH,YTYIHPASSY,YIHPASSYTF,HPASSYTFER	BRCA
OR14A16	c.478G>T	p.G160C	DRSTCVQRATVSWLYGGLIAVMHTA[p.G160C]CTFSLSYCGSNMVHQFFCDIPQLLAI	TACTFSLSY,HTACTFSLS,AVMHTACTF,MHTACTFSL,HTACTFSLSY,VMHTACTFSL,GLIAVMHTAC,IAVMHTACTF	LUAD
OR1M1	c.205G>A	p.V69I	LIILAISIDSHLHTPMYFFLANLSL[p.V69I]IDFCLATNTIPKMLVSLQTGSKAISY	NLSLIDFCL,SLIDFCLAT,FFLANLSLI,LANLSLIDF,NLSLIDFCLA,FLANLSLIDF,YFFLANLSLI,IDFCLATNTI	PRAD
OR2A25	c.240G>A	p.M80I	HTPMYFFLSHLAVVDIACACSTVPQ[p.M80I]ILVNLLHPAKPISFAGCMTQMFLFLS	ILVNLLHPA,CSTVPQILV,TVPQILVNL,VPQILVNLL,ILVNLLHPAK,STVPQILVNL,TVPQILVNLL	LUAD
OR2A25	c.313A>T	p.S105C	MLVNLLHPAKPISFAGCMTQMFLFL[p.S105C]CFAHTECLLLVVMSYDRYVAICHPLR	QMFLFLCFA,FLFLCFAHT,FLCFAHTEC,TQMFLFLCF,LCFAHTECL,MTQMFLFLCF,TQMFLFLCFA,FLCFAHTECL,CFAHTECLLL,QMFLFLCFAH	CLL
OR2A5	c.212C>T	p.S71L	GLIWLDSRLHTPMYFFLSHLAIIDI[p.S71L]LYASNNVPKMLTNLGLNKRKTISFVP	HLAIIDILY,AIIDILYAS,LYASNNVPK,DILYASNNV,ILYASNNVP,HLAIIDILYA,ILYASNNVPK,LYASNNVPKM,SHLAIIDILY,LSHLAIIDIL,IDILYASNNV	SKCM

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
OR2AG2	c.745G>T	p.G249W	TVLRMPSNEGRKKALVTCSSHLIVV[p.G249W]WMFYGAATFMYVLPSSFHSPKQDNII	IVVWMFYGA,WMFYGAATF,HLIVVWMFY,SHLIVVWMF,SSHLIVVWM,CSSHLIVVW,LIVVWMFYGA,WMFYGAATFM,SSHLIVVWMF,VWMFYGAATF,SHLIVVWMFY,IVVWMFYGAA	LUAD
OR2AK2	c.111G>C	p.W37C	LVSAMKTGNQSFGTDFLLVGLFQYG[p.W37C]CINSLLFVVIATLFTVALTGNIMLIH	FQYGCINSL,CINSLLFVV,QYGCINSLL,YGCINSLLF,FQYGCINSLL,CINSLLFVVI,QYGCINSLLF	LUAD
OR2AK2	c.133G>A	p.V45I	NQSFGTDFLLVGLFQYGWINSLLFV[p.V45I]IIATLFTVALTGNIMLIHLIRLNTRL	WINSLLFVI,SLLFVIIAT,LLFVIIATL,VIIATLFTV,IIATLFTVA,LFVIIATLF,WINSLLFVII,SLLFVIIATL,FVIIATLFTV,VIIATLFTVA,IIATLFTVAL,GWINSLLFVI,LLFVIIATLF	BRCA
OR2B11	c.29G>T	p.G10V	MKSDNHSFL[p.G10V]VDSPKAFILLGVSDRPWLELPLFVVL	KSDNHSFLV,FLVDSPKAF,HSFLVDSPK,FLVDSPKAFI,SFLVDSPKAF,MKSDNHSFLV	LUSC
OR2H1	c.859G>A	p.V287I	NPYAQGRGKFFGLFYAVGTPSLNPL[p.V287I]IYTLRNKEIKRALRRLLGKERDSRES	IYTLRNKEI	GBM
OR2H2	c.615G>C	p.L205F	PALIRLSCEDTSYNEIQVAVASVFI[p.L205F]FVVPLSLILVSYGAITWAVLRINSAK	AVASVFIFV,SVFIFVVPL,FIFVVPLSL,FVVPLSLIL,VAVASVFIF,IFVVPLSLI,VASVFIFVV,VAVASVFIFV,AVASVFIFVV,FIFVVPLSLI,FVVPLSLILV,VFIFVVPLSL,IFVVPLSLIL,QVAVASVFIF,ASVFIFVVPL	LUAD
OR2J2	c.700G>T	p.G234W	LIPLILILTTYGAIARAVLSMQSTT[p.G234W]WLQKVFRTCGAHLMVVSLFFIPVMCM	MQSTTWLQK,TTWLQKVFR,QSTTWLQKV,VLSMQSTTW,LSMQSTTWL,STTWLQKVF,VLSMQSTTWL,MQSTTWLQKV,SMQSTTWLQK,STTWLQKVFR,AVLSMQSTTW,QSTTWLQKVF	LUAD
OR2L13	c.318G>T	p.M106I	AYNFLSGQKGISFLGCGVQSFFFLT[p.M106I]IACSEGLLLTSMAYDRYLAICHSLYY	VQSFFFLTI,QSFFFLTIA,LTIACSEGL,IACSEGLLL,FLTIACSEGL,GVQSFFFLTI,LTIACSEGLL,VQSFFFLTIA	LUAD
OR2L13	c.724A>G	p.T242A	CGRVLFAVYHMHSKEGRKKAFTTIS[p.T242A]AHLTVVIFYYAPFVYTYLRPRNLRSP	TISAHLTVV,KAFTTISAH,AHLTVVIFY,FTTISAHLT,TTISAHLTV,SAHLTVVIF,KKAFTTISA,ISAHLTVVI,FTTISAHLTV,TTISAHLTVV,TISAHLTVVI,ISAHLTVVIF,RKKAFTTISA,KAFTTISAHL,SAHLTVVIFY,AHLTVVIFYY,KKAFTTISAH	LUAD
OR2L3	c.199C>A	p.L67I	LSMILLIFLDTHLHTPMYFLLSQLS[p.L67I]IIDLNYISTIVPKMASDFLSGNKSIS	QLSIIDLNY,FLLSQLSII,LLSQLSIIDL,QLSIIDLNYI,YFLLSQLSII,SQLSIIDLNY	LUAD
OR2L3	c.3G>T	p.M1I	[p.M1I]IENYNQTSTDFILLGFFPPSRIGLFL	IENYNQTST	LUAD
OR2L3	c.881A>G	p.K294R	EDKVLAVFYTTLTPMLNPIIYSLRN[p.K294R]REVMGALTRVSQRICSGKM*	IIYSLRNREV,RNREVMGALT,REVMGALTRV	TGCT
OR2L8	c.361C>T	p.R121C	CGIQSFFFLALGGAEALLLASMAYD[p.R121C]CYIAICFPLHYLIRMSKRVCVLMITG	ASMAYDCYI,SMAYDCYIA,MAYDCYIAI,CYIAICFPL,SMAYDCYIAI,AYDCYIAICF,CYIAICFPLH	LUAD
OR2L8	c.513G>T	p.R171S	GSWIIGSINACAHTVYVLHIPYCRS[p.R171S]SAINHFFCDVPAMVTLACMDTWVYEG	RSSAINHFF,IPYCRSSAI,CRSSAINHF,HIPYCRSSAI,SAINHFFCDV,RSSAINHFFC,YCRSSAINHF,LHIPYCRSSA,CRSSAINHFF	LUAD
OR2L8	c.603_604delTG	p.S201fs	FCDVPAMVTLACMDTWVYEGTVFLS[p.S201fs]HHLSRVSLHWYFMFLWPGSLCCLPHEICRREEESLFDLQHPPHCSNFLLCTFCLHLSTSKIPAISNRGQGSGCLLHHPHPNAQPHHL*	FLSHHLSRV,SLHWYFMFL,FMFLWPGSL,FLWPGSLCC,SLCCLPHEI,LLCTFCLHL,SLFDLQHPP,CLHLSTSKI,HLSTSKIPA,LLHHPHPNA,SRVSLHWYF,VSLHWYFMF,WYFMFLWPG,CSNFLLCTF,NFLLCTFCL,VFLSHHLSR,RVSLHWYFM,LSRVSLHWY,HPPHCSNFL,HPHPNAQPH,HPNAQPHHL,YEGTVFLSH,SHHLSRVSL,HLSRVSLHW,CRREEESLF,REEESLFDL,LQHPPHCSN,RGQGSGCLL,GQGSGCLLH,EESLFDLQH,LHWYFMFLW,HLSRVSLHWY,VSLHWYFMFL,FMFLWPGSLC,FLWPGSLCCL,FLLCTFCLHL,HLSTSKIPAI,CLLHHPHPNA,FLSHHLSRVS,TVFLSHHLSR,TFCLHLSTSK,VFLSHHLSRV,RVSLHWYFMF,SLHWYFMFLW,YFMFLWPGSL,TSKIPAISNR,HPPHCSNFLL,LSRVSLHWYF,LQHPPHCSNF,SLFDLQHPPH,YEGTVFLSHH,LSHHLSRVSL,HHLSRVSLHW,SRVSLHWYFM,ICRREEESLF,HCSNFLLCTF,LHLSTSKIPA,GQGSGCLLHH,WPGSLCCLPH	KIRP

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
OR2M2	c.284delC	p.A95fs	DLMLICTTVPKMAFNYLSGSKSISM[p.A95fs]VVVSHKFSSIYHCLALNVFFWLLWLMTAILLFATL*	VSHKFSSIY,LALNVFFWL,ALNVFFWLL,NVFFWLLWL,WLLWLMTAI,LLWLMTAIL,LMTAILLFA,VVSHKFSSI,ISMVVVSHK,SMVVVSHKF,KFSSIYHCL,IYHCLALNV,CLALNVFFW,VFFWLLWLM,LWLMTAILL,WLMTAILLF,GSKSISMVV,FSSIYHCLA,MTAILLFAT,TAILLFATL,SSIYHCLAL,SKSISMVVV,HKFSSIYHC,YHCLALNVF,HCLALNVFF,SIYHCLALNV,CLALNVFFWL,LALNVFFWLL,NVFFWLLWLM,WLLWLMTAIL,LLWLMTAILL,WLMTAILLFA,LMTAILLFAT,MTAILLFATL,VVVSHKFSSI,SISMVVVSHK,VSHKFSSIYH,ISMVVVSHKF,IYHCLALNVF,YHCLALNVFF,FWLLWLMTAI,LWLMTAILLF,GSKSISMVVV,KFSSIYHCLA,VVSHKFSSIY,KSISMVVVSH,HKFSSIYHCL,FSSIYHCLAL	HNSC
OR2M2	c.531C>A	p.F177L	GSTDGIIDAVATFSFSFCGSREIAH[p.F177L]LFCEFPSLLILSCNDTSIFEEVIFIC	HLFCEFPSL,GSREIAHLF,EIAHLFCEF,REIAHLFCE,HLFCEFPSLL,REIAHLFCEF,LFCEFPSLLI,GSREIAHLFC,CGSREIAHLF,AHLFCEFPSL	LUAD
OR2M2	c.967T>C	p.F323L	TRAFMKILGKGKSESELPHKLYVLL[p.F323L]LAKFFFLISIFFYDVKILALIMYIA	LLLAKFFFL,LLAKFFFLI,KLYVLLLAK,LYVLLLAKF,VLLLAKFFF,VLLLAKFFFL,LLLAKFFFLI,KLYVLLLAKF,LYVLLLAKFF,YVLLLAKFFF,LAKFFFLISI,LPHKLYVLLL	LUAD
OR2M3	c.704G>A	p.R235H	PVAIIIASYARVILAVIHMGSGEGR[p.R235H]HKAFTTCSSHLLVVGMYYGAALFMYI	SGEGRHKAF,HMGSGEGRHK,GSGEGRHKAF,HKAFTTCSSH,GEGRHKAFTT	CRC
OR2M3	c.819G>T	p.M273I	VGMYYGAALFMYIRPTSDRSPTQDK[p.M273I]IVSVFYTILTPMLNPLIYSLRNKEVT	KIVSVFYTI,TQDKIVSVF,TQDKIVSVFY,KIVSVFYTIL,SPTQDKIVSV	HNSC
OR2M5	c.613G>T	p.V205L	DFPSLLILSCNDTSIFEKVLFICCI[p.V205L]LMIVFPVAIIIASYARVILAVIHMGS	FICCILMIV,CILMIVFPV,ILMIVFPVA,LMIVFPVAI,LFICCILMI,KVLFICCIL,VLFICCILM,VLFICCILMI,ILMIVFPVAI,LMIVFPVAII,KVLFICCILM,FICCILMIVF	LUAD
OR2T12	c.551G>A	p.R184H	VATLSFPYCGAHEIDHFFCEAPVLV[p.R184H]HLACADTSVFENAMYICCVLMLLVPF	HLACADTSV,EAPVLVHLA,CEAPVLVHL,HLACADTSVF,CEAPVLVHLA	GBM
OR2T12	c.772A>T	p.M258L	KKAFATCSSHVAVVGLFYGAGIFTY[p.M258L]LRPKSHRSTNHDKVVSAFYTMFTPLL	YGAGIFTYL,GIFTYLRPK,GAGIFTYLR,TYLRPKSHR,YLRPKSHRS,AGIFTYLRPK,FTYLRPKSHR,FYGAGIFTYL,YGAGIFTYLR,YLRPKSHRST	LUAD
OR2T2	c.37T>G	p.F13V	MGMEGLLQNSTN[p.F13V]VVLTGLITHPAFPGLLFAIVFSIFVV	GLLQNSTNV,LLQNSTNVV,STNVVLTGL,LQNSTNVVL,GLLQNSTNVV,LLQNSTNVVL,NSTNVVLTGL,STNVVLTGLI,LQNSTNVVLT	LUSC
OR2T27	c.31G>T	p.D11Y	MEQSNYSVYA[p.D11Y]YFILLGLFSNARFPWLLFALILLVFL	QSNYSVYAY,SVYAYFILL,YAYFILLGL,SNYSVYAYF,NYSVYAYFI,YSVYAYFIL,VYAYFILLG,AYFILLGLF,YSVYAYFILL,NYSVYAYFIL,VYAYFILLGL,YAYFILLGLF,EQSNYSVYAY,QSNYSVYAYF,SNYSVYAYFI	LUAD
OR2T33	c.358C>A	p.R120S	CGVQIFFLPTLGGGECFLLAAMAYD[p.R120S]SYAAVCHPLRYPTLMSWQLCLRMTMS	AMAYDSYAA,MAYDSYAAV,AAMAYDSYA,SYAAVCHPL,LAAMAYDSY,FLLAAMAYDS,AMAYDSYAAV,AAMAYDSYAA,LLAAMAYDSY,SYAAVCHPLR,LAAMAYDSYA,DSYAAVCHPL,MAYDSYAAVC	HNSC
OR2T33	c.494C>A	p.P165Q	LRMTMSCWLLGAADGLLQAVVTLSF[p.P165Q]QYCGAHEIDHFFCETPVLVRLACADT	FQYCGAHEI,TLSFQYCGA,AVVTLSFQY,LSFQYCGAH,SFQYCGAHEI,QAVVTLSFQY,FQYCGAHEID	LUAD
OR2T34	c.737G>T	p.C246F	SSYTLILHLIHRMNSAAGRRKALAT[p.C246F]FSSHMIIVLLLFGASFYTYMLRSSYH	ALATFSSHM,KALATFSSH,ATFSSHMII,GRRKALATF,RKALATFSS,FSSHMIIVL,LATFSSHMI,ALATFSSHMI,ATFSSHMIIV,FSSHMIIVLL,TFSSHMIIVL,KALATFSSHM,AGRRKALATF,RKALATFSSH,LATFSSHMII	LUAD
OR2T4	c.408_409CG>TC	p.V137L	KMLLDQVMGVNKISAPECGMQMFFY[p.V137L]LTLAGSEFFLLATMAYDRYVACHPLR	GMQMFFYLT,MQMFFYLTL,CGMQMFFYL,GMQMFFYLTL,MQMFFYLTLA,FYLTLAGSEF	LIHC
OR2T6	c.637G>T	p.V213L	ACGDKTTYETVMYVCCVAMLLIPFS[p.V213L]LVTASYTRILITVHQMTSAEGRKKAF	AMLLIPFSL,MLLIPFSLV,LLIPFSLVT,LIPFSLVTA,LVTASYTRI,SLVTASYTR,PFSLVTASY,IPFSLVTAS,AMLLIPFSLV,LLIPFSLVTA,SLVTASYTRI,FSLVTASYTR,IPFSLVTASY,VAMLLIPFSL	LUAD
OR4C12	c.744C>A	p.F248L	LKNNSLEGRCKALSTCISHIIVVVL[p.F248L]LFVPCIFVYLRSVTTLPIDKAVAVFY	IIVVVLLFV,LLFVPCIFV,HIIVVVLLF,VLLFVPCIF,LFVPCIFVY,HIIVVVLLFV,VLLFVPCIFV,LLFVPCIFVY,SHIIVVVLLF,VVLLFVPCIF,LFVPCIFVYL,ISHIIVVVLL	UCEC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
OR4C12	c.837G>T	p.M279I	FVYLRSVTTLPIDKAVAVFYTMVVP[p.M279I]ILNPVVYTLRNAEVKSAIRKLWRKKV	MVVPILNPV,ILNPVVYTL,VFYTMVVPI,FYTMVVPIL,VPILNPVVY,AVFYTMVVPI,TMVVPILNPV,MVVPILNPVV,ILNPVVYTLR,VFYTMVVPIL,VVPILNPVVY	LUAD
OR4C12	c.925G>T	p.D309Y	VYTLRNAEVKSAIRKLWRKKVTSDN[p.D309Y]Y	RKKVTSDNY,WRKKVTSDNY	LUAD
OR4C16	c.188A>T	p.Y63F	LGNLLIIISVKTSQALKNPMFFFLF[p.Y63F]FLSLSDTCLSTSITPRMIVDALLKKT	PMFFFLFFL,FLSLSDTCL,FFFLFFLSL,NPMFFFLFF,FLFFLSLSDT,FLSLSDTCLS,KNPMFFFLFF,MFFFLFFLSL,NPMFFFLFFL	CLL
OR4C16	c.403A>C	p.S135R	IFILILTAVDRYVDICKPLHYMTII[p.S135R]RQWVCGVLMAVAWVGSCVHSLVQIFL	YMTIIRQWV,IIRQWVCGV,HYMTIIRQW,RQWVCGVLM,TIIRQWVCGV,RQWVCGVLMA,HYMTIIRQWV,LHYMTIIRQW,IRQWVCGVLM	STAD
OR4C16	c.484C>A	p.L162M	WVCGVLMAVAWVGSCVHSLVQIFLA[p.L162M]MSLPFCGPNVINHCFCDLQPLLKQAC	SLVQIFLAM,VQIFLAMSL,FLAMSLPFC,IFLAMSLPF,MSLPFCGPNV,FLAMSLPFCG,QIFLAMSLPF,HSLVQIFLAM,VQIFLAMSLP	LUAD
OR4C3	c.389_390insT	p.H130fs	IADSLYEGRTISYECCMAQLFGAHF[p.H130fs]FGRC*	AQLFGAHFF,LFGAHFFGR,QLFGAHFFGR,MAQLFGAHFF	LUAD
OR4E2	c.677G>A	p.R226Q	TNSGTISLSCFLAVVTSYMVILVSL[p.R226Q]QKHSAEGRQKALSTCSAHFMVVALFF	MVILVSLQK,ILVSLQKHSA,YMVILVSLQK	SKCM
OR4K2	c.761G>T	p.C254F	SSRGSSKALSTCTAHFIVVFLFFGP[p.C254F]FIFIYMWPLSSFLTDKILSVFYTIFT	FLFFGPFIF,FIFIYMWPL,VFLFFGPFI,LFFGPFIFI,FFGPFIFIY,VVFLFFGPF,GPFIFIYMW,VVFLFFGPFI,FLFFGPFIFI,IVVFLFFGPF,VFLFFGPFIF,FFGPFIFIYM,FGPFIFIYMW,PFIFIYMWPL,LFFGPFIFIY	LUSC
OR4K5	c.529delT	p.F177fs	VHTLSQLSFTVNLPFCGPNVVDSFF[p.F177fs]VIFLESPNLPAWTLTSLKY*	NVVDSFFVI,FLESPNLPA,PAWTLTSLK,AWTLTSLKY,SPNLPAWTL,LPAWTLTSL,VVDSFFVIF,LESPNLPAW,VVDSFFVIFL,FVIFLESPNL,NLPAWTLTSL,PAWTLTSLKY,ESPNLPAWTL,NVVDSFFVIF,FLESPNLPAW,LESPNLPAWT	STAD
OR4M1	c.122G>A	p.G41E	GLSQTREVQLVLFVIFLSFYLFILP[p.G41E]ENILIICTIRLDPHLTSPMYFLLANL	YLFILPENI,FILPENILI,ILPENILII,YLFILPENIL,FILPENILII,FYLFILPENI,LFILPENILI,ENILIICTIR	SKCM
OR4M2	c.355G>T	p.A119S	FDGCIAQLFFLHFAGASEMFLLTVM[p.A119S]SFDLYTAICRPLHYATIMNQRLCCIL	LTVMSFDLY,LLTVMSFDL,VMSFDLYTA,MSFDLYTAI,MFLLTVMSF,TVMSFDLYT,LLTVMSFDLY,FLLTVMSFDL,TVMSFDLYTA,VMSFDLYTAI,EMFLLTVMSF,MSFDLYTAIC,SEMFLLTVMS	LUAD
OR4M2	c.481G>T	p.A161S	MNQRLCCILVALSWRGGFIHSIIQV[p.A161S]SLIVRLPFCGPNELDSYFCDITQVVR	SIIQVSLIV,IQVSLIVRL,SLIVRLPFC,VSLIVRLPF,HSIIQVSLI,IHSIIQVSL,FIHSIIQVSL,SIIQVSLIVR,HSIIQVSLIV,QVSLIVRLPF	LUAD
OR4M2	c.803C>T	p.S268F	YSHITIVVLMFGPSIYIYARPFDSF[p.S268F]FLDKVVSVFNTLIFPLRNPIIYTLRN	FFLDKVVSV,FLDKVVSVF,YARPFDSFF,IYARPFDSFF,FFLDKVVSVF,YARPFDSFFL,RPFDSFFLDK	SKCM
OR4N2	c.122G>A	p.G41E	GLTQSQDIQLLVFVLVLIFYFIILP[p.G41E]ENFLIIFTIKSDPGLTAPLYFFLGNL	FIILPENFL,IILPENFLI,ILPENFLII,YFIILPENF,ENFLIIFTI,LPENFLIIF,FIILPENFLI,IILPENFLII,FYFIILPENF,YFIILPENFL,ILPENFLIIF,PENFLIIFTI	SKCM
OR4N2	c.448_449insT	p.L150fs	ICRPLHYPTVMNPRTCYAMMLALWL[p.L150fs]WGFCPLHYPGGPHPPLAFLWPKPAGQLLL*	MLALWLWGF,AMMLALWLW,LWLWGFCPL,LWGFCPLHY,YPGGPHPPL,GPHPPLAFL,WPKPAGQLL,LHYPGGPHP,LAFLWPKPA,MMLALWLWGF,MLALWLWGFC,ALWLWGFCPL,FLWPKPAGQL,YAMMLALWLW,HYPGGPHPPL,LWPKPAGQLL,WLWGFCPLHY,WPKPAGQLLL,LHYPGGPHPP,GPHPPLAFLW	BLCA,KIRC
OR4N4	c.448_449insT	p.L150fs	ICRPLHCSTVMNPRACYAMMLALWL[p.L150fs]WGFCPLHYPGGPHPPLAFLWPKPAGQLLL*	MLALWLWGF,AMMLALWLW,LWLWGFCPL,LWGFCPLHY,YPGGPHPPL,GPHPPLAFL,WPKPAGQLL,LHYPGGPHP,LAFLWPKPA,MMLALWLWGF,MLALWLWGFC,ALWLWGFCPL,FLWPKPAGQL,YAMMLALWLW,HYPGGPHPPL,LWPKPAGQLL,WLWGFCPLHY,WPKPAGQLLL,LHYPGGPHPP,GPHPPLAFLW	CLL
OR51A7	c.371T>G	p.L124R	AQEFFIHGFTVMESSVLLIMSLDRF[p.L124R]RAIHNPLRYSSILTSNRVAKMGLILA	IMSLDRFRA,LIMSLDRFR,RFRAIHNPL,MSLDRFRAI,RAIHNPLRY,IMSLDRFRAI,LIMSLDRFRA,MSLDRFRAIH,RFRAIHNPLR,FRAIHNPLRY,LLIMSLDRFR	STAD
OR51B2	c.488C>T	p.S163L	RVIALGVGVFLRGFVSILPVILRLF[p.S163L]LFSYCKSHVITRAFCLHQEIMRLACA	RLFLFSYCK,PVILRLFLF,ILRLFLFSY,LPVILRLFL,FLFSYCKSH,FLFSYCKSHV,ILPVILRLFL,VILRLFLFSY,LPVILRLFLF	SKCM

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
OR51B5	c.197_213delCCACAGACCTGGGGCTG	p.A66fs	GTLLLLIKEDHNLHEPMYFFLAMLA[p.A66fs]GPDHNAHGAGSPLAGSQGDWKCGLLFPGLLYTLTFLSRVWHSACHGL*	MLAGPDHNA,LLFPGLLYT,GLLYTLTFL,LLYTLTFLS,YTLTFLSRV,FLSRVWHSA,GLLFPGLLY,LFPGLLYTL,VWHSACHGL,LYTLTFLSR,NAHGAGSPL,SQGDWKCGL,GDWKCGLLF,FPGLLYTLT,AMLAGPDHNA,GLLFPGLLYT,LLFPGLLYTL,FLSRVWHSAC,RVWHSACHGL,LLYTLTFLSR,LYTLTFLSRV,YTLTFLSRVW,LSRVWHSACH,CGLLFPGLLY,HNAHGAGSPL,FPGLLYTLTF,MLAGPDHNAH,SQGDWKCGLL,WKCGLLFPGL,SPLAGSQGDW	KIRC
OR51F2	c.200G>C	p.R67P	SIPFCLLYVVAVSGNSMILFVVLCE[p.R67P]PSLHKPMYYFLSMLSATDLSLSLCTL	VLCEPSLHK,PSLHKPMYY,CEPSLHKPM,VVLCEPSLHK,LCEPSLHKPM,EPSLHKPMYY	LUSC
OR51S1	c.476G>A	p.R159Q	ICRPLHYPALLTNGVISKISLAISF[p.R159Q]QCLGLHLPLPFLLAYMPYCLPQVLTH	SLAISFQCL,SFQCLGLHL,ISFQCLGLH,FQCLGLHLPL,ISLAISFQCL,LAISFQCLGL,ISFQCLGLHL	LUSC
OR51V1	c.892C>A	p.P298T	FGKHLSPVAHVLIGNIYILFPPLMN[p.P298T]TIIYSVKTQQIHTRMLRLFSLKRY	ILFPPLMNT,LMNTIIYSV,LFPPLMNTI,MNTIIYSVK,NTIIYSVKT,PPLMNTIIY,FPPLMNTII,ILFPPLMNTI,PLMNTIIYSV,LMNTIIYSVK,LFPPLMNTII,FPPLMNTIIY	LUAD
OR52W1	c.397C>T	p.R133C	FVHALTAMESGVLLAMACDRAAAIG[p.R133C]CPLHYPVLVTKACVGYAALALALKAV	RAAAIGCPL,AAIGCPLHY,CPLHYPVLV,AIGCPLHYPV,RAAAIGCPLH,AAAIGCPLHY,IGCPLHYPVL	CRC
OR5AK2	c.267G>T	p.K89N	QHLAFVDICYTSAITPKMLQSFTEE[p.K89N]NNLMLFQGCVIQFLVYATFATSDCYL	FTEENNLML,TEENNLMLF,FTEENNLMLF,LQSFTEENNL,QSFTEENNLM	UCEC
OR5AS1	c.117G>T	p.M39I	FVGFTDYLPLRVTLFLVFLLVYTLT[p.M39I]IVGNILLIILVNINSSLQIPMYYFLS	FLLVYTLTI,LLVYTLTIV,YTLTIVGNI,TIVGNILLI,LTIVGNILL,FLLVYTLTIV,VFLLVYTLTI,VYTLTIVGNI,YTLTIVGNIL,LTIVGNILLI	LUAD
OR5AU1	c.935G>A	p.R312H	KAFSTCASHLTAICLFFGTTLFMYL[p.R312H]HPRSSYSLTQDRTVAVIYTVVIPVLN	FMYLHPRSS,YLHPRSSYS,TLFMYLHPR,GTTLFMYLH,MYLHPRSSY,HPRSSYSLT,LHPRSSYSL,YLHPRSSYSL,FMYLHPRSSY,TTLFMYLHPR	CRC
OR5B12	c.865A>T	p.S289C	HFMGTDKMASVFYAIVIPMLNPLVY[p.S289C]CLRNKEVKSAFKKTVGKAKASIGFIF	MLNPLVYCL,LVYCLRNKEV,MLNPLVYCLR,CLRNKEVKSA	LUAD
OR5B17	c.488G>A	p.R163H	VCACLAIGCYVIGFLNASIQIGDTF[p.R163H]HLSFCMSNVIHHFFCDKPAVITLTCS	IQIGDTFHL,HLSFCMSNV,DTFHLSFCM,IGDTFHLSF,HLSFCMSNVI,DTFHLSFCMS,QIGDTFHLSF	CRC
OR5B17	c.798G>T	p.M266I	SHLIAIFLFYITVIIMYIRPSSSHS[p.M266I]IDTDKIASVFYTMIIPMLSPIVYTLR	SSHSIDTDK,SIDTDKIASV,YIRPSSSHSI,SSSHSIDTDK,RPSSSHSIDT,IDTDKIASVF	LUAD
OR5D13	c.706C>T	p.R236C	SSLIIILTSYMLIFTTIMKMRSASG[p.R236C]CQKTFSTCASHLTAITIFHGTILFLY	KMRSASGCQ,SASGCQKTF,CQKTFSTCA,KMRSASGCQK,RSASGCQKTF,CQKTFSTCAS	GBM
OR5D14	c.736C>A	p.H246N	VFIFVTVLKIRSVSGRHKAFSTWAS[p.H246N]NLTSITIFHGTILFLYCVPNSKNSRQ	TWASNLTSI,KAFSTWASN,ASNLTSITI,SNLTSITIF,STWASNLTSI,KAFSTWASNL,WASNLTSITI,ASNLTSITIF	LUAD
OR5D16	c.790C>A	p.P264T	VFSTCASHLTAITIFHGTILFLYCV[p.P264T]TNSKNSRHTVKVASVFYTVVIPLLNP	FLYCVTNSK,CVTNSKNSR,LFLYCVTNSK	LUAD
OR5D18	c.812C>A	p.T271K	LTAITIFHGTILFLYCVPNSKNSRH[p.T271K]KVKVASVFYTVVIPMLNPLIYSLRNK	KVKVASVFY,RHKVKVASV,HKVKVASVF,NSKNSRHKVK,KVKVASVFYT,RHKVKVASVF,HKVKVASVFY	LUSC
OR5F1	c.131G>T	p.G44V	DTLELQIILFLFFLVIYTLTVLGNL[p.G44V]VMILLIRIDSQLHTPMYFFLANLSFV	VLGNLVMIL,TLTVLGNLV,TVLGNLVMI,LTVLGNLVM,YTLTVLGNLV,VLGNLVMILL,NLVMILLIRI,TLTVLGNLVM	LUAD
OR5J2	c.106G>T	p.A36S	EFILLGLTDHAELKAVLFVVFLVIY[p.A36S]SITLLRNLGMILLIQITSKLHTPMYF	VVFLVIYSI,FLVIYSITL,LVIYSITLL,VIYSITLLR,YSITLLRNL,FVVFLVIYSI,FLVIYSITLL,LVIYSITLLR,VFLVIYSITL,IYSITLLRNL	LUAD
OR5L1	c.824C>A	p.T275N	VFHGTVLSIYCRPSSGNSGDADKVA[p.T275N]NVFYTVVIPMLNSVIYSLRNKDVKEA	KVANVFYTV,ANVFYTVVI,DADKVANVF,DADKVANVFY,KVANVFYTVV,NVFYTVVIPM,GDADKVANVF,VANVFYTVVI	LUAD
OR5M3	c.265delA	p.T89fs	LSFVDVWFSSNVTPKMLENLLSQKK[p.T89fs]QLLMLVV*	LSDKKQLLM,LLSDKKQLL,KKQLLMLVV,LSDKKQLLML,LLSDKKQLLM	STAD
OR5P2	c.299C>T	p.A100V	PNMLVNFLVERNTVSYLGCAIQLGS[p.A100V]VAFFATVECVLLAAMAYDRFVAICSP	QLGSVAFFA,GSVAFFATV,IQLGSVAFF,AIQLGSVAF,CAIQLGSVA,IQLGSVAFFA,VAFFATVECV,CAIQLGSVAF,AIQLGSVAFF	GBM
OR6C65	c.460_461insT	p.I154fs	TTIMSNKVCNWLVISSWLAGFLIIF[p.I154fs]SPRDYGPPTGFL*	DYGPPTGFL,GFLIIFSPR,LIIFSPRDY,SPRDYGPPT,RDYGPPTGF,WLAGFLIIFS,AGFLIIFSPR,FLIIFSPRDY,RDYGPPTGFL	LUAD
OR6C75	c.280G>T	p.G94W	ISFTSVCIPRFLVTVVTGNRTISYN[p.G94W]WCVAQLFFFIFLGVTEFYLLAAMSYD	RTISYNWCV,SYNWCVAQL,YNWCVAQLF,NWCVAQLFF,SYNWCVAQLF,YNWCVAQLFF,NWCVAQLFFF,RTISYNWCVA,ISYNWCVAQL	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
OR6K2	c.236C>A	p.P79Q	HLHTPMYTFISALSFLEIWYTTATI[p.P79Q]QKMLSSLLSERSISFNGCLLQMYFFH	TIQKMLSSL,IQKMLSSLL,YTTATIQKM,TTATIQKML,ATIQKMLSSL,TIQKMLSSLL,IWYTTATIQK,WYTTATIQKM,YTTATIQKML,IQKMLSSLLS	LUAD
OR6K6	c.931T>C	p.F311L	YLRFSATYSVFWDTAIAVTFVILAP[p.F311L]LFNPIIYSLKNKDMKEAIGRLFHYQK	VTFVILAPL,ILAPLFNPI,TFVILAPLF,APLFNPIIY,VILAPLFNPI,ILAPLFNPII,AVTFVILAPL,LFNPIIYSLK,VTFVILAPLF,LAPLFNPIIY	TGCT,THCA
OR6N2	c.877C>T	p.R293C	LTLDRTLAIVYSVLTPMVNPIIYSL[p.R293C]CNKEIIKAIKRTIFQKGDKASLAHL	SLCNKEIIK,PIIYSLCNK,IYSLCNKEI,YSLCNKEII,IIYSLCNKEI,YSLCNKEIIK,IYSLCNKEII,CNKEIIKAIK,MVNPIIYSLC	GBM
OR6V1	c.744delC	p.I248fs	VLRIPSASSCQKAFSTCGSHLTLVF[p.I248fs]MATVVPSFCMSGLAKLTLCKSGRSWPW*	LTLVFMATV,TLVFMATVV,FMATVVPSF,FCMSGLAKL,GLAKLTLCK,SFCMSGLAK,GSHLTLVFM,VPSFCMSGL,MSGLAKLTL,TLCKSGRSW,CKSGRSWPW,HLTLVFMATV,LTLVFMATVV,FMATVVPSFC,VVPSFCMSGL,CMSGLAKLTL,PSFCMSGLAK,SGLAKLTLCK,VFMATVVPSF,MATVVPSFCM,LTLCKSGRSW	HNSC
OR7C1	c.311delT	p.F104fs	PKMLLNILTQNKFITYAGCLSQIFF[p.F104fs]SLHLDAWTIYS*	CLSQIFFSL,SQIFFSLHL,SLHLDAWTI,FFSLHLDAW,LHLDAWTIY,FSLHLDAWTI,IFFSLHLDAW,SLHLDAWTIY,LSQIFFSLHL	KIRC
OR7C1	c.535delT	p.C179fs	MGSLLETLTVLRLSFCTEMEIPHFF[p.C179fs]VIYLKS*	MEIPHFFVI,EMEIPHFFV,IPHFFVIYL,MEIPHFFVIY,IPHFFVIYLK,TEMEIPHFFV,EMEIPHFFVI,EIPHFFVIYL	STAD
OR7E24	c.21_22insT	p.L7fs	MSYFPILFFFF[p.L7fs]PQKVSELHRATESHRCLRIPPPGTLRGSRTAAGPRWAVPVHVPGHGAGEPAHHPGCQL*	ILFFFFPQK,LFFFFPQKV,ATESHRCLR,GSRTAAGPR,RTAAGPRWA,TAAGPRWAV,TLRGSRTAA,RATESHRCL,LRIPPPGTL,FPQKVSELH,ILFFFFPQKV,RTAAGPRWAV,PILFFFFPQK,FFFPQKVSEL,RATESHRCLR,CLRIPPPGTL,GTLRGSRTAA,RGSRTAAGPR,ELHRATESHR,GPRWAVPVHV,EPAHHPGCQL,SELHRATESH,HRATESHRCL,GSRTAAGPRW,FPILFFFPQ	PRAD
OR8D2	c.917G>T	p.R306M	IIPMLNPLIYSLRNKDVKNALKKMT[p.R306M]MGRQSS	ALKKMTMGR,KNALKKMTM,KKMTMGRQS,KMTMGRQSS,NALKKMTMGR,VKNALKKMTM,KKMTMGRQSS	LUAD
OR8H2	c.498G>T	p.L166F	CLALITGPYVIGFIDSFVNVVSMSR[p.L166F]FHFYDSNVIHHFFCDTSPILALSCTD	VSMSRFHFY,VVSMSRFHF,MSRFHFYDS,RFHFYDSNV,VNVVSMSRF,FHFYDSNVI,VVSMSRFHFY,RFHFYDSNVI,MSRFHFYDSN,FVNVVSMSRF,NVVSMSRFHF,SRFHFYDSNV,FHFYDSNVIH	LUSC
OR8J3	c.479C>T	p.S160L	VVSRRLCLLLVSLTYLYGFSTAIVV[p.S160L]LPCIFSVSYCSSNIINHFYCDIAPLL	VVLPCIFSV,TAIVVLPCI,LPCIFSVSY,AIVVLPCIF,IVVLPCIFSV,VLPCIFSVSY,STAIVVLPCI,YGFSTAIVVL,TAIVVLPCIF	LUSC
OR8K3	c.705G>T	p.K235N	SLLIVLLSYLLILVAILRMNSAGRQ[p.K235N]NAFSTCGAHLTVVIVFYGTLLFMYVQ	NSAGRQNAF,NAFSTCGAH,RQNAFSTCG,RMNSAGRQNA,RQNAFSTCGA,MNSAGRQNAF,NAFSTCGAHL	LUSC
OR8S1	c.296C>T	p.A99V	SSVIVPKMLENLLSQRKTISVEGCL[p.A99V]VQVFFVFVTAGTEACLLSGMAYDRHA	LVQVFFVFV,TISVEGCLV,CLVQVFFVF,VEGCLVQVF,VQVFFVFVT,CLVQVFFVFV,VQVFFVFVTA,KTISVEGCLV,GCLVQVFFVF,EGCLVQVFFV,SVEGCLVQVF,VEGCLVQVFF	CRC
OR9A2	c.865C>T	p.R289W	VEYNKIVSLLVSVLTPFLNPFIFTL[p.R289W]WNDKVKEALRDGMKRCCQLLKD*	FIFTLWNDK,FTLWNDKVK,LNPFIFTLW,FIFTLWNDKV,TLWNDKVKEA,FLNPFIFTLW	LUAD
OR9G9	c.506G>T	p.R169L	VAVSYCGGFINSSIITKKTFSFNFC[p.R169L]LENIIDDFFCDLLPLVELACGEKGGY	KTFSFNFCL,SFNFCLENI,FNFCLENII,LENIIDDFF,FSFNFCLENI,SFNFCLENII,KTFSFNFCLE,KKTFSFNFCL	LUAD
OSBP	c.2163G>C	p.Q721H	FSELALTLNAWESGTAPTDSRLRPD[p.Q721H]HRLMENGRWDEANAEKQRLEEKQRLS	RLRPDHRLM,DSRLRPDHR,RLRPDHRLME,SRLRPDHRLM	CESC
OSBP2	c.1881_1882insC	p.H627fs	ETFELDRLDDMGLRSLCEQVSHHPP[p.H627fs]LSCALRVLQAWLEPLAGDHHLQQVPGKIHLHHAARCHPLRIPGQWESLRVEEEHLNCSQHHRGQALDRPVRGHRDCEP*	VLQAWLEPL,ALRVLQAWL,KIHLHHAAR,HAARCHPLR,AARCHPLRI,HLNCSQHHR,SQHHRGQAL,HHAARCHPL,EQVSHHPPL,CALRVLQAW,LQAWLEPLA,LQQVPGKIH,QQVPGKIHL,GKIHLHHAA,GQWESLRVE,EPLAGDHHL,HPLRIPGQW,RVLQAWLEPL,VLQAWLEPLA,KIHLHHAARC,HHAARCHPLR,CEQVSHHPPL,SHHPPLSCAL,LQAWLEPLAG,LQQVPGKIHL,QQVPGKIHLH,LHHAARCHPL,LRIPGQWESL,WESLRVEEEH,LEPLAGDHHL,HPPLSCALRV,IPGQWESLRV	STAD
OSBPL6	c.1730G>A	p.R577Q	SEDNTSVADNISRQILNGELTGGAF[p.R577Q]QNGRRACLPAPCPDTSNINLWNILRN	FQNGRRACL,LTGGAFQNGR	UCEC
OSTN	c.344G>A	p.R115Q	PLDRLSAGSVDHKGKQRKVVDHPKR[p.R115Q]QFGIPMDRIGRNRLSNSRG	RQFGIPMDR,PKRQFGIPM,RQFGIPMDRI,HPKRQFGIPM,KVVDHPKRQF	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
OTOF	c.1163C>T	p.T388M	DDISSGLKGYVKCDVAVVGKGDNIK[p.T388M]MPHKANETDEDDIEGNLLLPEGVPPE	KGDNIKMPHK	BRCA
OTOF	c.3910G>A	p.E1304K	KLETMVKLDATSEAVVKVDVAEEEK[p.E1304K]KKKKKKKGTAEEPEEEEPDESMLDWW	KVDVAEEEKK	STAD
OTOL1	c.1291G>A	p.V431I	VAQNKKQFKSRETLYGQEIDQASLL[p.V431I]IILKLSAGDQVWLEVSKDWNGVYVSA	QASLLIILK,IDQASLLII,DQASLLIIL,QEIDQASLLI,IDQASLLIIL	CRC
OTOP1	c.310_318delCTGCTGTGG	p.LLW104del	AWAVHAAGVSKSDLLCFLTALMLLQ[p.LLW104del]MLWYVGRSSAHRRLFRLKDTHAGAGWLRGSITLF	MLLQMLWYV,LQMLWYVGR,LMLLQMLWY,LTALMLLQM,ALMLLQMLW,FLTALMLLQM,LMLLQMLWYV,ALMLLQMLWY,LLQMLWYVGR,TALMLLQMLW	ACC
OTUD3	c.830G>T	p.R277I	VQNLEAENYNIESAIIAVLRMNQGK[p.R277I]INNAEENLEPSGRVLKQCGPLWEEGG	RMNQGKINNA,GKINNAEENL	CRC
OTUD4	c.2726C>T	p.T909I	ALASIPPVAEGKAHPPTQILNRERE[p.T909I]IVPVELEPKRTIQSLKEKTEKVKDPK	ILNREREIV,REREIVPVE,LNREREIVPV,TQILNREREI,REREIVPVEL,REIVPVELEP	BLCA,PRAD,THCA
OTUD4	c.458_460delCTG	p.A153del	VADEDNSEISDSEDDSCKSKTAAAA[p.A153del]DVNGFKPLSGNEQLKNNGNSTSLPLSRK	KSKTAAAAD,KSKTAAAADV,TAAAADVNGF	PRAD
OTX2	c.130delC	p.R44fs	TSGMDLLHPSVGYPGPWASCPAATP[p.R44fs]GNSAGRGRRSLGRS*	RGRRSLGRS,SAGRGRRSL,AGRGRRSLGR,CPAATPGNSA,NSAGRGRRSL	STAD
OXR1	c.364G>A	p.E122K	GTIEYTVESRDSLNSIALKFDTTPN[p.E122K]KLVQLNKLFSRAVVTGQVLYVPDPEY	KLVQLNKLF,ALKFDTTPNK,DTTPNKLVQL,LKFDTTPNKL,NKLVQLNKLF	UCEC
P2RX1	c.58delC	p.R20fs	MARRFQEELAAFLFEYDTP[p.R20fs]AWCWCVIRRWALSSD*	FLFEYDTPA,DTPAWCWCV,TPAWCWCVI,WCVIRRWAL,FLFEYDTPAW,AWCWCVIRRW,CWCVIRRWAL,TPAWCWCVIR,DTPAWCWCVI,FEYDTPAWCW	STAD
P2RX7	c.425C>A	p.P142Q	RLCPEYPTRRTLCSSDRGCKKGWMD[p.P142Q]QQSKGIQTGRCVVYEGNQKTCEVSAW	WMDQQSKGI,KGWMDQQSK	LUAD
PABPC1	c.1223A>T	p.Y408F	MQRMASVRAVPNPVINPYQPAPPSG[p.Y408F]FFMAAIPQTQNRAAYYPPSQIAQLRP	YQPAPPSGF,QPAPPSGFF,PYQPAPPSGF,YQPAPPSGFF,QPAPPSGFFM,APPSGFFMAA,PPSGFFMAAI	KIRC
PABPC1	c.280C>T	p.R94C	LDTMNFDVIKGKPVRIMWSQRDPSL[p.R94C]CKSGVGNIFIKNLDKSIDNKALYDTF	SQRDPSLCK,CKSGVGNIF,SLCKSGVGNI,WSQRDPSLCK,LCKSGVGNIF	DLBCL
PABPC1	c.467_468insG	p.E156fs	DENGSKGYGFVHFETQEAAERAIEK[p.E156fs]NEWNAPK*	AERAIEKNEW	KIRC
PABPC1	c.541G>A	p.A181T	EKMNGMLLNDRKVFVGRFKSRKERE[p.A181T]TELGARAKEFTNVYIKNFGEDMDDER	SRKERETEL,KERETELGA,RETELGARA,KSRKERETEL,TELGARAKEF	KIRC
PABPC1	c.761_762insT	p.K254fs	KSKGFGFVSFERHEDAQKAVDEMNG[p.K254fs]NGAQWKTNLCWSSSEKGGTADGT*	NLCWSSSEK,KTNLCWSSS,AQWKTNLCW,DEMNGNGAQ,TNLCWSSSEK,AQWKTNLCWS,DEMNGNGAQW	CLL
PABPC1	c.999delA	p.K333fs	LRKEFSPFGTITSAKVMMEGGRSKG[p.K333fs]LVLYVSPPQKKPLKQLQK*	VLYVSPPQK,RSKGLVLYV,GRSKGLVLY,MMEGGRSKGL,LVLYVSPPQK,VLYVSPPQKK,RSKGLVLYVS,VSPPQKKPLK,GGRSKGLVLY	KIRC
PABPC3	c.975_979delTATGA	p.V325fs	LDDGIDDERLRKAFSPFGTITSAKV[p.V325fs]GRWSQQRVWFCMFLLPRRSH*	RVWFCMFLL,KVGRWSQQR,RWSQQRVWF,QQRVWFCMF,TITSAKVGR,WFCMFLLPR,GRWSQQRVW,SQQRVWFCM,GTITSAKVGR,VWFCMFLLPR,SQQRVWFCMF,KVGRWSQQRV,QQRVWFCMFL,WFCMFLLPRR,VGRWSQQRVW,GRWSQQRVWF,WSQQRVWFCM,CMFLLPRRSH	TGCT
PABPC3	c.997delA	p.K333fs	LRKAFSPFGTITSAKVMMEGGRSKG[p.K333fs]LVLYVSPPQKKPLKQLQK*	VLYVSPPQK,RSKGLVLYV,GRSKGLVLY,MMEGGRSKGL,LVLYVSPPQK,VLYVSPPQKK,RSKGLVLYVS,VSPPQKKPLK,GGRSKGLVLY	BLCA
PACSIN1	c.1075G>A	p.E359K	AVESTSQAGDRGSVSSYDRGQPYAT[p.E359K]KWSDDESGNPFGGSETNGGANPFEDD	RGQPYATKW	HNSC

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
PACSIN2	c.993G>C	p.Q331H	ADLNRTLSRREKKKATDGVTLTGIN[p.Q331H]HTGDQSLPSKPSSTLNVPSNPAQSAQ	INHTGDQSL,HTGDQSLPSK	BRCA
PADI2	c.340A>C	p.T114P	SSDKVTVNYYDEEGSIPIDQAGLFL[p.T114P]PAIEISLDVDADRDGVVEKNNPKKAS	GLFLPAIEI,FLPAIEISL,DQAGLFLPA,LFLPAIEISL,DQAGLFLPAI,LPAIEISLDV,IDQAGLFLPA	MM
PAFAH1B1	c.904delA	p.K302fs	VECISWAPESSYSSISEATGSETKK[p.K302fs]VVNLGHSCCLDPETRLLRCGMSVLACAL*	RLLRCGMSV,GMSVLACAL,LLRCGMSVL,SETKKVVNL,RLLRCGMSVL,LLRCGMSVLA,CGMSVLACAL	STAD
PALB2	c.839delA	p.N280fs	DSGSSQHLEHIPPKGSSELTTHDLK[p.N280fs]TLDLLHL*	LKTLDLLHL,SELTTHDLKT	STAD
PALLD	c.2986G>A	p.A996T	DSAHKMLVRENGVHSLIIEPVTSRD[p.A996T]TGIYTCIATNRAGQNSFSLELVVAAK	VTSRDTGIY,RDTGIYTCI,PVTSRDTGIY	KIRC
PALM2-AKAP2	c.3213_3214insGAAGCT	p.1075_1076insEA	KAVSKTSRDGAEQQGPEATVEEAEA[p.1075_1076insEA]EAAAFGSEKPQSMFEPPQVSSPVQEKRDVLP	EAEAEAAAF,VEEAEAEAA,AEAEAAAFG,EEAEAEAAAF,AEAEAAAFGS,VEEAEAEAAA	KIRC
PALM2-AKAP2	c.3354_3355insC	p.G1118fs	VQEKRDVLPKILPAEDRALRERGPP[p.G1118fs]PATASCAAQWPD*	RERGPPPAT,ALRERGPPPA,RERGPPPATA	KIRC
PALM2-AKAP2	c.895G>A	p.A299T	KLEMVHKSRKDHSSGNPGQQAQAPS[p.A299T]TAGPEANLDQPVTMIFMGYQNIEDEE	STAGPEANL,APSTAGPEA,GQQAQAPST,QQAQAPSTA,GQQAQAPSTA,QQAQAPSTAG	BRCA
PAMR1	c.302delG	p.G101fs	CDSCLIHPGCTIFENCKSCRNGSWG[p.G101fs]VPWMTSM*	WGVPWMTSM,RNGSWGVPW,KSCRNGSWGV,CRNGSWGVPW,RNGSWGVPWM,SWGVPWMTSM	STAD
PANK1	c.1199delA	p.K400fs	DSVGFNGKPECYYFENPTNPELCQK[p.K400fs]SRTALITHTLCCWLTWAQVSAF*	TLCCWLTWA,WLTWAQVSA,RTALITHTL,HTLCCWLTW,CQKSRTALI,KSRTALITH,LTWAQVSAF,LCQKSRTAL,LITHTLCCWL,KSRTALITHT,HTLCCWLTWA,ELCQKSRTAL,WLTWAQVSAF,SRTALITHTL,ALITHTLCCW	STAD
PANK2	c.1251delT	p.T417fs	VSILAVYSKDNYKRVTGTSLGGGTF[p.T417fs]LVSAVFLLAVPLLKKLLKWHLVEIAPKWIN*	SLGGGTFLV,FLVSAVFLL,AVFLLAVPL,LLKWHLVEI,LVSAVFLLA,FLLAVPLLK,LLAVPLLKK,TFLVSAVFL,VFLLAVPLL,GTFLVSAVF,VSAVFLLAV,LKWHLVEIA,HLVEIAPKW,FLVSAVFLLA,LVSAVFLLAV,AVFLLAVPLL,LLAVPLLKKL,KLLKWHLVEI,LLKKLLKWHL,LLKWHLVEIA,HLVEIAPKWI,FLLAVPLLKK,VFLLAVPLLK,AVPLLKKLLK,TFLVSAVFLL,GTFLVSAVFL,KWHLVEIAPK,TSLGGGTFLV,SAVFLLAVPL,GGTFLVSAVF,VPLLKKLLKW	PRAD
PANK2	c.377G>C	p.G126A	AAEEARRNPTLGGLLGRQRLLLRMG[p.G126A]AGRLGAPMERHGRASATSVSSAGEQA	LLRMGAGRL,RMGAGRLGA,LLLRMGAGR,GAGRLGAPM,RQRLLLRMGA,RLLLRMGAGR,AGRLGAPMER,MGAGRLGAPM,LRMGAGRLGA	ACC
PANK3	c.779G>T	p.R260I	LEMASKGDSTQADKLVRDIYGGDYE[p.R260I]IFGLPGWAVASSFGNMIYKEKRESVS	IYGGDYEIF,IFGLPGWAV,DIYGGDYEI,EIFGLPGWA,YEIFGLPGW,EIFGLPGWAV,DIYGGDYEIF,RDIYGGDYEI,YEIFGLPGWA	CRC
PAOX	c.319C>T	p.H107Y	QLAAEYGLLGEKELSQENQLVETGG[p.H107Y]YVGLPSVSYASSGASVSLQLVAEMAT	QLVETGGYV,NQLVETGGY,YVGLPSVSY,VETGGYVGL,YVGLPSVSYA,GYVGLPSVSY	CESC
PAPD4	c.675_676insT	p.C225fs	SLNGFGTRSSDGDLCLVVKEEPCFF[p.C225fs]SGKSED*	KEEPCFFSG	STAD
PAPPA2	c.2749C>A	p.P917T	QYVHTASSRRVCDSSGYWTPEEAVG[p.P917T]TPDVDQPCEPSLQAWSPEVHLYHMNM	EEAVGTPDV	LUAD
PAPPA2	c.5049delC	p.I1683fs	NSVEYKCEQGYGIGAVCSPLCVIPP[p.I1683fs]VTP*	SPLCVIPPV,CSPLCVIPPV	STAD
PAPPA2	c.5117C>A	p.P1706H	CVIPPSDPVMLPENITADTLEHWME[p.P1706H]HVKVQSIVCTGRRQWHPDPVLVHCIQ	TLEHWMEHV,MEHVKVQSI,WMEHVKVQSI,TLEHWMEHVK,DTLEHWMEHV,MEHVKVQSIV,LEHWMEHVKV	LUAD
PARD6A	c.252_253insC	p.G84fs	TDAHGDLLPLTNDDSLHRALASGPP[p.G84fs]ATAPTGAEAGRS*	ALASGPPAT,RALASGPPA,ALASGPPATA,RALASGPPAT,HRALASGPPA	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PARG	c.1750G>A	p.A584T	KYNVAYSKKWDFTALIDFWDKVLEE[p.A584T]TEAQHLYQSILPDMVKIALCLPNICT	EETEAQHLY,LEETEAQHL,TEAQHLYQS,LEETEAQHLY,TEAQHLYQSI	KIRP,PRAD
PARP15	c.1381delA	p.K461fs	PSLKTVKVVIFQPELLNIFYDSMKK[p.K461fs]ETSLHH*	SMKKETSLH,DSMKKETSL,MKKETSLHH,SMKKETSLHH	STAD
PARP4	c.2541delA	p.K847fs	SSLDSSGFSLHIGLSAAYLPRMWVE[p.K847fs]NIQKKKARLACLSFNPISMSTSLT*	RMWVENIQK,IQKKKARLA,KARLACLSF,LPRMWVENI,NPISMSTSL,NIQKKKARL,KKKARLACL,LACLSFNPI,CLSFNPISM,YLPRMWVENI,RLACLSFNPI,RMWVENIQKK,KARLACLSFN,KKARLACLSF,ACLSFNPISM	STAD
PASD1	c.685_687delGCT	p.A236del	SSQGQRGHTSMKAVYVEPAAAAAAA[p.A236del]ISDDQIDIAEVEQYGPQENVHMFVDSDS	EPAAAAAAAI	GBM
PASK	c.185C>T	p.T62I	PSRSFSSAHRHLSRRNGLSRLCQSR[p.T62I]IALSEDRWSSYCLSSLAAQNICTSKL	RLCQSRIAL,LSRLCQSRI,GLSRLCQSRI,LSRLCQSRIA,SRLCQSRIAL	KIRC
PAX2	c.1183delC	p.P395fs	YSHPQYTAYNEAWRFSNPALLMPPP[p.P395fs]VRPCRCCRCL*	PVRPCRCCR,MPPPVRPCR,RPCRCCRCL,LLMPPPVRPC,LMPPPVRPCR,NPALLMPPPV	STAD
PAX3	c.1271C>T	p.T424M	HGGVPHQPQTDYALSPLTGGLEPTT[p.T424M]MVSASCSQRLDHMKSLDSLPTSQSYC	MVSASCSQR,LEPTTMVSA,MVSASCSQRL,TMVSASCSQR	CRC
PAX3	c.590C>T	p.S197L	LERKEAEESEKKAKHSIDGILSERA[p.S197L]LAPQSDEGSDIDSEPDLPLKRKQRRS	SERALAPQS	BLCA
PAX6	c.1124delC	p.P375fs	QTSSYSCMLPTSPSVNGRSYDTYTP[p.P375fs]HICRHT*	RSYDTYTPH,SYDTYTPHI,DTYTPHICR,RSYDTYTPHI	STAD
PBLD	c.164C>A	p.P55Q	LDEDMHQKIAREMNLSETAFIRKLH[p.P55Q]QTDNFAQSSCFGLRWFTPASEVPLCG	KLHQTDNFA,RKLHQTDNF,IRKLHQTDNF,HQTDNFAQSS	LUAD
PBX2	c.208G>A	p.E70K	PGGRGKQDIGDILQQIMTITDQSLD[p.E70K]KAQAKKHALNCHRMKPALFSVLCEIK	TITDQSLDK,QSLDKAQAK,SLDKAQAKK,KAQAKKHAL,MTITDQSLDK,QSLDKAQAKK	BLCA
PBX2	c.785A>T	p.Y262F	LRSRFLDARRKRRNFSKQATEVLNE[p.Y262F]FFYSHLSNPYPSEEAKEELAKKCGIT	QATEVLNEF,TEVLNEFFY,NEFFYSHLS,ATEVLNEFFY,VLNEFFYSHL,KQATEVLNEF,FFYSHLSNPY,NEFFYSHLSN	KIRP,LUSC,TGCT
PBXIP1	c.2186_2188delACC	p.H729del	KKDKHSQSPRAAGPREGHSHSHHHH[p.H729del]RG*	HSHSHHHHR	BLCA
PCBP1	c.305T>A	p.L102Q	DKLEEDINSSMTNSTAASRPPVTLR[p.L102Q]QVVPATQCGSLIGKGGCKIKEIRIEST	RPPVTLRQV,RQVVPATQC,RPPVTLRQVV,RQVVPATQCG	CRC
PCCA	c.689G>A	p.R230H	AVRIAREIGYPVMIKASAGGGGKGM[p.R230H]HIAWDDEETRDGFRLSSQEAASSFGD	HIAWDDEETR	STAD
PCDH10	c.1429G>A	p.V477M	QVSDVNDNAPRFSQPVYDVYVTENN[p.V477M]MPGAYIYAVSATDRDEGANAQLAYSI	NMPGAYIYA,TENNMPGAY,NNMPGAYIY,MPGAYIYAV,VTENNMPGAY,YVTENNMPGA,NMPGAYIYAV,YDVYVTENNM,MPGAYIYAVS,TENNMPGAYI	CRC
PCDH10	c.1759C>A	p.R587S	ILIVDQNDNAPAIVAPLPGRNGTPA[p.R587S]SEVLPRSAEPGYLLTRVAAVDADDGE	GTPASEVLPR,RNGTPASEVL	LUAD
PCDH10	c.2956G>T	p.V986L	SDGRQAADYRSNLHVPGMDSVPDTE[p.V986L]LFETPEAQPGAERSFSTFGKEKALHS	TELFETPEA,GMDSVPDTEL,MDSVPDTELF	LUAD
PCDH10	c.354_355insC	p.N118fs	EVFLENPLELFQVEIEVLDINDNPP[p.N118fs]LFPGARPDGGNL*	VLDINDNPPL,LDINDNPPLF	STAD
PCDH10	c.673_674insC	p.P225fs	TAVDGGGGGGVGEGGGGGGGAGLPP[p.P225fs]PAAAHRHGPTHHPSAGLQ*	AAHRHGPTH,GPTHHPSAGL,RHGPTHHPSA	STAD
PCDH11X	c.1457C>T	p.T486M	DNAPVFTQSFVTVSIPENNSPGIQL[p.T486M]MKVSAMDADSGPNAKINYLLGPDAPP	IQLMKVSAM,QLMKVSAMDA	GBM
PCDH11X	c.3029G>T	p.R1010I	SSDPYSVSDCGYPVTTFEVPVSVHT[p.R1010I]IPPMKEVVRSCTPMKESTTMEIWIHP	SVHTIPPMK,EVPVSVHTI,HTIPPMKEV,VSVHTIPPM,VSVHTIPPMK,TIPPMKEVVR,HTIPPMKEVV,FEVPVSVHTI	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PCDH15	c.4655G>T	p.R1552I	DDLSAHNPLYKENISQVSTNSDISQ[p.R1552I]ITDFVDPFSPKIQAKSKSLRGPREKI	DISQITDFV,QITDFVDPF,SDISQITDF,SQITDFVDPF	CRC
PCDH15	c.5138G>T	p.C1713F	VELKSEPNVISSPAECSLELSPSRP[p.C1713F]FVLHSSLSRRETPICMLPIETERNIF	ELSPSRPFV,FVLHSSLSR,RPFVLHSSL,LELSPSRPF,FVLHSSLSRR,SLELSPSRPF,LELSPSRPFV	KIRC
PCDH19	c.1588G>A	p.E530K	YVSINPNSGDIYALRSFNHEQTKAF[p.E530K]KFKVLAKDGGLPSLQSNATVRVIILD	QTKAFKFKV,KAFKFKVLA,AFKFKVLAK,TKAFKFKVL,HEQTKAFKF,KAFKFKVLAK,QTKAFKFKVL	UCEC
PCDH19	c.856C>T	p.R286C	NASDPDEGTNGQVVYSFYGYVNDRT[p.R286C]CELFQIDPHSGLVTVTGALDYEEGHV	YVNDRTCEL,YVNDRTCELF	BRCA
PCDHAC2	c.1555G>A	p.A519T	LVERRVGERALSNYVSVHAESGKVY[p.A519T]TLQPLDHEELELLQFQVSARDAGVPP	AESGKVYTL,GKVYTLQPL,TLQPLDHEEL,KVYTLQPLDH,SGKVYTLQPL,HAESGKVYTL	CRC
PCDHAC2	c.2207C>T	p.A736V	ALSTVSFIFLLTIIILSIIKCYRYT[p.A736V]VYGTACCGGFCGVRERSPAELYKQAN	IIKCYRYTV,YTVYGTACC,IKCYRYTVY,YRYTVYGTA,SIIKCYRYTV,VYGTACCGGF,IIKCYRYTVY,CYRYTVYGTA,YRYTVYGTAC	CRC
PCDHAC2	c.2225C>T	p.A742V	TALRCSAAPTEGACGPVKPTLVCSS[p.A742V]VVGSWSYSQQRRQRVCSGEGLPKADL	SSVVGSWSY,KPTLVCSSV,CSSVVGSWSY,KPTLVCSSVV,LVCSSVVGSW	LUAD
PCDHAC2	c.414G>T	p.K138N	PLQVFHVDVEVKDINDNPPVFPATQ[p.K138N]NNLFIAESRPLDSRFPLEGASDADIG	VFPATQNNL,NNLFIAESR,FPATQNNLF,VFPATQNNLF,FPATQNNLFI	UCEC
PCDHAC2	c.467C>T	p.A156V	RFSRQEQRLFILESRMPDSRFPLEG[p.A156V]VSDLDIGANAQLRYRLNPNEYFDLDV	DSRFPLEGV,FPLEGVSDL	CRC
PCDHAC2	c.568G>A	p.E190K	NALLSYKLSSSEFFFLDIQANDELS[p.E190K]KSLSLVLGKSLDREETAEVNLLLVAT	ELSKSLSLV,KSLSLVLGK,LSKSLSLVL,DELSKSLSL,DELSKSLSLV	CRC
PCDHAC2	c.796G>A	p.A266T	AFERTIYKVRLLENAPNGTLVVTVN[p.A266T]TTDLDEGVNKDIAYSFNTDMSADILS	NTTDLDEGV,TTDLDEGVNK	CRC
PCDHAC2	c.811G>A	p.E271K	SYKVVLSENVQNDTRVIQLNASDPD[p.E271K]KGLNGEISYGIKMILPVSEKCMFSIN	QLNASDPDK,KGLNGEISY	CRC
PCDHB1	c.1704C>G	p.N568K	SSQVTVRVVVLDDNDNRPMILYPLQ[p.N568K]KGTLPCNDLVPRSAEAGYLVTKVVAV	ILYPLQKGT,PMILYPLQK,ILYPLQKGTL,RPMILYPLQK,YPLQKGTLPC	LUSC
PCDHB12	c.865C>T	p.R289C	VSAWDLDSGTNSELSYTFSHASEDI[p.R289C]CKTFEINQKSGDITLTAPLDFEAIES	ASEDICKTF,FSHASEDICK,HASEDICKTF,SEDICKTFEI	UCEC
PCDHB13	c.662C>T	p.P221L	VLDKALDREEEAELRLTLTALDGGS[p.P221L]LPRSGTAQVYIEVLDVNDNAPEFEQP	LPRSGTAQV,SLPRSGTAQV,TALDGGSLPR,LPRSGTAQVY	GBM
PCDHB4	c.763_764CC>TT	p.P255F	LIMDINDNAPEFVHTPYGVQVLENS[p.P255F]FLDSPIVRVLARDIDAGNFGSVSYGLF	FLDSPIVRV,SFLDSPIVR,NSFLDSPIV,GVQVLENSF,VQVLENSFL,FLDSPIVRVL,NSFLDSPIVR,YGVQVLENSF,LENSFLDSPI	TGCT
PCDHB5	c.151G>T	p.D51Y	AGSEAVRYSIPEETESGYSVANLAK[p.D51Y]YLGLGVGELATRGARMHYKGNKELLQ	YSVANLAKY,YLGLGVGEL,AKYLGLGVG,NLAKYLGLGV,YLGLGVGELA,KYLGLGVGEL,GYSVANLAKY,YSVANLAKYL	CRC
PCDHB5	c.1945C>T	p.P649S	RTARLLSERDAAKHRLVVLVKDNGE[p.P649S]SPRSATATLHVLLVDGFSQPYLPLPE	SPRSATATL,GESPRSATA,LVKDNGESPR,ESPRSATATL,GESPRSATAT	LUAD
PCDHB8	c.703G>A	p.D235N	RLTLTALDGGSPPRSGTAQVYIEVV[p.D235N]NVNDNAPEFEQPFYRVQISEDSPISF	QVYIEVVNV,EVVNVNDNA,NVNDNAPEF,AQVYIEVVNV,VNVNDNAPEF,IEVVNVNDNA	CRC
PCDHGC5	c.1796G>T	p.G599V	GVELAPRSAERGYLVTKVVAVDRDS[p.G599V]VQNAWLSYRLLKASEPGLFSVGLHTG	SVQNAWLSY,VQNAWLSYR,VVAVDRDSV,VQNAWLSYRL,SVQNAWLSYR,DSVQNAWLSY,VDRDSVQNAW	KIRC
PCDHGC5	c.1984G>A	p.V662M	ALKQSLVVAVQDHGQPPLSATVTLT[p.V662M]MAVADSIPEVLADLGSLEPSDGPYNY	LSATVTLTM,ATVTLTMAV,LTMAVADSI,TVTLTMAVA,MAVADSIPEV,TLTMAVADSI,SATVTLTMAV,PLSATVTLTM	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PCDHGC5	c.1990G>A	p.D664N	RLLVAVRDGGQPPLSATATLHLVFA[p.D664N]NSLQEVLPDITDRPDPSDLQAELQFY	VFANSLQEV,LHLVFANSL,FANSLQEVL,LVFANSLQEV,TLHLVFANSL,VFANSLQEVL	BRCA
PCDHGC5	c.2051C>A	p.P684H	TVTVAVADRIPDILADLGSIKTPID[p.P684H]HEDLDLTLYLVVAVAAVSCVFLAFVI	HEDLDLTLY,IDHEDLDLTL,TPIDHEDLDL,HEDLDLTLYL	LUAD
PCDHGC5	c.208G>A	p.A70T	SVVGNLAKDLGLSVLDVSARKLRVS[p.A70T]TEKLHFSVDAESGDLLVKNRIDREQI	SARKLRVST,RKLRVSTEK,KLRVSTEKL,STEKLHFSV,RVSTEKLHF,KLRVSTEKLH,VSTEKLHFSV,RKLRVSTEKL,LRVSTEKLHF,TEKLHFSVDA	UCEC
PCDHGC5	c.36G>T	p.K12N	MAALQKLPHCR[p.K12N]NLVLLCFLLATLWEARAGQIRYSVRE	KLPHCRNLV,NLVLLCFLL,LPHCRNLVL,QKLPHCRNL,KLPHCRNLVL,LPHCRNLVLL,LQKLPHCRNL,HCRNLVLLCF	LUAD
PCDHGC5	c.866C>T	p.S289L	LTATDPDEGINGKLTYSFRNEEEKI[p.S289L]LETFQLDSNLGEISTLQSLDYEESRF	EEEKILETF,NEEEKILETF,LETFQLDSNL	CRC
PCDHGC5	c.877C>T	p.R293C	DPDEGANGEVTYSFHNVDHRVAQIF[p.R293C]CLDSYTGEISNKEPLDFEEYKMYSME	CLDSYTGEI,AQIFCLDSY,HRVAQIFCL,VAQIFCLDSY,AQIFCLDSYT	SKCM
PCGF3	c.189delC	p.H63fs	SCLVKYLEENNTCPTCRIVIHQSHP[p.H63fs]CSTSVMTEPCKILFTNWYQASKKRK*	ILFTNWYQA,FTNWYQASK,TSVMTEPCK,HQSHPCSTS,QSHPCSTSV,SHPCSTSVM,VMTEPCKIL,MTEPCKILF,CKILFTNWY,KILFTNWYQA,HQSHPCSTSV,ILFTNWYQAS,FTNWYQASKK,STSVMTEPCK,VMTEPCKILF,LFTNWYQASK,QSHPCSTSVM,EPCKILFTNW	STAD
PCLO	c.11836C>A	p.P3946T	PYQTQPTFQAVATMSFTPQVQPTPT[p.P3946T]TQPSYQLPSQMMVIQQKPRQTTLYLE	PTPTTQPSY,TPTTQPSYQL,QPTPTTQPSY	LUAD
PCLO	c.12397C>T	p.R4133C	VKAEEDPMEDPYELKLLKHQIKQEF[p.R4133C]CRGTESLDHLAGLSHYYHADTSYRHF	HQIKQEFCR,QEFCRGTES,QEFCRGTESL	SKCM
PCMTD1	c.812G>T	p.R271M	LARIYIRRTLRNFINDEMQAKGIPQ[p.R271M]MAPPKRKRKRVKQRINTYVFVGNQLI	MQAKGIPQM,GIPQMAPPK,MAPPKRKRK,QMAPPKRKR,MQAKGIPQMA,KGIPQMAPPK,QMAPPKRKRK,MAPPKRKRKR,EMQAKGIPQM	LUAD
PCMTD1	c.842T>C	p.V281A	RNFINDEMQAKGIPQRAPPKRKRKR[p.V281A]AKQRINTYVFVGNQLIPQPLDSEEDE	RAKQRINTY,RAKQRINTYV,KRAKQRINTY,AKQRINTYVF	TGCT
PCNXL2	c.404G>A	p.R135Q	GEHITNHRNPSNNRQIHNGKKEEAS[p.R135Q]QNLSTPPLRCSSRGQSITSHHSSGPL	SQNLSTPPL,KKEEASQNL,SQNLSTPPLR,GKKEEASQNL,ASQNLSTPPL,KEEASQNLST	CRC
PCOLCE2	c.1043C>T	p.A348V	ITTITRDGSLHATVSIINIYKEGNL[p.A348V]VIQQAGKNMSARLTVVCKQCPLLRRG	NIYKEGNLV,IYKEGNLVI,LVIQQAGKNM,KEGNLVIQQA	CRC
PCOLCE2	c.260G>A	p.R87H	KITVPEGKVVVLNFRFIDLESDNLC[p.R87H]HYDFVDVYNGHANGQRIGRFCGTFRP	LESDNLCHY,CHYDFVDVY,SDNLCHYDF,ESDNLCHYDF,NLCHYDFVDV,LCHYDFVDVY	CRC
PCP4L1	c.191A>G	p.K64R	DLTAPETEKAALAIQGKFRRFQKRK[p.K64R]RDPSS*	KFRRFQKRKR	TGCT
PDE4B	c.1250C>T	p.S417L	MMTLEDHYHSDVAYHNSLHAADVAQ[p.S417L]LTHVLLSTPALDAVFTDLEILAAIFA	HAADVAQLT,DVAQLTHVL,LHAADVAQL,AQLTHVLLS,SLHAADVAQL,DVAQLTHVLL,LTHVLLSTPA,HAADVAQLTH,ADVAQLTHVL,AQLTHVLLST	CRC
PDGFRA	c.685G>A	p.E229K	NVYALKATSELDLEMEALKTVYKSG[p.E229K]KTIVVTCAVFNNEVVDLQWTYPGEVK	KTIVVTCAV,TVYKSGKTI,YKSGKTIVV,ALKTVYKSGK,KTIVVTCAVF,KTVYKSGKTI,TVYKSGKTIV,YKSGKTIVVT	GBM
PDGFRB	c.1949C>T	p.S650L	SQATMKVAVKMLKSTARSSEKQALM[p.S650L]LELKIMSHLGPHLNVVNLLGACTKGG	KQALMLELK,EKQALMLEL,ALMLELKIM,LELKIMSHL,MLELKIMSHL,RSSEKQALML,SEKQALMLEL,KQALMLELKI,LMLELKIMSH	GBM
PDIA6	c.168T>G	p.N56K	PCSPTSPAHSLSRKSPIMYPSTTMA[p.N56K]KAPGLVSCTFFLAVNGLYSSSDDVIE	TMAKAPGLV,MYPSTTMAK,TTMAKAPGL,YPSTTMAKA,TTMAKAPGLV,IMYPSTTMAK,MYPSTTMAKA,KAPGLVSCTF	TGCT
PDILT	c.1498G>A	p.E500K	LYKGEHTLKGFSDFLESHIKTKIED[p.E500K]KDELLSVEQNEVIEEEVLAEEKEVPM	HIKTKIEDK,IEDKDELLSV	CESC
PDPR	c.2377G>T	p.G793W	TMFILDDHDSDLDLWPWWGEPIYRN[p.G793W]WQYVGKTTSSAYSYSLERHVCLGFVH	EPIYRNWQY,WQYVGKTTS,WWGEPIYRNW,IYRNWQYVGK,EPIYRNWQYV,WQYVGKTTSS	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PDS5A	c.3927G>C	p.L1309F	KNDDLNKPINKGRKRAAVGQESPGG[p.L1309F]FEAGNAKAPKLQDLAKKAAPAERQID	QESPGGFEA,GQESPGGFEA	TGCT
PDYN	c.571G>T	p.G191W	EDPKEQVKRYGGFLRKYPKRSSEVA[p.G191W]WEGDGDSMGHEDLYKRYGGFLRRIRP	YPKRSSEVAW,VAWEGDGDSM	LUAD
PDZD2	c.1693C>A	p.R565S	RKHSLPQLLDSSSASQEYHIVKKST[p.R565S]SSLSTTQVESPWRLIRPSVISIIGLY	IVKKSTSSL,TSSLSTTQV,KKSTSSLST,HIVKKSTSSL,STSSLSTTQV,IVKKSTSSLS,KKSTSSLSTT	LUAD
PDZD2	c.302_303insG	p.R101fs	DTETVGLSFGNIPVFGDYGEKRRGG[p.R101fs]QEEENPPGSCAGCGLHLGDRAEEEQPSREEWEGPTAG*	REEWEGPTA,EEQPSREEW,EEWEGPTAG,EENPPGSCA	STAD
PELI2	c.589delG	p.G197fs	AKWKNPDGHMDGLTTNGVLVMHPRG[p.G197fs]ASPRSPSPGSGARSLSVEMCTPCEKPGRPSNEESWWKVRPTSCRTAPSLTCVGPLSSGEQQMGFFILQLRST*	RTAPSLTCV,QMGFFILQL,VLVMHPRGA,MGFFILQLR,GARSLSVEM,KVRPTSCRT,SPGSGARSL,RPTSCRTAP,VMHPRGASP,SSGEQQMGF,GEQQMGFFI,EQQMGFFIL,RPSNEESWW,QQMGFFILQL,VMHPRGASPR,SVEMCTPCEK,QMGFFILQLR,RSPSPGSGAR,KVRPTSCRTA,WWKVRPTSCR,HPRGASPRSP,RPTSCRTAPS,APSLTCVGPL,GPLSSGEQQM,SGARSLSVEM,LSSGEQQMGF,GEQQMGFFIL,EESWWKVRPT	STAD
PEX1	c.1108delA	p.I370fs	QSKTKQNVLSPEKEKQMSEPLDQKK[p.I370fs]LGQIIMKKMRRPVCYK*	KLGQIIMKK,KMRRPVCYK,IMKKMRRPV,QIIMKKMRR,MKKMRRPVC,QKKLGQIIM,KKMRRPVCY,IIMKKMRRPV,KKMRRPVCYK,IMKKMRRPVC,DQKKLGQIIM,KLGQIIMKKM,MKKMRRPVCY	BLCA,PRAD
PFKM	c.352C>A	p.R118S	TSGGDAQGMNAAVRAVVRVGIFTGA[p.R118S]SVFFVHEGYQGLVDGGDHIKEATWES	FTGASVFFV,SVFFVHEGY,IFTGASVFF,GIFTGASVF,VGIFTGASV,RVGIFTGASV,ASVFFVHEGY,IFTGASVFFV,VGIFTGASVF,GIFTGASVFF	LUAD
PFKP	c.1779delG	p.M593fs	SGTKRRVFIIETMGGYCGYLANMGG[p.M593fs]SRPELMPHTFSKSPSTSGICSPTWST*	ELMPHTFSK,GSRPELMPH,HTFSKSPST,YLANMGGSR,STSGICSPT,RPELMPHTF,NMGGSRPEL,SKSPSTSGI,TSGICSPTW,MPHTFSKSPS,ANMGGSRPEL,NMGGSRPELM,SRPELMPHTF,FSKSPSTSGI,STSGICSPTW	STAD
PGAM1	c.719G>A	p.R240H	PIVYELDKNLKPIKPMQFLGDEETV[p.R240H]HKAMEAVAAQGKAKK*	TVHKAMEAV,ETVHKAMEA,HKAMEAVAA,DEETVHKAM,ETVHKAMEAV,EETVHKAMEA	CRC
PGAP1	c.1694T>G	p.F565C	QAPSSTEISLKLHIAQPENNTHVAL[p.F565C]CKMYTSSDCRYEVTVKTSFSQILGQV	THVALCKMY,NTHVALCKMY	OV
PGM5	c.1277_1278insC	p.G426fs	VWLSIIAARKQSVEEIVRDHWAKFG[p.G426fs]PPLLLQV*	HWAKFGPPL,AKFGPPLLL,HWAKFGPPLL,KFGPPLLLQV	KIRC
PGM5	c.292A>G	p.I98V	RTAIEIVVQMAAANGIGRLIIGQNG[p.I98V]VLSTPAVSCIIRKIKAAGGIILTASH	RLIIGQNGV,VLSTPAVSCI,RLIIGQNGVL,GQNGVLSTPA	STAD
PGPEP1L	c.490_491insA	p.R164fs	KGCAALIHVPPLSRGLPASLLGRAL[p.R164fs]KSHHPGNAGRGGKAQAQSPVRRKLNHGPSSQRELTGGLLL*	SQRELTGGL,ASLLGRALK,RALKSHHPG,KSHHPGNAG,KAQAQSPVR,QAQSPVRRK,GKAQAQSPV,AQSPVRRKL,RKLNHGPSS,RELTGGLLL,ALKSHHPGNA,KLNHGPSSQR,KSHHPGNAGR,KAQAQSPVRR,AQAQSPVRRK,SQRELTGGLL	KIRC
PHACTR1	c.752_753insG	p.V251fs	LPCLPVKLSPPLPPKKVMICMPVGG[p.V251fs]ARPLTGVLHSPEEWPAGCGPAPPHCPALPDPAPAAVRQPRPAPPLHHRLPPHAPLGLQNDRRAQQNAGHQHAEAGKL*	ALPDPAPAA,AVRQPRPAP,RQPRPAPPL,MICMPVGGA,MPVGGARPL,GARPLTGVL,GPAPPHCPA,LPDPAPAAV,LPPHAPLGL,HRLPPHAPL,AQQNAGHDH,WPAGCGPAP,VMICMPVGGA,VLHSPEEWPA,ALPDPAPAAV,RLPPHAPLGL,CMPVGGARPL,MICMPVGGAR,GARPLTGVLH,AVRQPRPAPP,AGHDHAEAGK,MPVGGARPLT,GPAPPHCPAL,CPALPDPAPA,RPAPPLHHRL,HHRLPPHAPL,EEWPAGCGPA,VRQPRPAPPL,RQPRPAPPLH,AQQNAGHDHA,WPAGCGPAPP	LAML
PHACTR1	c.753delG	p.V251fs	LPCLPVKLSPPLPPKKVMICMPVGG[p.V251fs]QTSHWCPTQPRRVASRVWPSTTTLSCPPRSSTSCSTAATASTSPPPPAPSPCTPRAAE*	RVWPSTTTL,TTTLSCPPR,RVASRVWPS,ASRVWPSTT,RSSTSCSTA,HWCPTQPRR,TQPRRVASR,CPTQPRRVA,QPRRVASRV,WPSTTTLSC,GQTSHWCPT,SRVWPSTTT,MPVGGQTSH,TSHWCPTQPR,STTTLSCPPR,RVASRVWPST,ASRVWPSTTT,RSSTSCSTAA,STSCSTAATA,PTQPRRVASR,CPTQPRRVAS,QPRRVASRVW,APSPCTPRAA,MPVGGQTSHW,SRVWPSTTTL	STAD
PHACTR2	c.711_712insA	p.S237fs	APVPPPKPASRNTTREAAGSSHSKK[p.S237fs]NNWL*	SSHSKKNNWL	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PHACTR4	c.1061delC	p.S354fs	DEREKSTCSMGSELLPMISPRSPSP[p.S354fs]HCLLIYLQSLHAPLHSLLRLFKLCQKLSFHHP*	CLLIYLQSL,YLQSLHAPL,SLHAPLHSL,RLFKLCQKL,LIYLQSLHA,RSPSPHCLL,LHSLLRLFK,HAPLHSLLR,SPSPHCLLI,SPHCLLIYL,APLHSLLRL,LQSLHAPLH,LHAPLHSLL,FKLCQKLSF,LLIYLQSLHA,SLHAPLHSLL,PLHSLLRLFK,LLRLFKLCQK,RSPSPHCLLI,IYLQSLHAPL,LFKLCQKLSF,SPSPHCLLIY,SPRSPSPHCL,APLHSLLRLF,YLQSLHAPLH,QSLHAPLHSL	STAD
PHC3	c.104_106delCCA	p.T35del	STAMDTEPNPGTSSVSTTTSSTTTT[p.T35del]ITTSSSRMQQPQISVYSGSDRHAVQVIQ	TTSSTTTTI,TTTSSTTTTI	GBM
PHGDH	c.517_518GG>TT	p.G173L	LGILGLGRIGREVATRMQSFGMKTI[p.G173L]LYDPIISPEVSASFGVQQLPLEEIWPL	KTILYDPII,SFGMKTILY,QSFGMKTIL,MKTILYDPI,GMKTILYDPI,QSFGMKTILY,LYDPIISPEV,MQSFGMKTIL,MKTILYDPII	SKCM
PHIP	c.5043C>G	p.I1681M	KKRGRKPKKLQYAKPEDLEQNNVHP[p.I1681M]MRDEVLPSSTCNFLSETNNVKEDLLQ	EQNNVHPMR,NVHPMRDEV,LEQNNVHPM,HPMRDEVLPS	LUSC
PHOSPHO1	c.95_97delCCT	p.S32del	PWPANQPLPGGLLPRPLSLAPSSSS[p.S32del]CCSPPCSQDGRMAAQGAPRFLLTFDFDE	SLAPSSSSC,SLAPSSSSCC	PRAD
PI15	c.64G>T	p.V22F	MIAISAVSSALLFSLLCEAST[p.V22F]FVLLNSTDSSPPTNNFTDIEAALKAQ	LLCEASTFV,SLLCEASTF,CEASTFVLL,SLLCEASTFV,LLCEASTFVL,FSLLCEASTF	LUAD
PIAS2	c.1556C>T	p.S519L	SETQSSPTKGVLMYQPSSVRVPSVT[p.S519L]LVDPAAIPPSLTDYSVPFHHTPISSM	SVRVPSVTL,SVRVPSVTLV,SSVRVPSVTL	CRC
PIAS3	c.1378G>A	p.D460N	GGDPSENKKKVEVIDLTIESSSDEE[p.D460N]NLPPTKKHCSVTSAAIPALPGSKGVL	IESSSDEENL	CESC
PIAS3	c.348delC	p.H116fs	LAPIPPTLLAPGTLLGPKREVDMHP[p.H116fs]LCPSLCTLMSP*	KREVDMHPL,REVDMHPLC,DMHPLCPSL,HPLCPSLCTL,VDMHPLCPSL,REVDMHPLCP	STAD
PIGM	c.674G>T	p.R225L	NDKSLRQFRYTFQACLYELLKRLCN[p.R225L]LAVLLFVAVAGLTFFALSFGFYYEYG	RLCNLAVLL,NLAVLLFVA,LLKRLCNLA,LAVLLFVAV,ELLKRLCNL,LKRLCNLAV,KRLCNLAVL,LCNLAVLLF,NLAVLLFVAV,LLKRLCNLAV,RLCNLAVLLF,YELLKRLCNL,LKRLCNLAVL,KRLCNLAVLL	LUAD
PIGO	c.2361delC	p.P787fs	VTVLVKAGAGAPRTRTVLTPFSGPP[p.P787fs]LLKLTWIMWSLKSTDTCRRSSGAG*	KLTWIMWSL,WIMWSLKST,LTWIMWSLK,SLKSTDTCR,TPFSGPPLL,LLKLTWIMW,VLTPFSGPPL,KLTWIMWSLK,SLKSTDTCRR,LKLTWIMWSL	STAD
PIGR	c.548T>G	p.V183G	NAQKRKSLYKQIGLYPVLVIDSSGY[p.V183G]GNPNYTGRIRLDIQGTGQLLFSVVIN	SSGYGNPNY,DSSGYGNPNY	TGCT
PIGT	c.1037delC	p.A346fs	TAMINNSRNLNIQLKWKRPPENEAP[p.A346fs]QCPSCMPSGT*	NEAPQCPSCM	STAD
PIK3C2B	c.4419C>G	p.F1473L	EELNGYIWHLIHAPPEVAECDLVYT[p.F1473L]LFHPLPRDEKAMGTSPAPKSSDGTWA	LVYTLFHPL,YTLFHPLPR,AECDLVYTL,DLVYTLFHPL,LFHPLPRDEK,VYTLFHPLPR,AECDLVYTLF	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PIK3C2B	c.859delC	p.R287fs	PLDFSKDTSGKPVARSKTMPPQVPP[p.R287fs]APMPPAMATERMRRLARTAGFLQPRWAPGPTLLPMAMSCLRSQKREMRRLLHFATCWISFDLALTSKTTSSLAMSGVLSPLAQSTSGMRST*	TMPPQVPPA,LLHFATCWI,AMSGVLSPL,RLARTAGFL,FLQPRWAPG,LLPMAMSCL,EMRRLLHFA,WISFDLALT,VLSPLAQST,AMATERMRR,AMSCLRSQK,RTAGFLQPR,RWAPGPTLL,REMRRLLHF,HFATCWISF,CWISFDLAL,RMRRLARTA,RSQKREMRR,TSKTTSSLA,LPMAMSCLR,MSCLRSQKR,LTSKTTSSL,TSSLAMSGV,PPQVPPAPM,VPPAPMPPA,PPAPMPPAM,APMPPAMAT,QPRWAPGPT,APGPTLLPM,GPTLLPMAM,MATERMRRL,CLRSQKREM,RRLARTAGF,PRWAPGPTL,SQKREMRRL,QKREMRRLL,RLLHFATCW,SKTTSSLAM,SSLAMSGVL,LAMSGVLSP,TLLPMAMSCL,RLLHFATCWI,LAMSGVLSPL,AMSGVLSPLA,KTMPPQVPPA,AMATERMRRL,ALTSKTTSSL,TTSSLAMSGV,MAMSCLRSQK,ISFDLALTSK,ATERMRRLAR,RMRRLARTAG,CLRSQKREMR,RSQKREMRRL,SQKREMRRLL,TSKTTSSLAM,RTAGFLQPRW,LLPMAMSCLR,AMSCLRSQKR,QVPPAPMPPA,FATCWISFDL,LTSKTTSSLA,MPPQVPPAPM,VPPAPMPPAM,MPPAMATERM,QPRWAPGPTL,SPLAQSTSGM,MRRLARTAGF,EMRRLLHFAT,RRLARTAGFL,WAPGPTLLPM,KREMRRLLHF,REMRRLLHFA,RRLLHFATCW,LHFATCWISF,AQSTSGMRST,LPMAMSCLRS	GBM
PIK3CA	c.1035T>A	p.N345K	GETSTKSLWVINSALRIKILCATYV[p.N345K]KVNIRDIDKIYVRTGIYHGGEPLCDN	ILCATYVKV,KILCATYVK,KVNIRDIDK,ATYVKVNIR,KILCATYVKV,TYVKVNIRDI,CATYVKVNIR	BRCA,CRC,STAD,UCEC
PIK3CA	c.1049A>G	p.D350G	KSLWVINSALRIKILCATYVNVNIR[p.D350G]GIDKIYVRTGIYHGGEPLCDNVNTQR	YVNVNIRGI,NVNIRGIDK,NIRGIDKIY,TYVNVNIRGI,VNIRGIDKIY	CRC
PIK3CA	c.113G>A	p.R38H	IHLMPPRILVECLLPNGMIVTLECL[p.R38H]HEATLITIKHELFKEARKYPLHQLLQ	VTLECLHEA,LECLHEATL,CLHEATLITI,HEATLITIKH,LECLHEATLI	UCEC
PIK3CA	c.115G>A	p.E39K	HLMPPRILVECLLPNGMIVTLECLR[p.E39K]KATLITIKHELFKEARKYPLHQLLQD	IVTLECLRK,LRKATLITI,LECLRKATL,CLRKATLITI,MIVTLECLRK,RKATLITIKH,LECLRKATLI	UCEC
PIK3CA	c.1258T>C	p.C420R	DLPRAARLCLSICSVKGRKGAKEEH[p.C420R]RPLAWGNINLFDYTDTLVSGKMALNL	KEEHRPLAW,GAKEEHRPLA,RPLAWGNINL,AKEEHRPLAW	BRCA,UCEC
PIK3CA	c.1338_1364delGCCAGTACCTCATGGATTAGAAGATTT	p.PVPHGLEDL447del	LAWGNINLFDYTDTLVSGKMALNLW[p.PVPHGLEDL447del]LNPIGVTGSNPNKETPCLELEFDWFSSVVKFPDMSVIEEHANWSVSREAGFS	ALNLWLNPI,NLWLNPIGV,GKMALNLWL,MALNLWLNPI	BRCA
PIK3CA	c.1357G>A	p.E453K	NLFDYTDTLVSGKMALNLWPVPHGL[p.E453K]KDLLNPIGVTGSNPNKETPCLELEFD	GLKDLLNPI,LWPVPHGLK,VPHGLKDLL,NLWPVPHGLK,WPVPHGLKDL,HGLKDLLNPI	BRCA
PIK3CA	c.1364_1365insG	p.L455fs	DYTDTLVSGKMALNLWPVPHGLEDL[p.L455fs]AEPYWCYWIKSK*	GLEDLAEPY,DLAEPYWCY,AEPYWCYWI,LAEPYWCYW,HGLEDLAEPY	BRCA
PIK3CA	c.1624G>A	p.E542K	LARDNELRENDKEQLKAISTRDPLS[p.E542K]KITEQEKDFLWSHRHYCVTIPEILPK	ISTRDPLSK,STRDPLSKI,LSKITEQEK,AISTRDPLSK,SKITEQEKDF	BLCA,BRCA,CESC,CRC,HNSC,LUAD,LUSC,STAD,UCEC
PIK3CA	c.1633G>A	p.E545K	DNELRENDKEQLKAISTRDPLSEIT[p.E545K]KQEKDFLWSHRHYCVTIPEILPKLLL	SEITKQEKDF,KQEKDFLWSH	BLCA,BRCA,CESC,CRC,GBM,HNSC,KIRC,LUAD,LUSC,STAD,TGCT,UCEC,UCS
PIK3CA	c.1634A>C	p.E545A	DNELRENDKEQLKAISTRDPLSEIT[p.E545A]AQEKDFLWSHRHYCVTIPEILPKLLL	TAQEKDFLW,SEITAQEKDF,AQEKDFLWSH,ITAQEKDFLW	BRCA,CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PIK3CA	c.1634A>G	p.E545G	DNELRENDKEQLKAISTRDPLSEIT[p.E545G]GQEKDFLWSHRHYCVTIPEILPKLLL	SEITGQEKDF,GQEKDFLWSH	CRC
PIK3CA	c.1636C>A	p.Q546K	NELRENDKEQLKAISTRDPLSEITE[p.Q546K]KEKDFLWSHRHYCVTIPEILPKLLLS	KEKDFLWSH,TEKEKDFLW,SEITEKEKDF	BRCA,CRC,UCEC
PIK3CA	c.1637A>C	p.Q546P	NELRENDKEQLKAISTRDPLSEITE[p.Q546P]PEKDFLWSHRHYCVTIPEILPKLLLS	EITEPEKDFL,SEITEPEKDF,EPEKDFLWSH	UCEC
PIK3CA	c.1637A>G	p.Q546R	NELRENDKEQLKAISTRDPLSEITE[p.Q546R]REKDFLWSHRHYCVTIPEILPKLLLS	REKDFLWSH,TEREKDFLW,SEITEREKDF	BRCA,UCEC
PIK3CA	c.1A>G	p.M1V	[p.M1V]VPPRPSSGELWGIHLMPPRILVECLL	VPPRPSSGEL	GBM
PIK3CA	c.2176G>A	p.E726K	HLNRQVEAMEKLINLTDILKQEKKD[p.E726K]KTQKVQMKFLVEQMRRPDFMDALQGF	KTQKVQMKF,KDKTQKVQMK,KTQKVQMKFL,KKDKTQKVQM	BRCA,CESC,LUSC
PIK3CA	c.263G>A	p.R88Q	QDESSYIFVSVTQEAEREEFFDETR[p.R88Q]QLCDLRLFQPFLKVIEPVGNREEKIL	RQLCDLRLF,ETRQLCDLR,EEFFDETRQL	BRCA,CRC,GBM,STAD,UCEC
PIK3CA	c.278G>A	p.R93Q	YIFVSVTQEAEREEFFDETRRLCDL[p.R93Q]QLFQPFLKVIEPVGNREEKILNREIG	QLFQPFLKV,LQLFQPFLK,RRLCDLQLF,CDLQLFQPF,LQLFQPFLKV,QLFQPFLKVI,DLQLFQPFLK,TRRLCDLQLF,LCDLQLFQPF,CDLQLFQPFL	UCEC
PIK3CA	c.3012G>A	p.M1004I	RFQEMCYKAYLAIRQHANLFINLFS[p.M1004I]IMLGSGMPELQSFDDIAYIRKTLALD	NLFINLFSI,FINLFSIML,LFINLFSIM,FSIMLGSGM,IMLGSGMPEL,NLFINLFSIM,LFINLFSIML,LFSIMLGSGM	BRCA
PIK3CA	c.3127A>G	p.M1043V	DIAYIRKTLALDKTEQEALEYFMKQ[p.M1043V]VNDAHHGGWTTKMDWIFHTIKQHALN	ALEYFMKQV,FMKQVNDAH,MKQVNDAHH,EALEYFMKQV,FMKQVNDAHH	GBM,HNSC,UCEC
PIK3CA	c.3129G>A	p.M1043I	DIAYIRKTLALDKTEQEALEYFMKQ[p.M1043I]INDAHHGGWTTKMDWIFHTIKQHALN	FMKQINDAH,KQINDAHHG,EALEYFMKQI,FMKQINDAHH,KQINDAHHGG	BRCA,UCEC
PIK3CA	c.3130A>T	p.N1044Y	IAYIRKTLALDKTEQEALEYFMKQM[p.N1044Y]YDAHHGGWTTKMDWIFHTIKQHALN*	MYDAHHGGW,FMKQMYDAH,LEYFMKQMY,MKQMYDAHH,KQMYDAHHG,ALEYFMKQMY,FMKQMYDAHH,QMYDAHHGGW,KQMYDAHHGG	BRCA
PIK3CA	c.3132T>A	p.N1044K	IAYIRKTLALDKTEQEALEYFMKQM[p.N1044K]KDAHHGGWTTKMDWIFHTIKQHALN*	FMKQMKDAH,KQMKDAHHG,MKDAHHGGW,ALEYFMKQMK,FMKQMKDAHH,KQMKDAHHGG,QMKDAHHGGW	KIRC
PIK3CA	c.3140A>G	p.H1047R	IRKTLALDKTEQEALEYFMKQMNDA[p.H1047R]RHGGWTTKMDWIFHTIKQHALN*	FMKQMNDAR,KQMNDARHG,RHGGWTTKM,YFMKQMNDAR,FMKQMNDARH,KQMNDARHGG,QMNDARHGGW,ARHGGWTTKM	BRCA,CRC,GBM,HNSC,LIHC,LUSC,STAD,UCEC,UCS
PIK3CA	c.3140A>T	p.H1047L	IRKTLALDKTEQEALEYFMKQMNDA[p.H1047L]LHGGWTTKMDWIFHTIKQHALN*	FMKQMNDAL,ALHGGWTTK,KQMNDALHG,LHGGWTTKM,ALHGGWTTKM,YFMKQMNDAL,DALHGGWTTK,FMKQMNDALH,KQMNDALHGG,QMNDALHGGW	BRCA,HNSC,UCEC
PIK3CA	c.317G>T	p.G106V	EFFDETRRLCDLRLFQPFLKVIEPV[p.G106V]VNREEKILNREIGFAIGMPVCEFDMV	FLKVIEPVV,KVIEPVVNR	UCS
PIK3CA	c.323G>A	p.R108H	FDETRRLCDLRLFQPFLKVIEPVGN[p.R108H]HEEKILNREIGFAIGMPVCEFDMVKD	HEEKILNREI	UCEC
PIK3CA	c.325_327delGAA	p.E110del	ETRRLCDLRLFQPFLKVIEPVGNRE[p.E110del]KILNREIGFAIGMPVCEFDMVKDPEVQD	REKILNREI	BRCA,UCEC
PIK3CA	c.331A>G	p.K111E	TRRLCDLRLFQPFLKVIEPVGNREE[p.K111E]EILNREIGFAIGMPVCEFDMVKDPEV	REEEILNREI,EEILNREIGF	UCEC
PIK3CA	c.331_333delAAG	p.K111del	TRRLCDLRLFQPFLKVIEPVGNREE[p.K111del]ILNREIGFAIGMPVCEFDMVKDPEVQDF	REEILNREI,EEILNREIGF	BRCA

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PIK3CD	c.1141T>C	p.C381R	CFALYAVIEKAKKARSTKKKSKKAD[p.C381R]RPIAWANLMLFDYKDQLKTGERCLYM	KSKKADRPI,RPIAWANLM,KKADRPIAW,KSKKADRPIA,RPIAWANLML,KKSKKADRPI,SKKADRPIAW,ADRPIAWANL	TGCT
PIK3CG	c.493G>A	p.V165I	RHPPSEESQAFQRQLTALIGYDVTD[p.V165I]ISNVHDDELEFTRRGLVTPRMAEVAS	LIGYDVTDI,ALIGYDVTDI	LUAD
PIK3R1	c.1126G>A	p.G376R	ADGTFLVRDASTKMHGDYTLTLRKG[p.G376R]RNNKLIKIFHRDGKYGFSDPLTFSSV	TLRKGRNNK,KGRNNKLIK,YTLTLRKGR,RNNKLIKIF,LTLRKGRNNK,TLRKGRNNKL,KGRNNKLIKI,GRNNKLIKIF	GBM
PIK3R1	c.1137A>T	p.K379N	TFLVRDASTKMHGDYTLTLRKGGNN[p.K379N]NLIKIFHRDGKYGFSDPLTFSSVVEL	KGGNNNLIK,NNLIKIFHR,RKGGNNNLI,GNNNLIKIF,TLRKGGNNNL,NNNLIKIFHR,GGNNNLIKIF	GBM
PIK3R1	c.1697_1708delTTAAACCAGACC	p.KPDL567del	RRRLEEDLKKQAAEYREIDKRMNSI[p.KPDL567del]IQLRKTRDQYLMWLTQKGVRQKKLNEWLGNENTEDQY	RMNSIIQLR,MNSIIQLRK,SIIQLRKTR,KRMNSIIQL,RMNSIIQLRK,NSIIQLRKTR	BRCA
PIK3R5	c.1112T>G	p.L371R	LLSTSSLASHDSTLSLASSQASGPA[p.L371R]RSRHLLTSFVSGLSDGMDSGYVEDSE	SSQASGPAR,RSRHLLTSF,GPARSRHLL,ASSQASGPAR,RSRHLLTSFV,ARSRHLLTSF	KIRC
PILRA	c.872_873insC	p.S291fs	VYASLALSSSTSPRAPPSHRPLKSP[p.S291fs]PERDPVLCLKGLTNGQPSQD*	SPPERDPVL	LUAD
PIM1	c.490C>T	p.L164F	LQEELARSFFWQVLEAVRHCHNCGV[p.L164F]FHRDIKDENILIDLNRGELKLIDFGS	RHCHNCGVF,HCHNCGVFHR,VRHCHNCGVF	DLBCL
PIM1	c.550C>T	p.L184F	HNCGVLHRDIKDENILIDLNRGELK[p.L184F]FIDFGSGALLKDTVYTDFDGTRVYSP	FIDFGSGAL,RGELKFIDF,FIDFGSGALL,IDLNRGELKF,LKFIDFGSGA,KFIDFGSGAL,GELKFIDFGS	DLBCL
PIP4K2A	c.656G>A	p.R219K	IVTRNVFSHRLSVYRKYDLKGSTVA[p.R219K]KEASDKEKAKELPTLKDNDFINEGQK	TVAKEASDK,KEASDKEKA,STVAKEASDK,VAKEASDKEK	KIRP
PIP4K2C	c.611G>A	p.R204H	NTLLPQFLGMYRVSVDNEDSYMLVM[p.R204H]HNMFSHRLPVHRKYDLKGSLVSREAS	VMHNMFSHR,LVMHNMFSH,SYMLVMHNM,YMLVMHNMF,MHNMFSHRL,VMHNMFSHRL,LVMHNMFSHR,SYMLVMHNMF,DSYMLVMHNM,HNMFSHRLPV,MLVMHNMFSH	CRC
PITPNM1	c.884delC	p.P295fs	PPGKPSTEARSAASNTGTPDGPEAP[p.P295fs]QAQMPPPMPALGSSGPHPPVPPTHPNMEGLCLPRACLSGACRTLPETLRTAPRKSSLMPTKASRTVRRSSPRR*	AQMPPPMPA,QMPPPMPAL,CLSGACRTL,TLPETLRTA,RTVRRSSPR,ETLRTAPRK,RTAPRKSSL,RKSSLMPTK,KSSLMPTKA,SLMPTKASR,ASRTVRRSS,TVRRSSPRR,NMEGLCLPR,GPEAPQAQM,HPNMEGLCL,LPRACLSGA,MPTKASRTV,PQAQMPPPM,MEGLCLPRA,AQMPPPMPAL,CLPRACLSGA,SLMPTKASRT,LMPTKASRTV,RTVRRSSPRR,SSLMPTKASR,RTLPETLRTA,RTAPRKSSLM,PTKASRTVRR,APQAQMPPPM,MPALGSSGPH,LPRACLSGAC,APRKSSLMPT,LRTAPRKSSL,RKSSLMPTKA	STAD
PIWIL1	c.2095G>A	p.V699M	GLKVCLQAALRAWNSCNEYMPSRII[p.V699M]MYRDGVGDGQLKTLVNYEVPQFLDCL	RIIMYRDGV,EYMPSRIIM,YMPSRIIMY,MPSRIIMYR,YMPSRIIMYR,NEYMPSRIIM	HNSC
PKD1	c.2813C>T	p.T938M	VENSASRANLSLRVTAEEPICGLRA[p.T938M]MPSPEARVLQGVLVRYSPVVEAGSDM	AMPSPEARV,RAMPSPEAR,EPICGLRAM,MPSPEARVL,GLRAMPSPEA,RAMPSPEARV,AMPSPEARVL,EEPICGLRAM	TGCT
PKD2	c.1457A>T	p.Y486F	KLIRYVTTFDFFLAACEIIFCFFIF[p.Y486F]FYVVEEILEIRIHKLHYFRSFWNCLD	FCFFIFFYV,IIFCFFIFF,CFFIFFYVV,IFFYVVEEI,FFYVVEEIL,IFCFFIFFY,FCFFIFFYVV,FIFFYVVEEI,IIFCFFIFY,IFCFFIFFYV,IFFYVVEEIL,FYVVEEILEI,EIIFCFFIFF	CLL
PKHD1L1	c.5568C>A	p.F1856L	PPVASLSPTSGSIGGGTTLVITGNG[p.F1856L]LYPGNTTVTIGDEPCQIISINPNEVY	LVITGNGLY,GLYPGNTTV,TLVITGNGL,GLYPGNTTVT,LYPGNTTVTI,TLVITGNGLY,TTLVITGNGL	CRC
PKN2	c.226delA	p.K76fs	KREIRKELKIKEGAENLRKVTTDKK[p.K76fs]VWLM*	TTDKKVWLM,RKVTTDKKVW	STAD
PLA2G15	c.689delG	p.W230fs	FLQRQPQAWKDKYIRAFVSLGAPWG[p.W230fs]AWPRPCASWLQETTTGSQSSGP*	WLQETTTGS,AWPRPCASW,GAPWGAWPR,WPRPCASWL,SLGAPWGAW,FVSLGAPWGA,LGAPWGAWPR,VSLGAPWGAW,GAWPRPCASW	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PLA2G1B	c.157_158insTG	p.L53fs	KMIKCVIPGSDPFLEYNNYGCYCGL[p.L53fs]WGAQAPPWMNWTSAARHMTTAMTRPRSWTAVNFCWTTRTPTPIHTRALARQSPVAAKTKSVRPSFATATATLPSAFQKLHITRHTRTWTPRSIVRVEYHLSKASPLSASSHTVLSNKAPC*	ALARQSPVA,SVRPSFATA,TLPSAFQKL,PLSASSHTV,ATLPSAFQK,SSHTVLSNK,MTTAMTRPR,AVNFCWTTR,NYGCYCGLW,LWGAQAPPW,SWTAVNFCW,SFATATATL,AARHMTTAM,RHMTTAMTR,MTRPRSWTA,RSWTAVNFC,TTRTPTPIH,RTPTPIHTR,HTRALARQS,RALARQSPV,LARQSPVAA,KTKSVRPSF,KLHITRHTR,ITRHTRTWT,HTRTWTPRS,RTWTPRSIV,RSIVRVEYH,RVEYHLSKA,LSKASPLSA,WMNWTSAAR,AFQKLHITR,TWTPRSIVR,WTSAARHMT,WTAVNFCWT,WTTRTPTPI,WTPRSIVRV,RPRSWTAVN,TPIHTRALA,RPSFATATA,YHLSKASPL,ATATLPSAF,AQAPPWMNW,TAMTRPRSW,RQSPVAAKT,FQKLHITRH,HITRHTRTW,SKASPLSAS,LSASSHTVL,VEYHLSKAS,AMTRPRSWTA,MTRPRSWTAV,ALARQSPVAA,ATATATLPSA,HLSKASPLSA,RTWTPRSIVR,IVRVEYHLSK,ASSHTVLSNK,TAVNFCWTTR,TATLPSAFQK,SAFQKLHITR,RSWTAVNFCW,CWTTRTPTPI,AARHMTTAMT,TTRTPTPIHT,RTPTPIHTRA,HTRALARQSP,RALARQSPVA,LARQSPVAAK,RQSPVAAKTK,KTKSVRPSFA,KSVRPSFATA,SVRPSFATAT,KLHITRHTRT,ITRHTRTWTP,HTRTWTPRSI,RSIVRVEYHL,SSHTVLSNKA,PWMNWTSAAR,HMTTAMTRPR,TPIHTRALAR,TSAARHMTTA,WTAVNFCWTT,APPWMNWTSA,SAARHMTTAM,RPRSWTAVNF,TPTPIHTRAL,SPVAAKTKSV,RPSFATATAT,LPSAFQKLHI,SPLSASSHTV,MNWTSAARHM,TATATLPSAF,GLWGAQAPPW,WMNWTSAARH,AKTKSVRPSF,PSFATATATL,FQKLHITRHT,LHITRHTRTW,KASPLSASSH,TPRSIVRVEY	STAD
PLA2G3	c.602G>A	p.R201Q	GPDLCCREHDRCPQNISPLQYNYGI[p.R201Q]QNYRFHTISHCDCDTRFQQCLQNQHD	IQNYRFHTI,NYGIQNYRF,QYNYGIQNY,YNYGIQNYR,LQYNYGIQN,YNYGIQNYRF,LQYNYGIQNY,QYNYGIQNYR,IQNYRFHTIS,QNYRFHTISH	UCEC
PLAG1	c.551delA	p.K184fs	FESTGVLLEHLKSHAGKSSGGVKEK[p.K184fs]STSANIVIAGSTPERMSGDTWWCTLEERTSSVSIVHRDLGERIT*	RMSGDTWWC,TLEERTSSV,VIAGSTPER,RTSSVSIVH,TSSVSIVHR,GVKEKSTSA,KSTSANIVI,TWWCTLEER,IVHRDLGER,STSANIVIA,KEKSTSANI,EERTSSVSI,RMSGDTWWCT,CTLEERTSSV,IVIAGSTPER,RTSSVSIVHR,KSTSANIVIA,DTWWCTLEER,SIVHRDLGER,KEKSTSANIV,MSGDTWWCTL,LERTSSVSI,EERTSSVSIV,TPERMSGDTW	STAD
PLAGL2	c.30delC	p.P10fs	MTTFFTSVPP[p.P10fs]GFKMQSRRRKWAGN*	FTSVPPGFK,FFTSVPPGF,TSVPPGFKM,KMQSRRRKW,FFTSVPPGFK,TFFTSVPPGF,GFKMQSRRRK,KMQSRRRKWA,FTSVPPGFKM,FKMQSRRRKW	STAD
PLAU	c.602_603insG	p.R201fs	IIGGEFTTIENQPWFAAIYRRHRGG[p.R201fs]LCHLRVWRQPHQPLLGDQRHTLLH*	LLGDQRHTL,VWRQPHQPL,HLRVWRQPH,GLCHLRVWR,RHRGGLCHL,WRQPHQPLL,LLGDQRHTLL,VWRQPHQPLL,AIYRRHRGGL,RHRGGLCHLR,HLRVWRQPHQ,RVWRQPHQPL,RRHRGGLCHL,RGGLCHLRVW	STAD
PLCD3	c.1495delG	p.E499fs	KGRVLVKGKKLPAARSEDGRALSDR[p.E499fs]RRRRRMTRRKRRWRLQRRGGWPSRSPRSCRPWLCTATPPA*	WLCTATPPA,RALSDRRRR,RRRRRRMTR,RRRRRMTRR,RRRRMTRRK,RRRMTRRKK,RMTRRKKRR,KKRRWRLQR,KRRWRLQRR,RWRLQRRGG,GGWPSRSPR,WPSRSPRSC,SPRSCRPWL,RRKKRRWRL,LQRRGGWPS,RSPRSCRPW,RALSDRRRR,ALSDRRRRRR,RRRRRRMTRR,RRRRRMTRRK,RRRMTRRKK,MTRRKKRRWR,RKKRRWRLQR,KKRRWRLQRR,RWRLQRRGGW,LQRRGGWPSR,RGGWPSRSPR,RSPRSCRPWL,RSCRPWLCTA,RPWLCTATPP,TRRKKRRWRL,RMTRRKKRRW,SRSPRSCRPW	CLL
PLCE1	c.1315G>T	p.G439C	NTVGSLLHFLTKLPASETAHGRISV[p.G439C]CPCLKQCVRDTVCEYRATLQRTSISQ	RISVCPCLK,GRISVCPCL,HGRISVCPCL	LUSC
PLCE1	c.1690G>T	p.G564C	LMEQEQTIYRRVLPVDYLCFLTRDL[p.G564C]CTPECQSSLPCLKASISASILTTQNG	CTPECQSSL	LUAD
PLCL1	c.1692G>T	p.M564I	VKGKKLPSDPDVLEGEVTDEDEEAE[p.M564I]ISRRMSVDYNGEQKQIRLCRELSDLV	ISRRMSVDY,AEISRRMSV,EEAEISRRM,EISRRMSVDY,DEEAEISRRM	LUAD
PLEC	c.4157G>A	p.R1386Q	QDARRRQEQIQAMPLADSQAVREQL[p.R1386Q]QQEQALLEEIERHGEKVEECQRFAKQ	EQLQQEQAL,REQLQQEQA,REQLQQEQAL,EQLQQEQALL,QQEQALLEEI	ACC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PLEKHA6	c.329G>T	p.R110L	VDRCLFYYKDEKEESILGSIPLLSF[p.R110L]LVAAVQPSDNISRKHTFKAEHAGVRT	SIPLLSFLV,LLSFLVAAV,FLVAAVQPS,IPLLSFLVA,GSIPLLSFL,GSIPLLSFLV,PLLSFLVAAV,IPLLSFLVAA	LUAD
PLEKHA6	c.982delG	p.V328fs	TNPDKIAQRKSSMNQLQQWVNLRRG[p.V328fs]YPRLKTFGVPLGSILCLAGSLSTMAPTPPSTPMIISTTRQECGRRASVPCRPMIGSARPGPWRTSAMPSAMGVALPTSCESGRSPPATGGRMPPSGSQAPPGSQSIMMSWMPPLAPCAACPCSPAPTLCPAHPARAPTAVPAFTPLSAHPVPVLSGCHLAVRTSMLTLLPM*	RLKTFGVPL,CLAGSLSTM,SAMPSAMGV,IMMSWMPPL,MMSWMPPLA,WMPPLAPCA,FTPLSAHPV,PLSAHPVPV,VLSGCHLAV,NLRRGYPRL,TMAPTPPST,AMPSAMGVA,RMPPSGSQA,HLAVRTSML,RGYPRLKTF,RAPTAVPAF,LRRGYPRLK,STMAPTPPS,RASVPCRPM,SARPGPWRT,RTSAMPSAM,AVRTSMLTL,QWVNLRRGY,VNLRRGYPR,TPMIISTTR,STTRQECGR,TLCPAHPAR,CAACPCSPA,TAVPAFTPL,YPRLKTFGV,APTPPSTPM,RPGPWRTSA,MPSAMGVAL,SPPATGGRM,APPGSQSIM,MPPLAPCAA,CPCSPAPTL,SPAPTLCPA,HPARAPTAV,VPAFTPLSA,VPVLSGCHL,SQSIMMSWM,TSMLTLLPM,FGVPLGSIL,RQECGRRAS,IGSARPGPW,WRTSAMPSA,SAMGVALPT,CESGRSPPA,SQAPPGSQS,GSQSIMMSW,MSWMPPLAP,ARAPTAVPA,LSAHPVPVL,CHLAVRTSM,VRTSMLTLL,VPLGSILCL,QECGRRASV,TPPSTPMII,RTSMLTLLPM,CLAGSLSTMA,AMPSAMGVAL,SIMMSWMPPL,IMMSWMPPLA,WMPPLAPCAA,KTFGVPLGSI,SQAPPGSQSI,TLCPAHPARA,HLAVRTSMLT,AVRTSMLTLL,NLRRGYPRLK,WVNLRRGYPR,STPMIISTTR,RGYPRLKTFG,RLKTFGVPLG,STMAPTPPST,CGRRASVPCR,RASVPCRPMI,SARPGPWRTS,PWRTSAMPSA,RTSAMPSAMG,SWMPPLAPCA,QQWVNLRRGY,PTLCPAHPAR,VLSGCHLAVR,MAPTPPSTPM,TSAMPSAMGV,YPRLKTFGVP,APTPPSTPMI,RPMIGSARPG,RPGPWRTSAM,APPGSQSIMM,APTLCPAHPA,CPAHPARAPT,TPLSAHPVPV,RRGYPRLKTF,LCLAGSLSTM,RQECGRRASV,RRASVPCRPM,MIGSARPGPW,WRTSAMPSAM,SAMPSAMGVA,RMPPSGSQAP,MMSWMPPLAP,ARAPTAVPAF,GCHLAVRTSM,CHLAVRTSML,LAVRTSMLTL,MPSAMGVALP,MPPLAPCAAC,SPAPTLCPAH,VPAFTPLSAH,HPVPVLSGCH,CESGRSPPAT,VPLGSILCLA,VPVLSGCHLA	CRC,STAD
PLEKHB1	c.436T>C	p.S146P	TALLEANSTPAPAGATVPPRSRRVC[p.S146P]PKVRCVTRSWSPCKVERRIWVRVYSP	RSRRVCPKV,RVCPKVRCV,CPKVRCVTR,RSRRVCPKVR	CLL
PLEKHG4B	c.1150G>A	p.E384K	AIIFLQNSFCSLNTHRTPRTAQEVA[p.E384K]KLIDQHETMMKLVLEDPLLVSLRLEG	KLIDQHETM,RTAQEVAKL,KLIDQHETMM,AKLIDQHETM	CRC
PLEKHM1	c.2684C>T	p.A895V	RIIHNWDLTKRPICRQALKFLTQIR[p.A895V]VQPLINLQMVNASLYEHVERMHLIGR	TQIRVQPLI,LTQIRVQPL,LKFLTQIRV,IRVQPLINL,VQPLINLQM,FLTQIRVQPL,ALKFLTQIRV,QIRVQPLINL,RVQPLINLQM	TGCT
PLEKHM2	c.1376C>T	p.S459L	DQSFRTGSPGDAPERPPLCDFSEGL[p.S459L]LAPMDFYRFTVESPSTVTSGGGHHDP	LLAPMDFYR,LAPMDFYRF,GLLAPMDFY,FSEGLLAPM,LLAPMDFYRF,GLLAPMDFYR,SEGLLAPMDF,DFSEGLLAPM	BLCA
PLEKHO1	c.761delC	p.T254fs	QPSADRASSLSRPWEKTDKGATYTP[p.T254fs]RHPRS*	ATYTPRHPR,ATYTPRHPRS,GATYTPRHPR	STAD
PLEKHO2	c.1051G>C	p.E351Q	GEMQASGPPAPGTVQVSVNGMDDSP[p.E351Q]QPAKPSQAEGTPGTPPKDATTSTALP	GMDDSPQPA,GMDDSPQPAK,SPQPAKPSQA	CESC
PLIN5	c.916C>T	p.R306W	LETLVLSRSLTQELQGTVEALESSV[p.R306W]WGLPAGAQEKVAEVRRSVDALQTAFA	ALESSVWGL,ESSVWGLPA,SVWGLPAGA,VEALESSVW,EALESSVWGL,SSVWGLPAGA,LESSVWGLPA	ACC
PLK1	c.698A>G	p.D233G	KKTLCGTPNYIAPEVLSKKGHSFEV[p.D233G]GVWSIGCIMYTLLVGKPPFETSCLKE	SFEVGVWSI,KGHSFEVGV,GVWSIGCIM,FEVGVWSIG,GVWSIGCIMY,HSFEVGVWSI,EVGVWSIGCI,KGHSFEVGVW,VGVWSIGCIM,FEVGVWSIGC	CRC
PLOD3	c.888_889insC	p.P296fs	GWTPEGGCGFCNQDRRTLPGGQPPP[p.P296fs]PGVSGRVCGTAYSVSAPLPAAAATPGLSPRQGHPFPAQQRGLP*	RVCGTAYSV,SVSAPLPAA,SGRVCGTAY,AATPGLSPR,TAYSVSAPL,YSVSAPLPA,APLPAAAAT,LPAAAATPG,LSPRQGHPF,RQGHPFPAQ,VSGRVCGTAY,GTAYSVSAPL,SVSAPLPAAA,AAATPGLSPR,YSVSAPLPAA,LPAAAATPGL,SPRQGHPFPA,HPFPAQQRGL,GLSPRQGHPF,GRVCGTAYSV	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PLOD3	c.889delC	p.R297fs	GWTPEGGCGFCNQDRRTLPGGQPPP[p.R297fs]GCFWPCLWNSLLRFCPASCSGCYSWTIPPTGSPFSCTTTRSSMNPTSLTPGRSSRTTSQL*	FWPCLWNSL,CLWNSLLRF,NSLLRFCPA,TTRSSMNPT,RSSMNPTSL,RSSRTTSQL,SPFSCTTTR,SLTPGRSSR,TIPPTGSPF,CPASCSGCY,ASCSGCYSW,SCTTTRSSM,SMNPTSLTP,WPCLWNSLL,CFWPCLWNSL,FWPCLWNSLL,WTIPPTGSPF,TTRSSMNPTS,RSSMNPTSLT,TSLTPGRSSR,MNPTSLTPGR,FSCTTTRSSM,TRSSMNPTSL,SMNPTSLTPG,GRSSRTTSQL	CRC,STAD
PLSCR3	c.229G>A	p.E77K	FPSPGPVALGSAAPFLPLPGVPSGL[p.E77K]KFLVQIDQILIHQKAERVETFLGWET	KFLVQIDQI,VPSGLKFLV,GVPSGLKFLV,KFLVQIDQIL,LPGVPSGLKF,LKFLVQIDQI	CRC
PLXNA1	c.3046delC	p.P1016fs	LTPPGQSPGSAPIIININRAQLTNP[p.P1016fs]R*	INRAQLTNPR	STAD
PLXNA1	c.3883G>A	p.E1295K	ALECKEAFAELQTDiHELTNDLDGA[p.E1295K]SIPFLDYRTYAMRVLFPGIEDHPVLK	ASIPFLDYR,GASIPFLDY,DLDGASIPF,GASIPFLDYR,SIPFLDYRTY,LTNDLDGASI,NDLDGASIPF	UCEC
PLXNA2	c.1392_1393insCC	p.P464fs	YNGYSVVFVGTKSGKLKKIRADGPP[p.P464fs]PMVGSSTRWSLCSRTEAPSSGTWPSPLISATCTSCLRDRSPGSPWSHVSSIRLVGSA*	STRWSLCSR,KIRADGPPP,SATCTSCLR,WPSPLISAT,SPWSHVSSI,IRADGPPPM,PMVGSSTRW,VGSSTRWSL,TEAPSSGTW,ISATCTSCL,RDRSPGSPW,WSHVSSIRL,SPGSPWSHV,LISATCTSCL,SSTRWSLCSR,ISATCTSCLR,KIRADGPPPM,STRWSLCSRT,RWSLCSRTEA,MVGSSTRWSL,RTEAPSSGTW,WPSPLISATC,PPMVGSSTRW	STAD
PLXNA3	c.172C>T	p.P58S	LTHLAVHRVTGEVFVGAVNRVFKLA[p.P58S]SNLTELRAHVTGPVEDNARCYPPPSM	KLASNLTEL,RVFKLASNL,LASNLTELR,KLASNLTELR,RVFKLASNLT,FKLASNLTEL	HNSC
PLXNC1	c.1385C>T	p.S462L	IYIYLTAGKEVRRIRVANCNKHKSC[p.S462L]LECLTATDPHCGWCHSLQRCTFQGDC	NKHKSCLECL	CRC
PLXNC1	c.2455C>T	p.R819C	NINVSEYCVATYCGFLAPSLKSSKV[p.R819C]CTNVTVKLRVQDTYLDCGTLQYREDP	KVCTNVTVK,CTNVTVKLR,KSSKVCTNV,SKVCTNVTV,SSKVCTNVTV	CRC
PLXND1	c.1100G>T	p.R367L	GLQCAGGAGRGDLYSRLVSVFPARE[p.R367L]LLFAVFERPQGSPAARAAPAALCAFR	VFPARELLF,SVFPARELL,ELLFAVFER,ARELLFAVF,FPARELLFA,RELLFAVFE,SVFPARELLF,FPARELLFAV,PARELLFAVF	TGCT
PMEPA1	c.624delC	p.P208fs	RAPPNRTIFDSDLMDSARLGGPCPP[p.P208fs]AVTRASAPRATAAAGAWRGRRPPTARSSATTRGPPSSTSRAVGRPPCWRGPGSTTHTSRP*	RLGGPCPPA,AVTRASAPR,ATAAAGAWR,SSTSRAVGR,AVGRPPCWR,VTRASAPRA,RASAPRATA,AWRGRRPPT,RGRRPPTAR,TARSSATTR,AAGAWRGRR,SAPRATAAA,APRATAAAG,RPPTARSSA,RPPCWRGPG,RATAAAGAW,RAVGRPPCW,RLGGPCPPAV,VTRASAPRAT,RASAPRATAA,ASAPRATAAA,RATAAAGAWR,AWRGRRPPTA,RGRRPPTARS,TSRAVGRPPC,RAVGRPPCWR,TAAAGAWRGR,AAAGAWRGRR,CPPAVTRASA,APRATAAAGA,RPPTARSSAT,GPPSSTSRAV,ARLGGPCPPA	STAD
PMS2	c.1952A>G	p.K651R	AKRIKQLHHEAQQSEGEQNYRKFRA[p.K651R]RICPGENQAAEDELRKEISKTMFAEM	NYRKFRARI,KFRARICPG,RARICPGEN,QNYRKFRAR,KFRARICPGE,RARICPGENQ,EQNYRKFRAR,RKFRARICPG	TGCT
PNKP	c.520G>T	p.G174W	NLEKLLVFTAAGVKPQGKVAGFDLD[p.G174W]WTLITTRSGKVFPTGPSDWRILYPEI	AGFDLDWTL,WTLITTRSGK,DLDWTLITTR,GKVAGFDLDW	LUAD
PNLIP	c.110C>T	p.T37M	GAVAGKEVCYERLGCFSDDSPWSGI[p.T37M]MERPLHILPWSPKDVNTRFLLYTNEN	GIMERPLHI,SPWSGIMER,IMERPLHIL,GIMERPLHIL,DSPWSGIMER,MERPLHILPW	MM
PNPLA4	c.668T>C	p.L223P	LDLYVNIAKQDIMLSLANLVRLNQA[p.L223P]PFPPSKRKMESLYQCGFDDTVKFLLK	NQAPFPPSK,LVRLNQAPF,LNQAPFPPSK,NQAPFPPSKR,APFPPSKRKM,NLVRLNQAPF,RLNQAPFPPS	TGCT

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PNPLA7	c.3597delC	p.P1199fs	LAYVCCVRQLEVVKSSDYCEYLRPP[p.P1199fs]STATAPWTSASSTRSAKWATSTGARCLTSGAAAACWRRCSATSRGRARSPRVRSSPVPTPPSRTLPKLCLALSPPSPPWWMTNLTTRRSTRRSCWTSPGMHTQTSRAPQPSRAQTWRTSPHCGIDTPVWLSQNCLRAPLTRTGRGLC*	YLRPPSTAT,CLTSGAAAA,TLPKLCLAL,GMHTQTSRA,WLSQNCLRA,SQNCLRAPL,SASSTRSAK,STRSAKWAT,KWATSTGAR,GARCLTSGA,AACWRRCSA,RGRARSPRV,RARSPRVRS,RVRSSPVPT,RTLPKLCLA,TTRRSTRRS,STRRSCWTS,RSCWTSPGM,TSRAPQPSR,LTRTGRGLC,SATSRGRAR,WWMTNLTTR,WMTNLTTRR,NLTTRRSTR,LTTRRSTRR,VWLSQNCLR,RAPLTRTGR,TATAPWTSA,ATAPWTSAS,APWTSASST,SPRVRSSPV,VPTPPSRTL,SPPWWMTNL,APQPSRAQT,RSAKWATST,AKWATSTGA,ALSPPSPPW,AQTWRTSPH,PPSTATAPW,CEYLRPPST,YLRPPSTATA,TSASSTRSAK,RTLPKLCLAL,STATAPWTSA,STRSAKWATS,SAKWATSTGA,GARCLTSGAA,AAACWRRCSA,CWRRCSATSR,TSRGRARSPR,RGRARSPRVR,RARSPRVRSS,RSPRVRSSPV,RVRSSPVPTP,RSSPVPTPPS,TTRRSTRRSC,STRRSCWTSP,TSRAPQPSRA,RAQTWRTSPH,TWRTSPHCGI,CSATSRGRAR,WWMTNLTTRR,TNLTTRRSTR,NLTTRRSTRR,QTSRAPQPSR,PVWLSQNCLR,WTSASSTRSA,RPPSTATAPW,TPPSRTLPKL,APQPSRAQTW,SPHCGIDTPV,TPVWLSQNCL,APLTRTGRGL,CEYLRPPSTA,SASSTRSAKW,WATSTGARCL,LALSPPSPPW,ALSPPSPPWW,RRSCWTSPGM,AQTWRTSPHC,LSQNCLRAPL,SQNCLRAPLT,LTSGAAAACW	STAD
PNRC1	c.217C>T	p.R73C	PRALPPTLFLPHFLGGDGPCLTPQP[p.R73C]CAPAALPNRSLAVAGGTPRAAPKKRR	LTPQPCAPA,TPQPCAPAA,CLTPQPCAPA,TPQPCAPAAL	CESC
PODN	c.903delC	p.I301fs	RHVPKHLPPALYKLHLKNNKLEKIP[p.I301fs]RGPSAS*	LEKIPRGPSA	STAD
PODNL1	c.449C>T	p.A150V	QLQHLCVAHNKLSVAPQFLPRSLRV[p.A150V]VDLAANQVMEIFPLTFGEKPALRSVY	FLPRSLRVV,RSLRVVDLA,VDLAANQVM,RVVDLAANQV,RSLRVVDLAA,LPRSLRVVDL	GBM
PODXL	c.486_487insC	p.S162fs	TATAKPNTTSSQNGAEDTTNSGGKS[p.S162fs]QPQCDHRPHIH*	QPQCDHRPHI,SQPQCDHRPH	GBM
POGZ	c.223G>T	p.G75W	SAPVPIAAHASVAGHLSTSTTVSSS[p.G75W]WAQNSDSTKKTLVTLIANNNAGNPLV	TSTTVSSSW,STSTTVSSSW	LUAD
POLA1	c.1809G>T	p.E603D	PFQSHFCVVSKPKDCIFPYAFKEVI[p.E603D]DKKNVKVEVAATERTLLGFFLAKVHK	YAFKEVIDK,AFKEVIDKK,YAFKEVIDKK,EVIDKKNVKV	CRC
POLE	c.1231G>T	p.V411L	EIGFQKDSQGEYKAPQCIHMDCLRW[p.V411L]LKRDSYLPVGSHNLKAAAKAKLGYDP	HMDCLRWLK,RWLKRDSYL,IHMDCLRWL,LRWLKRDSY,LKRDSYLPV,WLKRDSYLPV,IHMDCLRWLK,CLRWLKRDSY,HMDCLRWLKR,LRWLKRDSYL	CRC,UCEC
POLE	c.1376C>T	p.S459F	YDPVELDPEDMCRMATEQPQTLATY[p.S459F]FVSDAVATYYLYMKYVHPFIFALCTI	FVSDAVATY,ATYFVSDAV,QPQTLATYF,FVSDAVATYY,TLATYFVSDA,ATYFVSDAVA,YFVSDAVATY,LATYFVSDAV,EQPQTLATYF,QPQTLATYFV	CRC
POLE	c.1718G>T	p.R573L	ESGVFRSDIPCRFRMNPAAFDFLLQ[p.R573L]LVEKTLRHALEEEEKVPVEQVTNFEE	FLLQLVEKT,DFLLQLVEK,AAFDFLLQL,AAFDFLLQLV,FLLQLVEKTL,QLVEKTLRHA,LQLVEKTLRH	LUAD
POLE	c.857C>G	p.P286R	DDLVERPDPVVLAFDIETTKLPLKF[p.P286R]RDAETDQIMMISYMIDGQGYLITNRE	TTKLPLKFR,RDAETDQIM,KFRDAETDQI,ETTKLPLKFR,RDAETDQIMM	UCEC
POLM	c.290delC	p.P97fs	EETSAEEAVSWQERRMAAAPPGCTP[p.P97fs]QLCWT*	APPGCTPQL	STAD
POLQ	c.2579G>A	p.R860Q	NAVPFKSARKAVDEEEEAVEERRNM[p.R860Q]QTIWVTGRKGLTEREAAALIVEEARM	QTIWVTGRK,MQTIWVTGR,RNMQTIWVT,MQTIWVTGRK,NMQTIWVTGR,RNMQTIWVTG,EERRNMQTIW	CRC
POLR1C	c.994A>C	p.K332Q	IFSVESTGVLPPDVLVSEAIKVLMG[p.K332Q]QCRRFLDELDAVQMD*	KVLMGQCRR,VLMGQCRRF,LMGQCRRFL,VLMGQCRRFL,AIKVLMGQCR,KVLMGQCRRF,GQCRRFLDEL	KIRC
POLR3B	c.1114C>T	p.L372F	GDNKVDDRDYYGNKRLELAGQLLSL[p.L372F]FFEDLFKKFNSEMKKIADQVIPKQRA	LLSLFFEDL,SLFFEDLFK,LFFEDLFKK,LSLFFEDLF,FFEDLFKKF,LAGQLLSLF,AGQLLSLFF,QLLSLFFEDL,LSLFFEDLFK,SLFFEDLFKK,LFFEDLFKKF,ELAGQLLSLF,LAGQLLSLFF,LLSLFFEDLF	BLCA

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
POM121L12	c.691C>A	p.P231T	GRRNLQPRPSAFKPLSKNGAVASFV[p.P231T]TRPGPLKPSLGPWSLSFCDDAWPSVL	FVTRPGPLK,GAVASFVTR,SFVTRPGPL,SFVTRPGPLK,ASFVTRPGPL,NGAVASFVTR	LUAD
POM121L12	c.725C>A	p.P242H	FKPLSKNGAVASFVPRPGPLKPSLG[p.P242H]HWSLSFCDDAWPSVLVQPAPSAIWDF	SLGHWSLSF,KPSLGHWSL,PSLGHWSLSF,LKPSLGHWSL,GPLKPSLGHW	LUAD
PON1	c.917G>A	p.R306Q	WVGCHPNGMKIFFYDSENPPASEVL[p.R306Q]QIQNILTEEPKVTQVYAENGTVLQGS	SEVLQIQNI,LQIQNILTE,PPASEVLQI,SEVLQIQNIL,NPPASEVLQI	UCEC
POP1	c.2248delA	p.K750fs	VASSPNGKESDLRRSEVPCAPMPKK[p.K750fs]LISHLMKWAHP*	LISHLMKWA,KLISHLMKW,KKLISHLMK,APMPKKLIS,MPKKLISHL,ISHLMKWAH,KLISHLMKWA,APMPKKLISH,MPKKLISHLM,KKLISHLMKW	STAD
POSTN	c.1522C>T	p.R508C	GAIHIFREIIKPAEKSLHEKLKQDK[p.R508C]CFSTFLSLLEAADLKELLTQPGDWTL	KQDKCFSTF,CFSTFLSLL,KCFSTFLSL,KQDKCFSTFL,LKQDKCFSTF,KCFSTFLSLL	CRC
POTEC	c.1519A>G	p.K507E	EEQNTGISQDEILTNKQKQIEVAEK[p.K507E]EMNSELSLSHKKEEDLLRENSMLQEE	AEKEMNSEL,KEMNSELSL,KEMNSELSLS,AEKEMNSELS	GBM,PRAD
POTEE	c.496G>A	p.V166M	DKLHRAAWWGKVPRKDLIVMLRDTD[p.V166M]MNKKDKQKRTALHLASANGNSEVVKL	MLRDTDMNKK	GBM
POTEE	c.862G>A	p.V288M	ADIESKNKHGLTPLLLGVHEQKQQV[p.V288M]MKFLIKKKANLNALDRYGRTALILAV	QVMKFLIKK,VMKFLIKKK,KQQVMKFLI,QQVMKFLIK,VHEQKQQVM,EQKQQVMKF,QVMKFLIKK,KQQVMKFLIK,QQVMKFLIKK,GVHEQKQQVM,HEQKQQVMKF	LUAD
POTEE	c.908G>T	p.R303I	LGVHEQKQQVVKFLIKKKANLNALD[p.R303I]IYGRTALILAVCCGSASIVSLLLEQN	IYGRTALIL,DIYGRTALI,KANLNALDI,ANLNALDIY,LDIYGRTAL,ALDIYGRTAL,IYGRTALILA,KANLNALDIY,NLNALDIYGR,KKANLNALDI	UCEC
POTEF	c.2022G>T	p.K674N	STLREEIAMLRLELDTMKHQSQLRE[p.K674N]NKYLEDIESVKKRNDNLLKALQLNEL	SQLRENKYL,RENKYLEDI,KHQSQLRENK,HQSQLRENKY,NKYLEDIESV	UCEC
POTEF	c.334A>G	p.S112G	DDSAMKTLRNKMGKWCCHCFPCCRG[p.S112G]GSKSKVGAWGDYDDSAFMEPRYHVRG	CCRGGSKSK	TGCT
POTEG	c.151G>A	p.D51N	KWCRHCFPWCRGSGKSNVGTSGDHD[p.D51N]NSAMKTLRSKMGKWCRHCFPWCRGSS	DNSAMKTLR,NSAMKTLRSK	SKCM
POTEG	c.407G>A	p.R136H	GSGKSKVGPWGDYDDSAFMEPRYHV[p.R136H]HREDLDKLHRAAWWGKVPRKDLIVML	HVHREDLDK,FMEPRYHVH,FMEPRYHVHR	GBM
POU2F2	c.715A>G	p.T239A	RIKLGFTQGDVGLAMGKLYGNDFSQ[p.T239A]ATISRFEALNLSFKNMCKLKPLLEKW	ATISRFEAL,DFSQATISR,FSQATISRF,KLYGNDFSQA,SQATISRFEA,DFSQATISRF,YGNDFSQATI	DLBCL
POU2F2	c.715A>T	p.T239S	RIKLGFTQGDVGLAMGKLYGNDFSQ[p.T239S]STISRFEALNLSFKNMCKLKPLLEKW	STISRFEAL,FSQSTISRF,DFSQSTISR,DFSQSTISRF,YGNDFSQSTI,SQSTISRFEA	DLBCL
POU3F3	c.961G>T	p.D321Y	GGGGGAGPGLNSHDPHSDEDTPTSD[p.D321Y]YLEQFAKQFKQRRIKLGFTQADVGLA	YLEQFAKQF,DEDTPTSDY,TSDYLEQFAK,DYLEQFAKQF,TPTSDYLEQF	LUAD
PPARGC1B	c.403delC	p.P135fs	AFPALDGGDALSCTSASPAPSSAPP[p.P135fs]ALPRRSPRPQPLRWTSSHCCRSSSWPHPTQHQALTPRRKGPPGARQASDLKVNGLVLRRTAPKTRRLP*	KVNGLVLRR,LVLRRTAPK,SSAPPALPR,RSPRPQPLR,SSHCCRSSS,HQALTPRRK,GARQASDLK,RTAPKTRRL,PALPRRSPR,TQHQALTPR,APSSAPPAL,RPQPLRWTS,WPHPTQHQA,RRSPRPQPL,SHCCRSSSW,SPRPQPLRW,ASDLKVNGLV,GLVLRRTAPK,SSAPPALPRR,VLRRTAPKTR,RTAPKTRRLP,DLKVNGLVLR,SPAPSSAPPA,SPRPQPLRWT,RPQPLRWTSS,WPHPTQHQAL,TPRRKGPPGA,SSHCCRSSSW,SDLKVNGLVL	STAD
PPIL4	c.1146T>A	p.S382R	PKQDTKYDLILDEQAEDSKSSHSHT[p.S382R]RKKHKKKTHHCSEEKEDEDYMPIKNT	KSSHSHTRK,SSHSHTRKK,HSHTRKKHK,HTRKKHKKK,KSSHSHTRKK,HSHTRKKHKK,DSKSSHSHTR	CLL

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PPL	c.1362delC	p.P454fs	GESWELMDSAGNKLIAPAVCFVIPP[p.P454fs]QTLRPWLWLTAWAASTGACGRRQLGANARCSSGMRC*	TLRPWLWLT,WLWLTAWAA,WLTAWAAST,FVIPPQTLR,CFVIPPQTL,PQTLRPWLW,NARCSSGMR,TAWAASTGA,RPWLWLTAW,RQLGANARC,ANARCSSGM,IPPQTLRPW,TLRPWLWLTA,LTAWAASTGA,CGRRQLGANA,CFVIPPQTLR,WAASTGACGR,IPPQTLRPWL,RPWLWLTAWA,RQLGANARCS,GANARCSSGM	STAD
PPL	c.976C>T	p.H326Y	DWKEYLNLLICEESHLKYMEDYHQF[p.H326Y]YEDVKDAQELLRKVDSDLNQKYGPDF	YMEDYHQFY,KYMEDYHQFY,HQFYEDVKDA,YEDVKDAQEL	BLCA
PPM1E	c.931C>T	p.R311W	IHLHVNLVRQEMFPHDPAEALCRAF[p.R311W]WVTDERFVQKAARESLRCGTTGVVTF	RAFWVTDER,AFWVTDERF,EALCRAFWV,AEALCRAFW,WVTDERFVQK,RAFWVTDERF,AEALCRAFWV	KIRC
PPM1H	c.678delC	p.P226fs	NSRTLTRAASLRGGVGAPGSPSTPP[p.P226fs]HASLPRRRFPMSAWSSERLKVHSRKWTYR*	SLPRRRFPM,SAWSSERLK,ASLPRRRFP,RLKVHSRKW,KVHSRKWTY,PMSAWSSER,MSAWSSERL,FPMSAWSSE,LPRRRFPMS,HASLPRRRF,RRRFPMSAW,MSAWSSERLK,KVHSRKWTYR,STPPHASLPR,ASLPRRRFPM,SERLKVHSRK,RLKVHSRKWT,FPMSAWSSER,SPSTPPHASL,LPRRRFPMSA,RRFPMSAWSS,LKVHSRKWTY	STAD
PPP1R12C	c.1116delC	p.P372fs	LSSREKISLQDLSKERRPGGAGGPP[p.P372fs]SRTRMRGKKVPPNHPLQNPEPSMASPPRRTPALRVPCSLKRPPSPGALAS*	ALRVPCSLK,PSRTRMRGK,RTRMRGKKV,RMRGKKVPP,RGKKVPPNH,ASPPRRTPA,SLKRPPSPG,SPPRRTPAL,RPPSPGALA,KKVPPNHPL,LQNPEPSMA,SLKRPPSPGA,PSRTRMRGKK,RTRMRGKKVP,RMRGKKVPPN,MASPPRRTPA,ALRVPCSLKR,RPGGAGGPPS,HPLQNPEPSM,TPALRVPCSL,LKRPPSPGAL,GKKVPPNHPL,LQNPEPSMAS	STAD
PPP2R1A	c.536C>G	p.P179R	CYPRVSSAVKAELRQYFRNLCSDDT[p.P179R]RMVRRAAASKLGEFAKVLELDNVKSE	TRMVRRAAA,RMVRRAAAS,NLCSDDTRMV,RMVRRAAASK,RNLCSDDTRM	UCEC,UCS
PPP2R1A	c.547C>T	p.R183W	VSSAVKAELRQYFRNLCSDDTPMVR[p.R183W]WAAASKLGEFAKVLELDNVKSEIIPM	MVRWAAASK,DTPMVRWAA,TPMVRWAAA,VRWAAASKL,CSDDTPMVRW,MVRWAAASKL,DTPMVRWAAA,TPMVRWAAAS,WAAASKLGEF	CRC,UCS
PPP2R1A	c.656C>T	p.S219L	KVLELDNVKSEIIPMFSNLASDEQD[p.S219L]LVRLLAVEACVNIAQLLPQEDLEALV	DEQDLVRLL,NLASDEQDLV,DEQDLVRLLA	UCS
PPP2R1A	c.767C>T	p.S256F	IAQLLPQEDLEALVMPTLRQAAEDK[p.S256F]FWRVRYMVADKFTELQKAVGPEITKT	KFWRVRYMV,FWRVRYMVA,QAAEDKFWR,RQAAEDKFW,DKFWRVRYM,KFWRVRYMVA,QAAEDKFWRV,TLRQAAEDKF,AEDKFWRVRY	UCEC
PPP2R2B	c.977C>T	p.P326L	SKGTIRLCDMRASALCDRHTKFFEE[p.P326L]LEDPSNRSFFSEIISSISDVKFSHSG	RHTKFFEEL,LEDPSNRSF,ELEDPSNRSF,LEDPSNRSFF	CRC
PPP2R3B	c.1165delA	p.T389fs	RKVQKEGKISYADFVWFLISEEDKK[p.T389fs]HRPASSTGSAAWTWTGTAPCPCSSSSTSTRSSAEGWTAWPSRPCPSRTASARCWTWSSRGLKGRSRCRT*	WTWSSRGLK,CSSSSTSTR,STGSAAWTW,SSTSTRSSA,RTASARCWT,SARCWTWSS,EGWTAWPSR,WTWTGTAPC,WTAWPSRPC,RPASSTGSA,RPCPSRTAS,SSAEGWTAW,KKHRPASST,ASSTGSAAW,RSSAEGWTA,AEGWTAWPS,TASARCWTW,RTASARCWTW,SSSTSTRSSA,SARCWTWSSR,CWTWSSRGLK,SSRGLKGRSR,RGLKGRSRCR,TWSSRGLKGR,SAAWTWTGTA,RPASSTGSAA,RPCPSRTASA,SSTGSAAWTW,RSSAEGWTAW,RCWTWSSRGL,SEEDKKHRPA	STAD
PPP2R3B	c.930C>A	p.F310L	ELRRSSFLQNVALLEEEADINQLTE[p.F310L]LFSYEHFYVIYCKFWELDTDHDLLID	LTELFSYEH,NQLTELFSY,ELFSYEHFY,ADINQLTEL,TELFSYEHF,ELFSYEHFYV,LFSYEHFYVI,INQLTELFSY,ADINQLTELF,LTELFSYEHF,TELFSYEHFY	UCEC
PPP2R5C	c.776C>A	p.S259Y	GFALPLKEEHKIFLLKVLLPLHKVK[p.S259Y]YLSVYHPQLAYCVVQFLEKDSTLTEP	YLSVYHPQL,KYLSVYHPQ,KVKYLSVYH,LPLHKVKYL,LHKVKYLSV,HKVKYLSVY,YLSVYHPQLA,LLPLHKVKYL,KYLSVYHPQL,KVKYLSVYHP,VLLPLHKVKY,LHKVKYLSVY,HKVKYLSVYH	CRC
PPP4R1	c.1791G>C	p.L597F	DSVPLISDAVENMDSTLHYIHSDSD[p.L597F]FSNNSSFSPDEERRTKVQDVVPQALL	HYIHSDSDF,SDFSNNSSF,LHYIHSDSDF	CESC
PPP6C	c.901C>T	p.R301C	LVHEGYKFMFDEKLVTVWSAPNYCY[p.R301C]CCGNIASIMVFKDVNTREPKLFRAVP	CYCCGNIASI,YCCGNIASIM	SKCM

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PPT2	c.794G>T	p.R265L	WQSSFFGFYDANETVLEMEEQLVYL[p.R265L]LDSFGLKTLLARGAIVRCPMAGISHT	YLLDSFGLK,VYLLDSFGL,QLVYLLDSF,MEEQLVYLL,LVYLLDSFGL,YLLDSFGLKT,LLDSFGLKTL,EQLVYLLDSF	LUAD
PRAM1	c.802G>A	p.A268T	QPEFSEAAQTPLWKPQSSEPKRDSS[p.A268T]TFPKKASQPPLSDFPKKPPQPELGDL	RDSSTFPKK,EPKRDSSTF,SEPKRDSSTF	UCEC
PRAMEF11	c.251G>C	p.C84S	KLQVLDLQDVCENFWMVWSEAMAHG[p.C84S]SFLNAKRNKTPVQDCPRMRERQPLTV	MAHGSFLNA,SFLNAKRNK,HGSFLNAKR,EAMAHGSFL,SEAMAHGSF,AMAHGSFLNA,MAHGSFLNAK,GSFLNAKRNK,WSEAMAHGSF,SEAMAHGSFL	SKCM
PRAMEF11	c.311G>A	p.R104Q	AMAHGCFLNAKRNKTPVQDCPRMRE[p.R104Q]QQPLTVFVELWLKNRTLDEYLTCLLL	RMREQQPLT,EQQPLTVFV,REQQPLTVF,RMREQQPLTV,CPRMREQQPL,MREQQPLTVF,REQQPLTVFV	CLL
PRAMEF4	c.743G>A	p.R248H	LTQFTPYLGHMRNLQKLILSHMDVS[p.R248H]HYVSPEQKKEIVTQFTTQFLKLRCLQ	LSHMDVSHY,SHMDVSHYV,VSHYVSPEQK,ILSHMDVSHY,LSHMDVSHYV	CRC
PRAMEF8	c.1342A>G	p.I448V	ALCWGRFAELGAELMKTPRDLRQPK[p.I448V]VIVFCTVPCPRCGIRASYDLEPSHCL	LRQPKVIVF,TPRDLRQPKV,DLRQPKVIVF,QPKVIVFCTV	TGCT
PRAMEF8	c.956G>A	p.R319H	LEMVVMTDCLLSESDLKHLSWCPSI[p.R319H]HQLKELDLRGVTLTHFSPEPLTGLLE	SWCPSIHQL,HLSWCPSIH,SWCPSIHQLK,CPSIHQLKEL,LSWCPSIHQL	PRAD
PRB1	c.820delC	p.R274fs	KPQGPPPPGKPQGPPAQGGSKSQSA[p.R274fs]DLLQESHKDHPNKKATILKVPHLQQEAIPSSLRHLLLDSPRDHHALLKGADLPDLPSDSLPSHLGFNDRK*	HPNKKATIL,VPHLQQEAI,IPSSLRHLL,SPRDHHALL,LPDLPSDSL,DSLPSHLGF,SKSQSADLL,LQQEAIPSS,QQEAIPSSL,LPSDSLPSH,LQQEAIPSSL,AIPSSLRHLL,LLKGADLPDL,SADLLQESHK,SPRDHHALLK,EAIPSSLRHL,IPSSLRHLLL,LPSDSLPSHL,KKATILKVPH,LKVPHLQQEA,SDSLPSHLGF	HNSC
PRDM1	c.1763C>G	p.S588C	PYPLKKQNGKIKYECNVCAKTFGQL[p.S588C]CNLKVHLRVHSGERPFKCQTCNKGFT	KTFGQLCNL,GQLCNLKVH,KTFGQLCNLK,QLCNLKVHLR,AKTFGQLCNL,GQLCNLKVHL	MM
PRDM16	c.3107C>T	p.P1036L	HLCNRCFGQQTNLDRHLKKHEHENA[p.P1036L]LVSQHPGVLTNHLGTSASSPTSESDN	ALVSQHPGV,KKHEHENAL,HEHENALVS,HENALVSQH,ALVSQHPGVL,LKKHEHENAL,KKHEHENALV	LUAD
PRDM16	c.811G>C	p.E271Q	RRHKKYTCGSVGAALYEGLAEELKP[p.E271Q]QGLGGGSGQAHECKDCERMFPNKYSL	AEELKPQGL	BLCA
PRDM4	c.2404T>A	p.*802K	DSVGTEDCRINSAVYSADESLSAHK[p.*802K]KKEKKQAILDENANGKIHITSYLL*	KIHITSYLL,SAHKKKEKK,NGKIHITSY,GKIHITSYL,ILDENANGKI,SLSAHKKKEK,AILDENANGK,ANGKIHITSY,NGKIHITSYL,GKIHITSYLL	CLL
PRDM7	c.1159A>C	p.M387L	GQELGIRSSIEPAESLGQAVNCWSG[p.M387L]LGMSMARNWASSGAASGRKSSWQGEN	SGLGMSMAR,QAVNCWSGL,VNCWSGLGM,CWSGLGMSM,LGMSMARNW,GQAVNCWSGL,AVNCWSGLGM,NCWSGLGMSM	PRAD
PRELP	c.601G>T	p.D201Y	LRLSQNHISRIPPGVFSKLENLLLL[p.D201Y]YLQHNRLSDGVFKPDTFHGLKNLMQL	KLENLLLLY,LLYLQHNRL,LLLYLQHNR,LENLLLLYL,KLENLLLLYL,LLLYLQHNRL,SKLENLLLLY,LLLLYLQHNR	LUAD
PREP	c.1407C>A	p.F469L	SKDGTKIPMFIVHKKGIKLDGSHPA[p.F469L]LLYGYGGFNISITPNYSVSRLIFVRH	KLDGSHPAL,SHPALLYGY,ALLYGYGGF,KLDGSHPALL,LLYGYGGFNI,GSHPALLYGY,LDGSHPALLY,IKLDGSHPAL	CESC
PREX1	c.2191G>A	p.V731I	AKEIIKIPDQPDTLCFQIRGAAPPY[p.V731I]IYAVGRGSEAMAAGLCAGQCILKVNG	AAPPYIYAV,RGAAPPYIY,GAAPPYIYAV,QIRGAAPPYI,RGAAPPYIYA,IRGAAPPYIY	CRC
PREX1	c.3736G>A	p.E1246K	CLEHLFNQVDSINALLKGPVMSRAF[p.E1246K]KETKHFPMNHSLQEFKQKEECTIRGR	MSRAFKETK,FKETKHFPM,RAFKETKHF,VMSRAFKETK,KGPVMSRAFK,MSRAFKETKH,AFKETKHFPM,SRAFKETKHF	UCEC
PREX2	c.1088G>A	p.R363Q	WFVCMAKTPEEKHEWFEAILKERER[p.R363Q]QKGLKLGMEQDTWVMISEQGEKLYKM	ILKERERQK,RQKGLKLGM,KERERQKGL,RERQKGLKL,AILKERERQK,KERERQKGLK	BRCA
PREX2	c.1686_1687insT	p.R562fs	CDNGFMHHVLEKSEFKDEPLLFRFF[p.R562fs]FG*	EPLLFRFFF,DEPLLFRFFF	STAD
PRG4	c.2023A>C	p.N675H	PTTPEEPTPTTPEEPAPTTPKAAAP[p.N675H]HTPKEPAPTTPKEPAPTTPKEPAPTT	KAAAPHTPK,APHTPKEPA	CLL

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PRIC285	c.3865G>C	p.E1289Q	LFWVQIVLWRQGFYYPLGIVREVLP[p.E1289Q]QASTWEQGLRILGLEYSLRVPPSDQA	IVREVLPQA,REVLPQAST,EVLPQASTW,GIVREVLPQA,QASTWEQGLR,REVLPQASTW	BLCA
PRKAA2	c.1220G>A	p.R407Q	CPLDALNTTKPKSLAVKKAKWHLGI[p.R407Q]QSQSKPYDIMAEVYRAMKQLDFEWKV	GIQSQSKPY,KAKWHLGIQS,LGIQSQSKPY,IQSQSKPYDI	CRC
PRKAB1	c.311C>A	p.P104H	PTVFRWTGGGKEVYLSGSFNNWSKL[p.P104H]HLTRSHNNFVAILDLPEGEHQYKFFV	NWSKLHLTR,HLTRSHNNF,FNNWSKLHL,SKLHLTRSH,HLTRSHNNFV,SFNNWSKLHL,NNWSKLHLTR,LHLTRSHNNF	CLL
PRKAR2B	c.926C>T	p.S309L	ERLKVVDVIGTKVYNDGEQIIAQGD[p.S309L]LADSFFIVESGEVKITMKRKGKSEVE	DLADSFFIV,AQGDLADSF,GDLADSFFI,AQGDLADSFF,IAQGDLADSF,GEQIIAQGDL,GDLADSFFIV	CRC
PRKCD	c.1294delG	p.G432fs	FLTHLICTFQTKDHLFFVMEFLNGG[p.G432fs]T*	FVMEFLNGGT	GBM
PRKCE	c.470_471insG	p.Q157fs	SSGEAPKDNEERVFRERMRPRKRQG[p.Q157fs]GRQAQGPSGQRPQVHGHLSSAAHLLLPLQRLHLGCHRKAGIPVSSLHLRGPQAVPRAHNHKVCWVKEAGDPRPGGLPAVQRQHAPQVRYPQLQGPYLLRSLWVPALGTLAAGFAV*	HLSSAAHLL,YLLRSLWVP,GTLAAGFAV,QVHGHLSSA,SLHLRGPQA,LLRSLWVPA,RLHLGCHRK,AVPRAHNHK,PYLLRSLWV,LWVPALGTL,RPRKRQGGR,HNHKVCWVK,VQRQHAPQV,RQHAPQVRY,RSLWVPALG,RYPQLQGPY,WVKEAGDPR,QLQGPYLLR,SAAHLLLPL,GPSGQRPQV,RPQVHGHLS,VPRAHNHKV,DPRPGGLPA,APQVRYPQL,YPQLQGPYL,VPALGTLAA,ALGTLAAGF,RKRQGGRQA,GQRPQVHGH,HGHLSSAAH,GHLSSAAHL,LSSAAHLLL,LQRLHLGCH,CHRKAGIPV,KAGIPVSSL,LHLRGPQAV,RAHNHKVCW,PQLQGPYLL,GPYLLRSLW,LRSLWVPAL,HLSSAAHLL,LLLPLQRLHL,SLHLRGPQAV,YLLRSLWVPA,LLRSLWVPAL,SLWVPALGTL,ALGTLAAGFA,AAHLLLPLQR,RYPQLQGPYL,RMRPRKRQGG,LQRLHLGCHR,RLHLGCHRKA,SSLHLRGPQA,HLRGPQAVPR,QAVPRAHNHK,RAHNHKVCWV,VQRQHAPQVR,VRYPQLQGPY,SSAAHLLLPL,RPQVHGHLSS,VPRAHNHKVC,DPRPGGLPAV,YPQLQGPYLL,GPYLLRSLWV,HLGCHRKAGI,GQRPQVHGHL,HGHLSSAAHL,GHLSSAAHLL,RKAGIPVSSL,AGIPVSSLHL,RQHAPQVRYP,LQGPYLLRSL,VPALGTLAAG	KIRC
PRKCG	c.1033C>T	p.R345C	SSSPIPSPSPSPTDPKRCFFGASPG[p.R345C]CLHISDFSFLMVLGKGSFGKVMLAER	CLHISDFSF,CLHISDFSFL,SPGCLHISDF,GCLHISDFSF	STAD
PRKCI	c.1438C>T	p.R480C	IVGSSDNPDQNTEDYLFQVILEKQI[p.R480C]CIPRSLSVKAASVLKSFLNKDPKERL	KQICIPRSL,CIPRSLSVK,KQICIPRSLS,LEKQICIPRS	CRC
PRKCQ	c.971C>T	p.A324V	GMNVHHRCQTKVANLCGINQKLMAE[p.A324V]VLAMIESTQQARCLRDTEQIFREGPV	KLMAEVLAM,LMAEVLAMI,NQKLMAEVL,AEVLAMIES,GINQKLMAEV,KLMAEVLAMI,QKLMAEVLAM,AEVLAMIEST	UCEC
PRKDC	c.10702C>G	p.Q3568E	DTSTGHKNKEFVARIKSKLDQGGVI[p.Q3568E]EDFINALDQLSNPELLFKDWSNDVRA	GVIEDFINA,GVIEDFINAL	CESC
PRKRA	c.366G>T	p.K122N	NILKANASICFAVPDPLMPDPSKQP[p.K122N]NNQLNPIGSLQELAIHHGWRLPEYTL	QPNNQLNPI,KQPNNQLNPI	CRC
PRMT8	c.84delC	p.S28fs	SSRCLLLRRKMAENAAESTEVNSPP[p.S28fs]PSPPSPSSLLSPCNASIMCPLNPAAQDGARCPSC*	LLSPCNASI,SIMCPLNPA,IMCPLNPAA,SPPSPSSLL,LSPCNASIM,SLLSPCNASI,SIMCPLNPAA,LLSPCNASIM,PPSPPSPSSL	STAD
PRMT8	c.91T>C	p.S31P	SSRCLLLRRKMAENAAESTEVNSPP[p.S31P]PQPPQPVVPAKPVQCVHHVSTQPSCP	SPPPQPPQPV	BLCA
PRODH	c.1579C>G	p.L527V	TVRFALRRMEELGLHPADHRVYFGQ[p.L527V]VLGMCDQISFPLGQAGYPVYKYVPYG	VYFGQVLGM,RVYFGQVLG,HRVYFGQVL,RVYFGQVLGM,VLGMCDQISF,GQVLGMCDQI	TGCT
PROKR2	c.889G>A	p.V297I	KTVLVLMCILTAYVLCWAPFYGFTI[p.V297I]IRDFFPTVFVKEKHYLTAFYVVECIA	IIRDFFPTV,GFTIIRDFF,TIIRDFFPT,APFYGFTII,YGFTIIRDF,IRDFFPTVF,TIIRDFFPTV,FYGFTIIRDF,YGFTIIRDFF,APFYGFTIIR,FTIIRDFFPT,IIRDFFPTVF	GBM

基因	cDNA變化	蛋白質變化	突變背景序列	胜肽	實例性疾病
PROX1	c.1774delT	p.F592fs	SPYSGSAMQEGLSPNHLKKAKLMFF[p.F592fs]IPVIPAPIC*	KLMFFIPVI,FIPVIPAPI,KAKLMFFIP,MFFIPVIPA,KKAKLMFFI,AKLMFFIPV,LMFFIPVIPA,FFIPVIPAPI,KAKLMFFIPV,AKLMFFIPVI	STAD
PROX1	c.674T>A	p.V225D	PRESYRENKRKQKLPQQQQQSFQQL[p.V225D]DSARKEQKREERRQLKQQLEDMQKQL	SFQQLDSAR,QSFQQLDSAR	KIRC
PRPF31	c.865C>T	p.R289W	STSVLPHTGYIYHSDIVQSLPPDLR[p.R289W]WKAARLVAAKCTLAARVDSFHESTEG	RWKAARLVA,DLRWKAARL,WKAARLVAA,LRWKAARLV,LPPDLRWKA,SLPPDLRWKA,QSLPPDLRWK,RWKAARLVAA,DLRWKAARLV,VQSLPPDLRW,LRWKAARLVA,LPPDLRWKAA	TGCT
PRPF6	c.2288G>T	p.R763L	KCPHSTPLWLLLSRLEEKIGQLTRA[p.R763L]LAILEKSRLKNPKNPGLWLESVRLEY	QLTRALAIL,KIGQLTRAL,GQLTRALAI,ALAILEKSRL,LTRALAILEK,KIGQLTRALA,RALAILEKSR,EKIGQLTRAL,GQLTRALAIL	LUAD
PRRC2C	c.5647C>A	p.P1883T	SASIPILASALASTSAPTPAPAASS[p.P1883T]TAAPVITAPTIPASAPTASVPLAPAS	AASSTAAPV,STAAPVITA,TPAPAASST,APAASSTAA,ASSTAAPVI,TAAPVITAPT,TPAPAASSTA,APAASSTAAP,AASSTAAPVI	KIRC
PRRX1	c.587C>T	p.A196V	DVTAVEQPIVPRPAPRPTDYLSWGT[p.A196V]VSPYSAMATYSATCANNSPAQGINMA	LSWGTVSPY,YLSWGTVSP,TVSPYSAMA,GTVSPYSAM,TDYLSWGTV,PTDYLSWGTV,YLSWGTVSPY,VSPYSAMATY,WGTVSPYSAM	BRCA
PRSS1	c.319G>A	p.D107N	EGNEQFINAAKIIRHPQYDRKTLNN[p.D107N]NIMLIKLSSRAVINARVSTISLPTAP	TLNNNIMLI,KTLNNNIML,RKTLNNNIM,KTLNNNIMLI,TLNNNIMLIK,NIMLIKLSSR,RKTLNNNIML	HNSC
PRSS36	c.2038delC	p.L680fs	LPQGHQVSRLVISIRLPQHLGLRPP[p.L680fs]WPSWS*	GLRPPWPSW,QHLGLRPPW,PQHLGLRPPW,LGLRPPWPSW	STAD
PRSS57	c.115G>C	p.E39Q	TVATALMLPVKPPAGSWGAQIIGGH[p.E39Q]QVTPHSRPYMASVRFGGQHHCGGFLL	AQIIGGHQV,QVTPHSRPY,HQVTPHSRPY,AQIIGGHQVT	LUSC
PSD2	c.766delG	p.G256fs	NVLSRLSLMAMPNGFHEDGPQGPGG[p.G256fs]MRMMMRRTRTSC*	GGMRMMMRR,GMRMMMRRT,RMMMRRTRT,MMMRRTRTS,MMRRTRTSC,GPGGMRMMM,PQGPGGMRM,MMMRRTRTSC,GMRMMMRRTR,RMMMRRTRTS,GPQGPGGMRM,PQGPGGMRMM	STAD
PSD3	c.1687A>C	p.T563P	PEIAFWGSNAGVKTTRLEAHSEMGS[p.T563P]PEILEKETPENLSNGTSSNVEAAKRL	MGSPEILEK,SEMGSPEIL,EMGSPEILEK,AHSEMGSPEI	KIRC
PSG8	c.1189C>T	p.R397C	FQLSGQKLFIPQITTKHSGLYACSV[p.R397C]CNSATGKESSKSMTVKVSGKRIPVSL	SVCNSATGK,GLYACSVCNS,CSVCNSATGK	CRC
PSG8	c.958C>T	p.R320C	LILPSVTRNETGPYQCEIRDQYGGI[p.R320C]CSYPVTLNVLYGPDLPRIYPSFTYYR	DQYGGICSY,CSYPVTLNV,QYGGICSYPV,RDQYGGICSY,GGICSYPVTL,CSYPVTLNVL	CRC
PSG9	c.1210G>A	p.E404K	LFIPQITRNHSGLYACSVHNSATGK[p.E404K]KISKSMTVKVSGPCHGDLTESQS*	KISKSMTVK,SATGKKISK,KKISKSMTV,KISKSMTVKV,SVHNSATGKK	SKCM
PSMD11	c.14C>T	p.A5V	MAAA[p.A5V]VVVEFQRAQSLLSTDREASIDILHSI	MAAAVVVEF,AAAVVVEFQR	TGCT
PSMD12	c.602G>A	p.R201Q	SMEKKERVEFILEQMRLCLAVKDYI[p.R201Q]QTQIISKKINTKFFQEENTEKLKLKY	YIQTQIISK,IQTQIISKK,KDYIQTQII,AVKDYIQTQI,YIQTQIISKK,IQTQIISKKI	CRC
PSME3	c.691C>T	p.R231W	IAKYPHVEDYRRTVTEIDEKEYISL[p.R231W]WLIISELRNQYVTLHDMILKNIEKIK	SLWLIISEL,KEYISLWLI,EYISLWLII,DEKEYISLW,SLWLIISELR,KEYISLWLI,ISLWLIISEL,DEKEYISLWL	CESC
PSME4	c.1483A>G	p.N495D	GGRWFPEGPTHMLPLLMRALPGVDP[p.N495D]DDFSKCMITFQFIATFSTLVPLVDCS	GVDPDDFSK,LPGVDPDDF,DDFSKCMITF,DPDDFSKCMI	TGCT
PSPH	c.433G>A	p.V145I	IRELVSRLQERNVQVFLISGGFRSI[p.V145I]IEHVASKLNIPATNVFANRLKFYFNG	SIIEHVASK,ISGGFRSII,SIIEHVASKL,LISGGFRSII,RSIIEHVASK,GFRSIIEHVA,IEHVASKLNI	GBM
PTCH1	c.2066C>A	p.P689H	LRTEYDPHTHVYYTTAEPRSEISVQ[p.P689H]HVTVTQDTLSCQSPESTSSTRDLLSQ	EISVQHVTV,SEISVQHVT,SEISVQHVTV,VQHVTVTQDT	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PTCH1	c.3921delC	p.P1307fs	RQQPHLDSGSLPPGRQGQQPRRDPP[p.P1307fs]EKACGHPPTDRAETLLKFLLKGILALAIGPAGALAGPVLTTLGTQRPLPWAAPCPATASPSPL*	FLLKGILAL,LLKGILALA,ILALAIGPA,ALAIGPAGA,LLKFLLKGI,AIGPAGALA,ALAGPVLTT,ETLLKFLLK,KFLLKGILA,TQRPLPWAA,WAAPCPATA,LAIGPAGAL,RPLPWAAPC,LPWAAPCPA,LKFLLKGIL,LKGILALAI,AGALAGPVL,LAGPVLTTL,LGTQRPLPW,AETLLKFLL,TLLKFLLKGI,FLLKGILAL,LLKGILALA,ILALAIGPAGAL,ALAGPVLTTL,KFLLKGILAL,HPPTDRAETL,GPAGALAGPV,CPATASPSPL,LLKFLLKGIL,TDRAETLLKF,LKFLLKGILA,TQRPLPWAAP,LPWAAPCPAT	STAD
PTCHD3	c.1764delT	p.F588fs	KKFCCFPFGSVPDEHGTDIHPISLF[p.F588fs]LETILAPFSQGVSPSIL*	SLFLETILA,FLETILAPF,ILAPFSQGV,DIHPISLFL,ISLFLETIL,FSQGVSPSI,SQGVSPSIL,HPISLFLET,LETILAPFS,TILAPFSQGV,LFLETILAPF,HPISLFLETI,FSQGVSPSIL	STAD
PTEN	c.388C>G	p.R130G	CEDLDQWLSEDDNHVAAIHCKAGKG[p.R130G]GTGVMICAYLLHRGKFLKAQEALDFY	GTGVMICAY,GGTGVMICAY,KAGKGGTGVM	UCEC
PTEN	c.389G>A	p.R130Q	CEDLDQWLSEDDNHVAAIHCKAGKG[p.R130Q]QTGVMICAYLLHRGKFLKAQEALDFY	QTGVMICAY,GKGQTGVMI,GQTGVMICAY,KAGKGQTGVM	CESC,CRC,UCEC
PTEN	c.389G>C	p.R130P	CEDLDQWLSEDDNHVAAIHCKAGKG[p.R130P]PTGVMICAYLLHRGKFLKAQEALDFY	PTGVMICAY,GKGPTGVMI,GPTGVMICAY,KAGKGPTGVM	UCEC
PTEN	c.389G>T	p.R130L	CEDLDQWLSEDDNHVAAIHCKAGKG[p.R130L]LTGVMICAYLLHRGKFLKAQEALDFY	LTGVMICAY,GLTGVMICA,KAGKGLTGV,GKGLTGVMI,GLTGVMICAY,KAGKGLTGVM	UCEC
PTEN	c.407G>A	p.C136Y	WLSEDDNHVAAIHCKAGKGRTGVMI[p.C136Y]YAYLLHRGKFLKAQEALDFYGEVRTR	GVMIYAYLL,VMIYAYLLH,RTGVMIYAY,KGRTGVMIY,VMIYAYLLHR,GVMIYAYLLH,KGRTGVMIYA,RTGVMIYAYL,GKGRTGVMIY,GRTGVMIYAY	GBM
PTEN	c.509G>A	p.S170N	FLKAQEALDFYGEVRTRDKKGVTIP[p.S170N]NQRRYVYYYSYLLKNHLDYRPVALLF	VTIPNQRRY,NQRRYVYYY,IPNQRRYVY,GVTIPNQRRY,TIPNQRRYVY,VTIPNQRRY,IPNQRRYVY	GBM
PTEN	c.518G>A	p.R173H	AQEALDFYGEVRTRDKKGVTIPSQR[p.R173H]HYVYYYSYLLKNHLDYRPVALLFHKM	TIPSQRHYV,HYVYYYSYL,SQRHYVYYY,RHYVYYYSY,VTIPSQRHY,IPSQRHYVY,PSQRHYVYY,PSQRHYVYYY,VTIPSQRHYV,RHYVYYYSYL,HYVYYYSYLL,SQRHYVYYYS,GVTIPSQRHY,TIPSQRHYVY,QRHYVYYYSY,IPSQRHYVYY	GBM
PTEN	c.701G>T	p.R234L	GTCNPQFVVCQLKVKIYSSNSGPTR[p.R234L]LEDKFMYFEFPQPLPVCGDIKVEFFH	RLEDKFMYF,YSSNSGPTRL,TRLEDKFMYF,LEDKFMYFEF	LUAD
PTEN	c.795delA	p.L265fs	EFPQPLPVCGDIKVEFFHKQNKMLK[p.L265fs]RTKCFTFG*	KMLKRTKCF,MLKRTKCFT,LKRTKCFTF,MLKRTKCFTF,KQNKMLKRTK,KMLKRTKCFT,NKMLKRTKCF	STAD
PTEN	c.830C>T	p.T277I	DIKVEFFHKQNKMLKKDKMFHFWVN[p.T277I]IFFIPGPEETSEKVENGSLCDQEIDS	KMFHFWVNI,MFHFWVNIF,FHFWVNIFF,HFWVNIFFI,KMFHFWVNIF,MFHFWVNIFF,FHFWVNIFFI	GBM
PTGR1	c.119A>C	p.E40A	GYPTNSDFELKTAELPPLKNGEVLL[p.E40A]AALFLTVDPYMRVAAKRLKEGDTMMG	VLLAALFLT,LLAALFLTV,EVLLAALFL,GEVLLAALF,VLLAALFLTV,AALFLTVDPY,LKNGEVLLAA,GEVLLAALFL	TGCT
PTH2	c.64C>G	p.L22V	METRQVSRSPRVRLLLLLLLL[p.L22V]VVVPWGVRTASGVALPPVGVLSLRPP	LLLLLLVVV,LLVVVPWGV,LVVVPWGVR,LLLLVVVPW,RLLLLLLLV,LLLLLLLVVV,LLLVVVPWGV,LLVVVPWGVR,LLLLLVVVPW	PRAD
PTPDC1	c.1288C>T	p.R430W	AVAADFDNRGMIFSNEQQFDPLWKR[p.R430W]WNVECLQPLTHLKRRLSYSDSDLKRA	WKRWNVECL,WNVECLQPL,LWKRWNVECL,RWNVECLQPL,QQFDPLWKRW	CRC
PTPN11	c.1508G>T	p.G503V	IIREKGVDCDIDVPKTIQMVRSQRS[p.G503V]VMVQTEAQYRFIYMAVQHYIETLQRR	QMVRSQRSV,MVRSQRSVM,RSVMVQTEA,VMVQTEAQY,SQRSVMVQT,IQMVRSQRSV,SVMVQTEAQY,MVRSQRSVMV,QMVRSQRSVM	LUAD
PTPN11	c.226G>A	p.E76K	VTHIKIQNTGDYYDLYGGEKFATLA[p.E76K]KLVQYYMEHHGQLKEKNGDVIELKYP	KLVQYYMEH,ATLAKLVQY,LAKLVQYYM,TLAKLVQYY,EKFATLAKL,TLAKLVQYYM,ATLAKLVQYY,FATLAKLVQY,GEKFATLAKL,KLVQYYMEHH	MM
PTPN12	c.2294G>A	p.R765Q	PPTFSDKREQISENPTEATDIGFGN[p.R765Q]QCGKPKGPRDPPSEWT*	IGFGNQCGK	CRC
PTPN13	c.2660C>T	p.S887L	SYQHKFQLQMRARQSNQDAQDIERA[p.S887L]LFRSLNLQAESVRGFNMGRAISTGSL	RALFRSLNL,LFRSLNLQA,AQDIERALF,IERALFRSL,ALFRSLNLQA	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PTPN13	c.6199G>A	p.E2067K	YIQEDDIYDDSQEAEVIQSLLDVVD[p.E2067K]KEAQNLLNENNAAGYSCGPGTLKMNG	QSLLDVVDK,SLLDVVDKEA	LUAD
PTPN14	c.2147_2149delAGG	p.E716del	QYHHKKTFSDATMLIHSSESEEEEE[p.E716del]APESVPQIPMLREKMEYSAQLQAALARI	SESEEEEEA	GBM
PTPN14	c.856G>A	p.E286K	THNKSTILVELINKEETALFHTDDI[p.E286K]KNAKYISRLFATRHKFYKQNKICTEQ	ALFHTDDIK,HTDDIKNAK,KNAKYISRL,HTDDIKNAKY,TALFHTDDIK,DIKNAKYISR,IKNAKYISRL,KNAKYISRLF	MM
PTPN18	c.1113_1118delGACGGG	p.TG378del	TYAVVQKRGAPAGAGSGTQTGTGTG[p.TG378del]ARSAEEAPLYSKVTPRAQRPGAHAEDARGTL	QTGTGTGAR	UCS
PTPN4	c.957delT	p.N319fs	NLWKACVEHHTFFRLDRPLPPQKNF[p.N319fs]LHIILH*	QKNFLHIIL,RPLPPQKNFL,LPPQKNFLHI	STAD
PTPRB	c.2178A>T	p.Q726H	SLTPGRLYTVTITTRSGKYENHSFS[p.Q726H]HERTVPDKVQGVSVSNSARSDYLRVS	HSFSHERTV,ENHSFSHER,FSHERTVPDK,GKYENHSFSH	TGCT
PTPRB	c.4678G>A	p.D1560N	ENPNSNSKSFNIKLGAEMESLGGKC[p.D1560N]NPTQQKFCDGPLKPHTAYRISIRAFT	KCNPTQQKF,GGKCNPTQQK,GKCNPTQQKF	SKCM
PTPRC	c.2685A>C	p.Q895H	GLEAENKVDVYGYVVKLRRQRCLMV[p.Q895H]HVEAQYILIHQALVEYNQFGETEVNL	RQRCLMVHV,LMVHVEAQY,MVHVEAQYI,VHVEAQYIL,LMVHVEAQYI,RQRCLMVHVE,CLMVHVEAQY,MVHVEAQYIL	STAD
PTPRF	c.3521G>A	p.R1174Q	PRWSTPEELELDELLEAIEQGGEEQ[p.R1174Q]QRRRRQAERLKPYVAAQLDVLPETFT	EQQRRRRQA,QQRRRRQAER	PRAD
PTPRJ	c.1000G>T	p.G334W	HDESLVGPVDPSSGQQSRDTEVLLV[p.G334W]WLEPGTRYNATVYSQAANGTEGQPQA	LVWLEPGTR,RDTEVLLVW,VWLEPGTRY,VLLVWLEPGT,WLEPGTRYNA,LVWLEPGTRY,RDTEVLLVWL	LUAD
PTPRT	c.2783G>T	p.R928L	SWDTAKEDENRNKNRYGNIISYDHS[p.R928L]LVRLLVLDGDPHSDYINANYIDGYHR	IISYDHSLV,NIISYDHSL,ISYDHSLVR,SYDHSLVRL,HSLVRLLVL,YDHSLVRLL,NIISYDHSLV,IISYDHSLVR,SYDHSLVRLL,ISYDHSLVRL,YDHSLVRLLV	LUAD
PTPRT	c.3224delC	p.P1075fs	WPDHGVPCYATGLLGFVRQVKFLNP[p.P1075fs]RKLGP*	RQVKFLNPR,QVKFLNPRK,VKFLNPRKL,RQVKFLNPRK	STAD
PTPRU	c.1675C>T	p.P559S	VNVPGPRRTISKLRNETYHVFSNLH[p.P559S]SGTTYLFSVRARTGKGFGQAALTEIT	NLHSGTTYL,LHSGTTYLF,SNLHSGTTY,FSNLHSGTTY,NLHSGTTYLF,SGTTYLFSVR,HVFSNLHSGT,HSGTTYLFSV,SNLHSGTTYL	LUAD
PTPRU	c.4300G>A	p.D1434N	FFAAKTLRNYKPNMVETMDQYHFCY[p.D1434N]NVALEYLEGLESR*	CYNVALEYL,FCYNVALEY,DQYHFCYNV,YHFCYNVAL,QYHFCYNVAL,HFCYNVALEY,NVALEYLEGL,DQYHFCYNVA,MDQYHFCYNV	CRC
PUF60	c.1187C>T	p.S396L	VMAAQAPGVITGVTPARPPIPVTIP[p.S396L]LVGVVNPILASPPTLGLLEPKKEKEE	VTIPLVGVV,PLVGVVNPI,PPIPVTIPL,RPPIPVTIPL,IPLVGVVNPI,PPIPVTIPLV,IPVTIPLVGV	BLCA
PVRL4	c.1072G>A	p.A358T	LDPQEDSGKQVDLVSASVVVVGVIA[p.A358T]TLLFCLLVVVVLMSRYHRRKAQQMT	VIATLLFCL,ATLLFCLLV,TLLFCLLVV,VVVGVIATL,VGVIATLLF,GVIATLLFCL,VIATLLFCLL,ATLLFCLLVV,TLLFCLLVVV,VVVGVIATLL,VVGVIATLLF	UCEC
PWWP2B	c.251delC	p.S84fs	PVNDSHGRAPEEGDAEVMQLGSSSP[p.S84fs]LLPAGFSPPRPPAPSHPRPSCRRCPPEACPRTLPTSKAPPSLTRCGSGTRTSCGCPSRRPGPSSARGGVCPATATRGASSSAPSACGRARCSVRSARAR*	MQLGSSSPL,QLGSSSPLL,RTSCGCPSR,GVCPATATR,SSAPSACGR,GFSPPRPPA,LTRCGSGTR,SARGGVCPA,ATRGASSSA,CGRARCSVR,RARCSVRSA,TSCGCPSRR,APSHPRPSC,HPRPSCRRC,RPSCRRCPP,GPSSARGGV,CPATATRGA,LPAGFSPPR,VMQLGSSSPL,MQLGSSSPLL,TSKAPPSLTR,RTSCGCPSRR,SSSAPSACGR,AGFSPPRPPA,RTLPTSKAPP,GTRTSCGCPS,PSRRPGPSSA,RGASSSAPSA,RARCSVRSAR,SSSPLLPAGF,LLPAGFSPPR,RPSCRRCPPE,CPRTLPTSKA,LPTSKAPPSL,CPATATRGAS	STAD
PXDNL	c.3935C>T	p.T1312M	IPKVDLRVWQDCCADCRSRGQFRAV[p.T1312M]MQESQKKRSAQYSYPVDKDMELSHLR	RAVMQESQK,AVMQESQKK,SRGQFRAVM,RSRGQFRAVM,RAVMQESQKK,GQFRAVMQES	CRC
PXDNL	c.4366C>A	p.P1456T	CPPAPCPSPELVKGTCCPVCRDRGM[p.P1456T]TSDSPEKR*	GMTSDSPEK,MTSDSPEKR,RGMTSDSPEK	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
PYGO2	c.448delC	p.Q150fs	GPQPLRRQPPPFPPNPMGPAFNMPP[p.Q150fs]RVLATHPQAT*	NMPPRVLAT,VLATHPQAT,RVLATHPQA,MPPRVLATH,AFNMPPRVLA,RVLATHPQAT,MGPAFNMPPR,GPAFNMPPRV	STAD
PYHIN1	c.443G>C	p.G148A	NRLTAKGAEETLGPQKRKKPSEEET[p.G148A]ATKRSKMSKEQTRPSCSAGASTSTAM	ATKRSKMSK,TATKRSKMSK	LUSC
QRSL1	c.677C>T	p.S226L	AHCGLVGFKPSYGLVSRHGLIPLVN[p.S226L]LMDVPGILTRCVDDAAIVLGALAGPD	GLIPLVNLM,NLMDVPGIL,IPLVNLMDV,NLMDVPGILT,LVNLMDVPGI	CRC
QSOX1	c.1202G>T	p.R401L	DDRKEGAVLAKKVNWIGCQGSEPHF[p.R401L]LGFPCSLWVLFHFLTVQAARQNVDHS	HFLGFPCSL,CQGSEPHFL,GSEPHFLGF,EPHFLGFPC,FLGFPCSLWV,HFLGFPCSLW,QGSEPHFLGF,LGFPCSLWVL,SEPHFLGFPC	LUAD
QSOX2	c.2048G>T	p.R683L	SLDMSLCVVLYVASSLFLMVMYFFF[p.R683L]LVRSRRWKVKHHHPAV*	LMVMYFFFL,MVMYFFFLV,VMYFFFLVR,FLVRSRRWK,FFLVRSRRW,LVRSRRWKV,YFFFLVRSR,FFFLVRSRR,FLMVMYFFFL,LMVMYFFFLV,FLVRSRRWKV,MVMYFFFLVR,FFFLVRSRRW,MYFFFLVRSR,FFLVRSRRWK,LVRSRRWKVK,YFFFLVRSRR	LUAD
R3HDM2	c.1763G>A	p.S588N	MPNQQQAAYQGMIGVQQPQNQGLLS[p.S588N]NQRSSMGGQMQGLVVQYTPLPSYQVP	LLSNQRSSM,NQRSSMGGQM,GLLSNQRSSM	CLL
R3HDM2	c.1774A>G	p.S592G	QQAAYQGMIGVQQPQNQGLLSSQRS[p.S592G]GMGGQMQGLVVQYTPLPSYQVPVGSD	GMGGQMQGL,LLSSQRSGM,QRSGMGGQM,GMGGQMQGLV,SQRSGMGGQM,GLLSSQRSGM	CLL
R3HDM2	c.616C>T	p.R206W	EFINDNNNQFKKFPQMTSYHRMLLH[p.R206W]WVAAYFGMDHNVDQTGKAVIINKTSN	RMLLHWVAA,MLLHWVAAY,SYHRMLLHW,HWVAAYFGM,LLHWVAAYF,HRMLLHWVA,MLLHWVAAYF,RMLLHWVAAY,SYHRMLLHWV,YHRMLLHWVA,TSYHRMLLHW,HRMLLHWVAA,LHWVAAYFGM	CLL
RAB11FIP4	c.1787C>T	p.S596L	SLYEAKNLFAAQTKAQSLAAEIDTA[p.S596L]LRDELMEALKEQEEINFRLRQYMDKI	ALRDELMEA,LAAEIDTAL,SLAAEIDTAL,ALRDELMEAL,LAAEIDTALR	BLCA
RAB11FIP5	c.509G>A	p.R170H	WYKLHSKPGKKEKERGEIEVTIQFT[p.R170H]HNNLSASMFDLSMKDKPRSPFSKIRD	IEVTIQFTH,IQFTHNNLS,THNNLSASM,HNNLSASMF,IQFTHNNLSA,FTHNNLSASM,VTIQFTHNNL,THNNLSASMF	GBM
RAB13	c.500G>T	p.R167L	EHGIRFFETSAKSSMNVDEAFSSLA[p.R167L]LDILLKSGGRRSGNGNKPPSTDLKTC	SLALDILLK,DEAFSSLAL,FSSLALDIL,SSLALDILLK,EAFSSLALDI,VDEAFSSLAL	LUAD
RAB7L1	c.235C>T	p.R79W	YEIVRLQLWDIAGQERFTSMTRLYY[p.R79W]WDASACVIMFDVTNATTFSNSQRWKQ	RLYYWDASA,TSMTRLYYW,YYWDASACV,MTRLYYWDA,WDASACVIM,SMTRLYYWDA,RLYYWDASAC,FTSMTRLYYW,LYYWDASACV,YYWDASACVI,MTRLYYWDAS,YWDASACVIM,WDASACVIMF	CRC
RAB8A	c.58G>T	p.G20W	MAKTYDYLFKLLLIGDSGV[p.G20W]WKTCVLFRFSEDAFNSTFISTIGIDF	LIGDSGVWK,GVWKTCVLF,VWKTCVLFR,LLIGDSGVW,WKTCVLFRF,GVWKTCVLFR,SGVWKTCVLF,VWKTCVLFRF,LLLIGDSGVW	LUAD
RABGAP1	c.2782_2783insA	p.K928fs	LEEESAQLKEMCRRELDKAESEIKK[p.K928fs]KQFYHW*	SEIKKKQFY,IKKKQFYHW,AESEIKKKQF	STAD
RABGAP1	c.2782delA	p.K928fs	LEEESAQLKEMCRRELDKAESEIKK[p.K928fs]TVLSLVTISRFVLS*	SLVTISRFV,KTVLSLVTI,VLSLVTISR,EIKKTVLSL,LSLVTISRF,KKTVLSLVT,AESEIKKTV,SLVTISRFVL,TVLSLVTISR,EIKKTVLSLV,VLSLVTISRF,AESEIKKTVL,SEIKKTVLSL,KKTVLSLVTI	STAD
RABGEF1	c.619A>G	p.N207D	PASADDFLPTLIYIVLKGNPPRLQS[p.N207D]DIQYITRFCNPSRLMTGEDGYYFTNL	RLQSDIQYI,LQSDIQYIT,SDIQYITRF,QSDIQYITRF	TGCT
RAC1	c.101C>G	p.P34R	VGDGAVGKTCLLISYTTNAFPGEYI[p.P34R]RTVFDNYSANVMVDGKPVNLGLWDTA	RTVFDNYSA,YIRTVFDNY,NAFPGEYIR,FPGEYIRTV,FPGEYIRTVF	TGCT
RAC1	c.476C>T	p.A159V	LTPITYPQGLAMAKEIGAVKYLECS[p.A159V]VLTQRGLKTVFDEAIRAVLCPPPVKK	AVKYLECSV,SVLTQRGLK,KYLECSVLT,VKYLECSVL,VLTQRGLKTV,CSVLTQRGLK,AVKYLECSVL	HNSC
RAC1	c.85C>T	p.P29S	IKCVVVGDGAVGKTCLLISYTTNAF[p.P29S]SGEYIPTVFDNYSANVMVDGKPVNLG	TTNAFSGEY,FSGEYIPTV,SGEYIPTVF,YTTNAFSGEY,TTNAFSGEYI,FSGEYIPTVF	SKCM

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
RAD50	c.205G>T	p.D69Y	TIIECLKYICTGDFPPGTKGNTFVH[p.D69Y]YPKVAQETDVRAQIRLQFRDVNGELI	GNTFVHYPK,NTFVHYPKV,TKGNTFVHY,KGNTFVHYPK,GTKGNTFVHY,NTFVHYPKVA,YPKVAQETDV	LUAD
RAD51AP2	c.946delA	p.T316fs	RDFTNIYWSQNRPDVKKQKLQNDKK[p.T316fs]L*	KQKLQNDKKL	STAD
RAD51C	c.499G>A	p.D167N	VQIPECFGGVAGEAVFIDTEGSFMV[p.D167N]NRVVDLATACIQHLQLIAEKHKGEEH	FMVNRVVDL,MVNRVVDLA,EGSFMVNRV,FMVNRVVDLA,SFMVNRVVDL,DTEGSFMVNR,TEGSFMVNRV	BLCA
RAD51C	c.670T>C	p.Y224H	FTLDNILSHIYYFRCRDYTELLAQV[p.Y224H]HLLPDFLSEHSKVRLVIVDGIAFPFR	ELLAQVHLL,AQVHLLPDF,TELLAQVHL,AQVHLLPDFL,LAQVHLLPDF,HLLPDFLSEH,TELLAQVHLL	BLCA
RAF1	c.770C>T	p.S257L	YSTPHAFTFNTSSPSSEGSLSQRQR[p.S257L]LTSTPNVHMVSTTLPVDSRMIEDAIR	RQRLTSTPN,LTSTPNVHM,SQRQRLTST,RLTSTPNVH,LTSTPNVHMV,RQRLTSTPNV,RLTSTPNVHM,SQRQRLTSTP	CRC
RALGAPA1	c.1192C>T	p.R398C	LTEREPSSSSLCSIDEEHLTDIEIV[p.R398C]CRVFSSKRSNVNFVTEIFRQAFLLPI	IVCRVFSSK,LTDIEIVCRV,EIVCRVFSSK,IVCRVFSSKR,HLTDIEIVCR,TDIEIVCRVF,IEIVCRVFSS	CRC
RALGAPB	c.1136delC	p.T379fs	RSDSAPPTPVNRLSMPQSAAVSTTP[p.T379fs]HITGGTGLLL*	TTPHITGGT,SAAVSTTPH,AAVSTTPHI,TPHITGGTGL,SAAVSTTPHI	STAD
RALGPS1	c.1142G>A	p.R381Q	SKSATFPSEKARHLLDDSVLESRSP[p.R381Q]QRGLALTSSSAVTNGLSLGSSESSEF	RSPQRGLAL,SVLESRSPQR,LESRSPQRGL,SRSPQRGLAL	BLCA
RANBP17	c.2700G>T	p.M900I	HSDLLQYRKLSQSYYPLLECLTQDH[p.M900I]ISFIINLEPPVLMYVLTSISEGLTTL	LTQDHISFI,CLTQDHISF,TQDHISFII,CLTQDHISFI,LLECLTQDHI,LTQDHISFII,QDHISFIINL	TGCT
RANBP2	c.3691C>T	p.R1231C	VESKEWKERGIGNVKILRHKTSGKI[p.R1231C]CLLMRREQVLKICANHYISPDMKLTP	KTSGKICLL,CLLMRREQV,SGKICLLMR,HKTSGKICL,TSGKICLLMR,KTSGKICLLM,SGKICLLMRR,CLLMRREQVL,RHKTSGKICL,HKTSGKICLL	CRC
RANBP3	c.1157T>G	p.L386W	EATPEKESLAESAAAYTKATARKCL[p.L386W]WEKVEVITGEEAESNVLQMQCKLFVF	CLWEKVEVI,TARKCLWEK,KATARKCLW,ATARKCLWEK	KIRC
RANBP6	c.2743C>T	p.R915W	QWGLCIFDDIIEHCSPTSFKYVEYF[p.R915W]WWPMLLNMRDNNPEVRQAAAYGLGVM	YVEYFWWPM,SFKYVEYFW,KYVEYFWWP,EYFWWPMLL,FWWPMLLNM,FKYVEYFWW,VEYFWWPML,YVEYFWWPML,SFKYVEYFWW,KYVEYFWWPM,VEYFWWPMLL,YFWWPMLLNM,FWWPMLLNMR,TSFKYVEYFW	CESC
RANBP6	c.2950A>C	p.I984L	LVKVIKCANSKTKKNVIATENCISA[p.I984L]LGKILKFKPNCVNVDEVLPHWLSWLP	ISALGKILK,ALGKILKFK,SALGKILKF,TENCISALG,CISALGKILK,SALGKILKFK,IATENCISAL,ISALGKILKF	LUSC
RAPGEFL1	c.1067G>T	p.R356L	LPGKFKNLFRKFENLTDPCRNHKSY[p.R356L]LEVISKMKPPVIPFVPLILKDLTFLH	KSYLEVISK,SYLEVISKM,RNHKSYLEV,KSYLEVISKM,SYLEVISKMK,RNHKSYLEVI	LUAD
RARS2	c.16C>T	p.R6C	MACGF[p.R6C]CRAIACQLSRVLNLPPENLITSISAV	MACGFCRAI	BLCA
RASAL3	c.245G>A	p.R82H	VSTQPAPRSIFRRVLSAPPKESRTS[p.R82H]HLRLSKALWGRHKNPPPEPDPEPEQE	RTSHLRLSK,TSHLRLSKA,SHLRLSKAL,HLRLSKALW,RTSHLRLSKA,HLRLSKALWG,KESRTSHLRL,SHLRLSKALW	GBM
RASGEF1C	c.562G>A	p.A188T	LAALRQGPEGLVGADKPISYRTKPP[p.A188T]TSIHRELLGVCSDPYTLAQQLTHVEL	SYRTKPPTS,RTKPPTSIH,YRTKPPTSI,SYRTKPPTSI,RTKPPTSIHR,TSIHRELLGV,KPPTSIHREL	KIRC
RASIP1	c.1801C>T	p.R601C	ATLLALCVQHSARELELGHLPRLLG[p.R601C]CLARLIKEAVWEKIKEIGDRQPENHP	RLLGCLARL,HLPRLLGCL,LLGCLARLI,CLARLIKEA,LPRLLGCLA,RLLGCLARLI,CLARLIKEAV,HLPRLLGCLA,LLGCLARLIK	ACC
RB1	c.948_951delTCTT	p.N316fs	FKNFIPFMNSLGLVTSNGLPEVENL[p.N316fs]NDTKKFILKIKI*	KKFILKIKI,DTKKFILKIK,VENLNDTKKF	GBM
RBBP4	c.988G>A	p.E330K	NLKLKLHSFESHKDEIFQVQWSPHN[p.E330K]KTILASSGTDRRLNVWDLSKIGEEQS	QVQWSPHNK,SPHNKTILA,VQWSPHNKT,FQVQWSPHNK,SPHNKTILAS,VQWSPHNKTI	LAML
RBBP7	c.820G>A	p.E274K	QKLMIWDTRSNTTSKPSHLVDAHTA[p.E274K]KVNCLSFNPYSEFILATGSADKTVAL	LVDAHTAKV,HLVDAHTAK,HTAKVNCLS,TAKVNCLSF,HLVDAHTAKV,KVNCLSFNPY,HTAKVNCLSF	CRC
RBBP7	c.937G>A	p.E313K	LATGSADKTVALWDLRNLKLKLHTF[p.E313K]KSHKDEIFQVHWSPHNETILASSGTD	KLHTFKSHK,KLKLHTFKS,LKLHTFKSH,FKSHKDEIF,NLKLKLHTFK,KLKLHTFKSH,KSHKDEIFQV,HTFKSHKDEI	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
RBFOX2	c.1018G>A	p.A340T	NTYIPLISLPLVPGFPYPTAATTAA[p.A340T]TFRGAHLRGRGRTVYGAVRAVPPTAI	ATFRGAHLR,AATTAATFR,TTAATFRGA,TAATTAATF,TAATTAATFR,TFRGAHLRGR,AATFRGAHLR,YPTAATTAAT,PTAATTAATF	CRC
RBL2	c.379G>A	p.E127K	VSKGTVEGNYVSLTRILKCSEQSLI[p.E127K]KFFNKMKKWEDMANLPPHFRERTERL	SLIKFFNKM,QSLIKFFNK,LIKFFNKMK,KFFNKMKKW,CSEQSLIKF,SEQSLIKFF,SLIKFFNKMK,LIKFFNKMKK,EQSLIKFFNK,KCSEQSLIKF,IKFFNKMKKW	UCEC
RBM14	c.856_876delGCTGCTGCTGCAGCAGCAGCC	p.AAAAAAAA286del	LTSTSLDPYDRHLLPTSGAAATAAA[p.AAAAAAA286del]VTAASTSYYGRDRSPLRRATAPVPTVGEGYGYGHESELSQASAAAR	GAAATAAAV,ATAAAVTAA,TAAAVTAAS,SGAAATAAAV,TAAAVTAAST	PAAD
RBM19	c.1168G>T	p.G390W	FREKNVPTTKGAPKNTTKSWQGRIL[p.G390W]WENEEEEDLAESGRLFVRNLPYTSTE	KSWQGRILW,WENEEEEDL,TKSWQGRILW	LUAD
RBM26	c.1930C>G	p.P644A	TTSPKPLVQQPILPVVKQSVKERLG[p.P644A]AVPSSTIEPAEAQSASSDLPQNVTKL	SVKERLGAV,KERLGAVPS,LGAVPSSTI,RLGAVPSSTI,KERLGAVPSS	BLCA
RBM39	c.1058C>T	p.T353I	ERTDASSASSFLDSDELERTGIDLG[p.T353I]ITGRLQLMARLAEGTGLQIPPAAQQA	LGITGRLQL,ITGRLQLMAR,LERTGIDLGI,LGITGRLQLM	UCEC
RBM47	c.1485_1505delGGCCGCAGCCGCGCAGCCGC	p.495_502AAAAAAAA>A	HTVEHMISPIAVQPDPASAAAAAAA[p.495_502AAAAAAAA>A]VIPTVSTPPPFQGRPITPVYTVAPNVQRIPTAGIYGASYVPFAAPA	ASAAAAAAAV,SAAAAAAAVI	PAAD
RBM6	c.2024T>G	p.V675G	RQDGESKTIMLKRIYRSTPPEVIVE[p.V675G]GLEPYVRLTTANVRIIKNRTGPMGHT	VIVEGLEPY,VIVEGLEPYV,EVIVEGLEPY	MM
RBM6	c.287_288insG	p.R96fs	SYGARDGPHGDYRGGEGPGHDFRGG[p.R96fs]RFFVF*	FRGGRFFVF,HDFRGGRFF,DFRGGRFFVF,HDFRGGRFFV	STAD
RCL1	c.335C>A	p.P112Q	HDCSVLRGIGYYLESLLCLAPFMKH[p.P112Q]QLKIVLRGVTNDQVDPSVDVLKATAL	FMKHQLKIV,QLKIVLRGV,PFMKHQLKI,APFMKHQLK,MKHQLKIVL,CLAPFMKHQL,HQLKIVLRGV,FMKHQLKIVL,LAPFMKHQLK,APFMKHQLKI	LUAD
RDH8	c.593C>T	p.A198V	LLQFNIFISLVEPGPVVTEFEGKLL[p.A198V]VQVSMAEFPGTDPETLHYFRDLYLPA	KLLVQVSMA,LVQVSMAEF,TEFEGKLLV,GKLLVQVSM,FEGKLLVQV,VTEFEGKLLV,LLVQVSMAEF,VQVSMAEFPG,TEFEGKLLVQ,FEGKLLVQVS	GBM
REG1B	c.170G>T	p.W57L	PRISCPEGTNAYRSYCYYFNEDPET[p.W57L]LVDADLYCQNMNSGNLVSVLTQAEGA	ETLVDADLY,YFNEDPETL,YYFNEDPETL	LUAD
REG1B	c.201G>T	p.M67I	AYRSYCYYFNEDPETWVDADLYCQN[p.M67I]INSGNLVSVLTQAEGAFVASLIKESS	CQNINSGNL,NINSGNLVSV,CQNINSGNLV,INSGNLVSVL	LUSC
REG3A	c.449C>T	p.S150L	SDVMNYFAWERNPSTISSPGHCASL[p.S150L]LRSTAFLRWKDYNCNVRLPYVCKFTD	SLLRSTAFL,LLRSTAFLR,SPGHCASLL,ASLLRSTAF,LRSTAFLRW,SLLRSTAFLR,ASLLRSTAFL,CASLLRSTAF,LLRSTAFLRW	LUAD
REG4	c.329G>T	p.G110V	GYQRSQPIWIGLHDPQKRQQWQWID[p.G110V]VAMYLYRSWSGKSMGGNKHCAEMSSN	WIDVAMYLY,QWIDVAMYL,WQWIDVAMY,RQQWQWIDV,QQWQWIDVA,QWQWIDVAM,VAMYLYRSW,WQWIDVAMYL,WIDVAMYLYR,QWQWIDVAMY,QWIDVAMYLY,QQWQWIDVAM,RQQWQWIDVA	LUAD
REN	c.45_47delGCT	p.15_16LL>L	MDGWRRMPRWGLLLL[p.15_16LL>L]WGSCTFGLPTDTTTFKRIFLKRMPSIRE	MPRWGLLLLW	GBM
RERE	c.528G>C	p.K176N	PACSLPVASQPPQHLSEAGRGPVGS[p.K176N]NRDHLLMNVKWYYRQSEVPDSVYQHL	GSNRDHLLM,AGRGPVGSNR,GPVGSNRDHL	BLCA
REV3L	c.88G>T	p.A30S	RIVTADYYMASPLQGLDTCQSPLTQ[p.A30S]SPVKKVPVVRVFGATPAGQKTCLHLH	SPVKKVPVV,CQSPLTQSP,CQSPLTQSPV,TQSPVKKVPV	TGCT
RFC3	c.245T>A	p.I82N	RELYGVGVEKLRIEHQTITTPSKKK[p.I82N]NEISTIASNYHLEVNPSDAGNSDRVV	TPSKKKNEI,KKKNEISTI,KKNEISTIA,NEISTIASNY,SKKKNEISTI	TGCT
RFC3	c.888G>T	p.K296N	LLEVRGRLYELLTHCIPPEIMKAC[p.K296N]NEESRSCDIF*	IMKACNEESR,NEESRSCDIF	TGCT

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
RGMB	c.187A>C	p.S63R	AWTGMGLRAAPSSAAAAAAEVEQRR[p.S63R]RPGLCPPPLELLLLLLFSLGLLHAGD	RPGLCPPPL,VEQRRRPGL,RRPGLCPPPL	ACC
RGS6	c.1097G>T	p.W366L	LKDQVGRDQFLRFLESEFSSENLRF[p.W366L]LLAVQDLKKQPLQDVAKRVEEIWQEF	FLLAVQDLK,LLAVQDLKK,RFLLAVQDL,FSSENLRFL,SENLRFLLA,FLLAVQDLKK,RFLLAVQDLK,FSSENLRFLL,SENLRFLLAV,LRFLLAVQDL	LUSC
RGS7	c.130C>T	p.R44C	PNMLVYRKMEDVIARMQDEKNGIPI[p.R44C]CTVKSFLSKIPSVFSGSDIVQWLIKN	CTVKSFLSK,IPICTVKSF,KNGIPICTVK,CTVKSFLSKI,IPICTVKSFL	SKCM
RGS9BP	c.286G>T	p.A96S	ERAEFERLWVAFSGCLDLLEADMRR[p.A96S]SLELGAAFPLHAPRRPLVRTGVAGAS	RSLELGAAF,LEADMRRSL,ADMRRSLEL,SLELGAAFPL,RRSLELGAAF	ACC
RGSL1	c.664G>A	p.V222I	HTKMTMAKEEACHGLMQEYETRLYS[p.V222I]ICYTHIGGLPLNMSIKKCHHFQKRYS	RLYSICYTH,EYETRLYSI,LYSICYTHI,ETRLYSICY,YETRLYSIC,RLYSICYTHI,SICYTHIGGL,QEYETRLYSI,YETRLYSICY	BRCA
RHBDD3	c.101_102insG	p.G34fs	SPALPLASSVLMLLMSTLWLVGAGP[p.G34fs]RPGPGPGAVAGPLAGAPAADPCPGPHGPARPAPEPAAPAHCGLAAGVPPGHAEIPACLSPARPGFWAAGSAAGRPWAVQCSRQLWIHACPPGHAGWGGTPP*	AVAGPLAGA,GLAAGVPPG,EIPACLSPA,SAAGRPWAV,CSRQLWIHA,WAAGSAAGR,RPWAVQCSR,GPRPGPGPG,RPGPGPGAV,GPGAVAGPL,GPLAGAPAA,GPHGPARPA,APAHCGLAA,SPARPGFWA,CLSPARPGF,AEIPACLSP,GFWAAGSAA,AGSAAGRPW,WAVQCSRQL,VQCSRQLWI,RQLWIHACP,WIHACPPGHA,TLWLVGAGPR,EIPACLSPAR,FWAAGSAAGR,EPAAPAHCGL,GPRPGPGPGA,RPGPGPGAVA,GPARPAPEPA,RPAPEPAAPA,SPARPGFWAA,RPGFWAAGSA,AEIPACLSPA,ACLSPARPGF,AAGSAAGRPW,WAVQCSRQLW,RQLWIHACPP,HACPPGHAGW	KICH
RHEB	c.103T>A	p.Y35N	AILGYRSVGKSSLTIQFVEGQFVDS[p.Y35N]NDPTIENTFTKLITVNGQEYHLQLVD	FVDSNDPTI,GQFVDSNDPT,SNDPTIENTF	KIRC
RHOA	c.118G>C	p.E40Q	ACGKTCLLIVFSKDQFPEVYVPTVF[p.E40Q]QNYVADIEVDGKQVELALWDTAGQED	VFQNYVADI,YVPTVFQNY,VPTVFQNYV,YVPTVFQNYV,FQNYVADIEV,VYVPTVFQNY,TVFQNYVADI,VPTVFQNYVA	HNSC
RHOA	c.125A>G	p.Y42C	GKTCLLIVFSKDQFPEVYVPTVFEN[p.Y42C]CVADIEVDGKQVELALWDTAGQEDYD	VPTVFENCV,YVPTVFENCV,TVFENCVADI,CVADIEVDGK,VYVPTVFENC,FENCVADIEV	STAD
RHOBTB1	c.1391C>T	p.T464M	VLEMFDLRMMVENIMNKEAFMNQEI[p.T464M]MKAFHVRKANRIKECLSKGTFSDVTF	FMNQEIMKA,IMKAFHVRK,AFMNQEIMK,EIMKAFHVR,MNQEIMKAF,MKAFHVRKA,EAFMNQEIM,QEIMKAFHV,FMNQEIMKAF,IMKAFHVRKA,EAFMNQEIMK,EIMKAFHVRK,KEAFMNQEIM	CRC
RHPN2	c.217G>A	p.V73M	LKAVRMRTGAENLLKVATNSKVREQ[p.V73M]MRLELSFVNSDLQMLKEELEGLNISV	QMRLELSFV,KVREQMRLE,NSKVREQMR,EQMRLELSF,SKVREQMRL,VREQMRLEL,REQMRLELS,EQMRLELSFV,KVREQMRLEL,REQMRLELSF	TGCT
RILPL1	c.1074C>A	p.S358R	RIPQPPPIAHPRTSPQPESGIKRLF[p.S358R]RFFSRDKKRLANTQRNVHIQESFGQW	SGIKRLFRF,GIKRLFRFF,KRLFRFFSR,LFRFFSRDK,ESGIKRLFR,RFFSRDKKR,RLFRFFSRDK,SGIKRLFRFF,GIKRLFRFFS,IKRLFRFFSR,LFRFFSRDKK	KICH
RIMBP2	c.2489G>A	p.R830H	FPRGSAGPQRSRPVTVPSIDDYGRD[p.R830H]HLSPDFYEESETDPGAEELPARIFVA	RDHLSPDFY,YGRDHLSPDF	GBM
RIMBP3	c.1187_1189delCGG	p.A396del	HELIKLNWLLAKALWVLARRCYTLQ[p.A396del]ENKQLRRAGCPYQADEKVKRLKVKRAEL	RCYTLQENK,TLQENKQLR,QENKQLRRA,YTLQENKQLR	KIRC
RIMBP3	c.3461A>G	p.Q1154R	YADGLKVCEVADATAGSTLLEFSQL[p.Q1154R]RVPLTWQKVSVRTMSLCGESLDSVPA	LLEFSQLRV,TLLEFSQLR,SQLRVPLTW,LEFSQLRVP,TLLEFSQLRV,QLRVPLTWQK,STLLEFSQLR,FSQLRVPLTW,LEFSQLRVPL	TGCT
RIMS2	c.1203delA	p.V401fs	LGLKVVGGKMTESGRLCAFITKVKK[p.V401fs]EV*	FITKVKKEV	STAD
RIMS2	c.164G>T	p.R55L	EREEYSQYATSDTAMPRSPSDYADR[p.R55L]LSQHEPQFYEDSDHLSYRDSNRRSHR	LSQHEPQFY,SPSDYADRL,RLSQHEPQF,RLSQHEPQFY	LUAD
RIMS2	c.1796G>A	p.R599Q	KRRTKTVKKTLEPKWNQTFIYSPVH[p.R599Q]QREFRERMLEITLWDQARVREEESEF	FIYSPVHQR,HQREFRERM,IYSPVHQREF,TFIYSPVHQR,YSPVHQREFR,HQREFRERML	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
RIN3	c.1345C>G	p.L449V	DTPRESTEQGQDTEVKASDPHSMPE[p.L449V]VPRTAKQPPVPPPRKKRISRQLASTL	SMPEVPRTA,SMPEVPRTAK,HSMPEVPRTA,VPRTAKQPPV	KIRC
RIN3	c.2123C>T	p.S708L	LYKCVLKPLKEAINSCLHQIHSKDG[p.S708L]LLQQLKENQLVILATTTTDLGVTTSV	HQIHSKDGL,SKDGLLQQL,HQIHSKDGLL	CRC
RING1	c.511delG	p.G171fs	QAMHRAQRVRRPIPGSDQTTTMSGG[p.G171fs]KESPGREKGMEKM*	QTTTMSGGK,GGKESPGREK,KESPGREKGM	STAD
RINL	c.1205C>T	p.P402L	RRRQTALRAGAGPPGAQGPGPEGQS[p.P402L]LAPALRSRIHERLAHLHAACAPRRKV	SLAPALRSR,GPGPEGQSL,PEGQSLAPA,SLAPALRSRI,EGQSLAPALR,PEGQSLAPAL	ACC
RINT1	c.321delA	p.L107fs	SKMQLEEQVLTISSEIPKRIRSALK[p.L107fs]MQKNQSNFLISFWSRKLISSAPLTAIC*	MQKNQSNFL,KLISSAPLT,FLISFWSRK,KMQKNQSNF,RIRSALKMQ,ISFWSRKLI,WSRKLISSA,NFLISFWSR,NQSNFLISF,KRIRSALKM,QKNQSNFLI,RKLISSAPL,ISSAPLTAI,KMQKNQSNFL,FLISFWSRKL,KLISSAPLTA,LISSAPLTAI,MQKNQSNFLI,RIRSALKMQK,SNFLISFWSR,KNQSNFLISF,NFLISFWSRK,SRKLISSAPL,LKMQKNQSNF,NQSNFLISFW	STAD
RIT1	c.270G>T	p.M90I	DDEPANLDILDTAGQAEFTAMRDQY[p.M90I]IRAGEGFIICYSITDRRSFHEVREFK	FTAMRDQYI,AMRDQYIRA,YIRAGEGFI,QYIRAGEGF,TAMRDQYIR,IRAGEGFII,YIRAGEGFII,QYIRAGEGFI,AMRDQYIRAG,FTAMRDQYIR,DQYIRAGEGF	LUAD
RIT2	c.254G>T	p.R85L	QVRIDNEPAYLDILDTAGQAEFTAM[p.R85L]LEQYMRGGEGFIICYSVTDRQSFQEA	GQAEFTAML,TAMLEQYMR,FTAMLEQYM,AEFTAMLEQ,FTAMLEQYMR,AEFTAMLEQY	LUAD
RLBP1	c.215C>T	p.A72V	KAKDELNEREETREEAVRELQEMVQ[p.A72V]VQAASGEELAVAVAERVQEKDSGFFL	RELQEMVQV,QEMVQVQAA,VQAASGEEL,LQEMVQVQAA,VQAASGEELA,QEMVQVQAAS	CRC
RLBP1	c.841G>A	p.D281N	PFLKSKLLERVFVHGDDLSGFYQEI[p.D281N]NENILPSDFGGTLPKYDGKAVAEQLF	FYQEINENI,YQEINENIL,NENILPSDF,GFYQEINENI,FYQEINENIL,QEINENILPS	CRC
RLIM	c.1502C>T	p.S501L	SPSSSSGGESSETSSDLFEGSNEGS[p.S501L]LSSGSSGARREGRHRAPVTFDESGSL	SLSSGSSGA,FEGSNEGSL	KIRC
RLN2	c.412A>T	p.S138C	QQHVPVLKDSSLLFEEFKKLIRNRQ[p.S138C]CEAADSSPSELKYLGLDTHSRKKRQL	LIRNRQCEA,RQCEAADSS,CEAADSSPS,KLIRNRQCEA,LIRNRQCEAA,RQCEAADSSP	LUAD
RNASET2	c.380C>T	p.A127V	HSFPNRSRFWKHEWEKHGTCAAQVD[p.A127V]VLNSQKKYFGRSLELYRELDLNSVLL	QVDVLNSQK,VLNSQKKYF,AQVDVLNSQK,QVDVLNSQKK	CRC
RNF111	c.2313delC	p.R771fs	HEVMQRMEVQRRRMMQHPTRAHERP[p.R771fs]HPIHIGCTQTMVMGIIFMCLRLCPHILDRLQRGLPGNWELKLE*	TMVMGIIFM,VMGIIFMCL,HIGCTQTMV,RLCPHILDR,QTMVMGIIF,RGLPGNWEL,RAHERPHPI,MGIIFMCLR,CTQTMVMGI,MVMGIIFMC,CLRLCPHIL,HERPHPIHI,IHIGCTQTM,IGCTQTMVM,FMCLRLCPH,LQRGLPGNW,LPGNWELKL,MVMGIIFMCL,FMCLRLCPHI,RLCPHILDRL,VMGIIFMCLR,RGLPGNWELK,RAHERPHPIH,QTMVMGIIFM,RPHPIHIGCT,HIGCTQTMVM,TQTMVMGIIF,RLQRGLPGNW	STAD
RNF113B	c.515C>T	p.A172V	YRGIHSYLRYLKPKDTSMGNSSSGM[p.A172V]VRKGPIRAPGHLRATVRWDYQPDICK	NSSSGMVRK,SMGNSSSGMV	CRC
RNF149	c.25A>G	p.S9G	MAWRRREA[p.S9G]GVGARGVLALALLALALCVPGARGRA	AWRRREAGV,MAWRRREAG,RRREAGVGAR,MAWRRREAGV,REAGVGARGV	ACC
RNF150	c.623C>T	p.S208L	LERNITVTMYITIGTRNLQKYVSRT[p.S208L]LVVFVSISFIVLMIISLAWLVFYYIQ	RTLVVFVSI,KYVSRTLVV,YVSRTLVVF,VSRTLVVFV,LQKYVSRTL,LVVFVSISF,QKYVSRTLV,YVSRTLVVFV,NLQKYVSRTL,LQKYVSRTLV,LVVFVSISFI,KYVSRTLVVF,RTLVVFVSIS,TLVVFVSISF,QKYVSRTLVV	CRC
RNF150	c.707G>A	p.R236Q	FVSISFIVLMIISLAWLVFYYIQRF[p.R236Q]QYANARDRNQRRLGDAAKKAISKLQI	FYYIQRFQY,YYIQRFQYA,IQRFQYANA,YIQRFQYANA,FYYIQRFQYA,YYIQRFQYAN,IQRFQYANAR,VFYYIQRFQY,FQYANARDRN	CRC
RNF152	c.283C>T	p.P95S	PDDPEVLAVIAIPHTSEHTPVFIKL[p.P95S]SSNGCYMLPLPISKERALLPGDMGCR	KLSSNGCYM,IKLSSNGCY,LSSNGCYML,KLSSNGCYML,FIKLSSNGCY,IKLSSNGCYM,SSNGCYMLPL	SKCM

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
RNF17	c.1052C>G	p.S351C	KKYNNKKELSCYDTYPPLEKKKVDM[p.S351C]CVLTSEAPPPPLQPETNDVHLEAKNF	KKKVDMCVL	KIRC
RNF222	c.397G>A	p.A133T	PLAASSPAWRPPPGQARPPGSPGQS[p.A133T]TQLPLDLLPSLPRESQIFVISRHGMP	SPGQSTQLPL,GQSTQLPLDL,TQLPLDLLPS	ACC
RNF39	c.787G>T	p.G263C	HRRLLISADRRSVQLAPPGTPAPPD[p.G263C]CPKRFDQLPAVLGAQGFGAGRHCWEV	GTPAPPDCPK	ACC
RNF43	c.1976delG	p.G659fs	PSTSSLFNLQKSSLSARHPQRKRRG[p.G659fs]VPPSPPLALGPRMQLCTQLARFFPITPPVWHILGPQRHTP*	RMQLCTQLA,TQLARFFPI,RFFPITPPV,FFPITPPVW,ITPPVWHIL,RGVPPSPPL,MQLCTQLAR,HPQRKRRGV,VPPSPPLAL,RKRRGVPPS,LALGPRMQL,QLCTQLARF,FPITPPVWH,RMQLCTQLAR,MQLCTQLARF,CTQLARFFPI,RFFPITPPVW,RGVPPSPPLA,FPITPPVWHI,SPPLALGPRM,GPRMQLCTQL,RRGVPPSPPL,QLCTQLARFF,TQLARFFPIT,ARFFPITPPV	STAD
RNF43	c.348_349insC	p.P116fs	NASDDDNLEPGFISIVKLESPRRAP[p.P116fs]PPLPVTG*	SPRRAPPPL,RRAPPPLPV	STAD
RNF43	c.647C>T	p.S216L	PPAWPDYDVWILMTVVGTIFVIILA[p.S216L]LVLRIRCRPRHSRPDPLQQRTAWAIS	IILALVLRI,IFVIILALV,VIILALVLR,TIFVIILAL,FVIILALVL,TIFVIILALV,VIILALVLRI,IFVIILALVL,LVLRIRCRPR,FVIILALVLR,IILALVLRIR,LALVLRIRCR,GTIFVIILAL	CRC
RNMT	c.1174delA	p.K392fs	PEFLVYFPLLNEMAKKYNMKLVYKK[p.K392fs]HFWNSTKKRLRTMKIKCS*	VYKKHFWNS,KKHFWNSTK,KHFWNSTKK,STKKRLRTM,KKRLRTMKI,RLRTMKIKC,HFWNSTKKR,MKLVYKKHF,YKKHFWNST,STKKRLRTMK,KKHFWNSTKK,KKRLRTMKIK,RLRTMKIKCS,FWNSTKKRLR,NMKLVYKKHF,MKLVYKKHFW	STAD
RNPC3	c.347delA	p.E116fs	LVVEFAKEQDRVHSPCPTSGSEKKK[p.E116fs]GLMTLSKMIKKKKNLVI*	GLMTLSKMI,LMTLSKMIK,MTLSKMIKK,TLSKMIKKK,LSKMIKKKK,MIKKKKNLV,KGLMTLSKM,IKKKKNLVI,KMIKKKKNLV,GLMTLSKMIK,LMTLSKMIKK,MTLSKMIKKK,TLSKMIKKKK,KKKGLMTLSK,MIKKKKNLVI,SKMIKKKKNL,SEKKKGLMTL,KKGLMTLSKM	CESC
ROBO2	c.3052G>A	p.D1018N	SQITQATPYATTQILHSNSIHELAV[p.D1018N]NLPDPQWKSSIQQKTDLMGFGYSLPD	SIHELAVNL,HELAVNLPD,AVNLPDPQWK,NSIHELAVNL,LAVNLPDPQW,HELAVNLPDP	UCEC
ROBO2	c.3238_3239insC	p.P1080fs	KNKNSSKPQKNNGSTWANVPLPPPP[p.P1080fs]SPAPSWHGAGTLCSGTTRKWL*	TLCSGTTRK,GTLCSGTTR,SPAPSWHGA,APSWHGAGT,GTLCSGTTRK,VPLPPPPSPA,SPAPSWHGAG,APSWHGAGTL	STAD
ROBO2	c.3877delA	p.K1293fs	PTSPFSTDSNTSAALSQSQRPRPTK[p.K1293fs]NTREGGWTNNQHCLIEGKE*	WTNNQHCLI,REGGWTNNQH	STAD
ROCK1	c.1552A>T	p.T518S	HRINEYQRKAEQENEKRRNVENEVS[p.T518S]SLKDQLEDLKKVSQNSQLANEKLSQL	EVSSLKDQL,NVENEVSSLK,RNVENEVSSL,NEVSSLKDQL	PRAD
ROR2	c.2014G>A	p.D672N	KLLGNSLLPIRWMAPEAIMYGKFSI[p.D672N]NSDIWSYGVVLWEVFSYGLQPYCGYS	NSDIWSYGV,KFSINSDIW,SINSDIWSY,IMYGKFSIN,GKFSINSDI,FSINSDIWSY,NSDIWSYGVV,IMYGKFSINS,INSDIWSYGV,GKFSINSDIW	CRC
RORB	c.280G>T	p.G94W	NRNRCQHCRLQKCLALGMSRDAVKF[p.G94W]WRMSKKQRDSLYAEVQKHQQRLQEQR	AVKFWRMSK,MSRDAVKFW,AVKFWRMSKK,MSRDAVKFWR,DAVKFWRMSK,GMSRDAVKFW	LUAD
ROS1	c.734G>T	p.R245I	FPGGPILGYNLRLISKNQKLDAGTQ[p.R245I]ITSFQFYSTLPNTIYRFSIAAVNEVG	GTQITSFQF,TQITSFQFY,QKLDAGTQI,GTQITSFQFY,ITSFQFYSTL,NQKLDAGTQI,LDAGTQITSF,AGTQITSFQF	UCEC
RP1	c.5312C>T	p.S1771L	WLLKENHLLRMSSENPGMCGNADTT[p.S1771L]LVDTLLDNNSSEVPYSHFGNLAPGPT	DTTLVDTLL,GMCGNADTTL	LUSC
RPA1	c.92G>A	p.R31H	SEGAIAAIMQKGDTNIKPILQVINI[p.R31H]HPITTGNSPPRYRLLMSDGLNTLSSF	LQVINIHPI,ILQVINIHPI,LQVINIHPIT	HNSC
RPL10L	c.560A>C	p.K187T	RQKIHISKKWGFTKFNADEFEDMVA[p.K187T]TKCLIPDGCGVKYVPSHGPLDKWRVL	DEFEDMVAT,DEFEDMVATK,FEDMVATKCL	LUAD
RPL13AP20	c.319G>C	p.G107R	QTMRGMPPHKTKPGQAALDCLKVFD[p.G107R]RIPPPYDKKKRMVVPAALKVVRLKPA	VFDRIPPPY,RIPPPYDKK,KVFDRIPPP,KVFDRIPPPY,RIPPPYDKKK	UCS

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
RPL19	c.451C>T	p.R151C	KVKGNVFKNKRILMEHiHKLKADKA[p.R151C]CKKLLADQAEARRSKTKEARKRREER	KLKADKACK,KLKADKACKK	TGCT
RPL22	c.44delA	p.K15fs	MAPVKKLVVKGGKK[p.K15fs]RSKF*	VVKGGKKRSK,VKGGKKRSKF	UCEC
RPL5	c.172_173delAG	p.R58fs	KRLVIQDKNKYNTPKYRMIVRVTNR[p.R58fs]YHLSDCLCPYRGGYDSLRSVCTRTAKIWCEGWPDKLCCSILYWPAAGPQASQ*	HLSDCLCPY,RSVCTRTAK,MIVRVTNRY,IVRVTNRYH,RVTNRYHLS,RTAKIWCEG,CLCPYRGGY,DSLRSVCTR,VRVTNRYHL,KLCCSILYW,CSILYWPAA,DKLCCSILY,WPAAGPQAS,WPDKLCCSI,SLRSVCTRTA,RMIVRVTNRY,KIWCEGWPDK,HLSDCLCPYR,IWCEGWPDKL,IVRVTNRYHL,RSVCTRTAKI,YHLSDCLCPY,CPYRGGYDSL,WPDKLCCSIL,RTAKIWCEGW	TGCT
RPL6	c.578T>G	p.F193C	LASGLLLVTGPLVLNRVPLRRTHQK[p.F193C]CVIATSTKIDISNVKIPKHLTDAYFK	CVIATSTKI,RTHQKCVIA,KCVIATSTK,HQKCVIATS,RTHQKCVIAT,HQKCVIATST	CRC
RPRD2	c.289C>A	p.R97S	PHRLNLFYLANDVIQNCKRKNAIIF[p.R97S]SESFADVLPEAAALVKDPSVSKSVER	AIIFSESFA,NAIIFSESF,FSESFADVL,IIFSESFADV,IFSESFADVL,NAIIFSESFA,KNAIIFSESF	LUAD
RPS2	c.598A>G	p.R200G	GKPHTVPCKVTGRCGSVLVRLIPAP[p.R200G]GGTGIVSAPVPKKLLMMAGIDDCYTS	RLIPAPGGT,LVRLIPAPG,IPAPGGTGI,LIPAPGGTGI,IPAPGGTGIV	CLL
RPS6KA5	c.496G>A	p.E166K	THLSQRERFTEHEVQIYVGEIVLAL[p.E166K]KHLHKLGIIYRDIKLENILLDSNGHV	VLALKHLHK,LALKHLHKL,LKHLHKLGI,VLALKHLHKL,ALKHLHKLGI,IVLALKHLHK,YVGEIVLALK,KHLHKLGIIY,GEIVLALKHL,LKHLHKLGII	CRC
RPS6KA6	c.1181C>A	p.S394Y	ATSIAEEYKITPITSANVLPIVQIN[p.S394Y]ENAAQFGEVYELKEDIGVGSYSVCKR	ENAAQFGEV,QINENAAQF,VQINENAAQ,VQINENAAQF,ENAAQFGEVY,NENAAQFGEV,LPIVQINENA	UCEC
RPS6KA6	c.327delA	p.K109fs	KKASLKVRDRVRTKMERDILVEVNH[p.K109fs]HLLSNCTMPFRLKGNCT*	ILVEVNHHL,LLSNCTMPF,LSNCTMPFR,HHLLSNCTM,ILVEVNHHLL,LLSNCTMPFR,SNCTMPFRLK,HLLSNCTMPF,NHHLLSNCTM	STAD
RPSA	c.331C>G	p.Q111E	AVLKFAAATGATPIAGRFTPGTFTN[p.Q111E]EIQAAFWEPRLLVVTDPRADHQPLTE	FTNEIQAAF,TPGTFTNEI,FTPGTFTNEI,TFTNEIQAAF,EIQAAFWEPR,NEIQAAFWEP,FTNEIQAAFW	GBM
RPTN	c.1090G>A	p.G364S	QSSHYGQMDRKGQCYHYDQTNRQGQ[p.G364S]SSHYSQPNRQGQSSHYGQPDTQDQSS	SSHYSQPNR,TNRQGQSSHY,GQSSHYSQPN	CLL
RPTN	c.1614G>A	p.M538I	QTDRQGQSFHYGQPDRQGQSSHYSQ[p.M538I]IDRQGQSSHYGQTDRQGQSSHYGQTD	GQSSHYSQI,SSHYSQIDR,SQIDRQGQSS,IDRQGQSSHY	TGCT
RPTN	c.886G>A	p.G296S	CGQSERLGQELGCGQTDRQGQSSHY[p.G296S]SQTDRQDQSYHYGQTDRQGQSSHYSQ	SQTDRQDQSY	PRAD
RRAD	c.833C>A	p.A278E	LRRDSKEANARRQAGTRRRESLGKK[p.A278E]EKRFLGRIVARNSRKMAFRAKSKSCH	KEKRFLGRI,KEKRFLGRIV	KIRC,TGCT
RREB1	c.2348G>T	p.G783V	CGEDLKHYRALRIHMRTHCGRGLGG[p.G783V]VHKGRKPFECKECSAAFAAKRNCIHH	GVHKGRKPF,CGRGLGGVHK	ACC
RRN3	c.25C>T	p.R9C	MAAPLLHT[p.R9C]CLPGDAAASSSAVKKLGASRTGISNM	MAAPLLHTC,LLHTCLPGDA,MAAPLLHTCL,HTCLPGDAAA	KIRP
RRN3	c.31C>T	p.P11S	MAAPLLHTRL[p.P11S]SGDAAASSSAVKKLGASRTGISNMRA	HTRLSGDAA,LLHTRLSGDA,HTRLSGDAAA	KIRP
RRP15	c.642G>T	p.L214F	KEAGSSMRKRAKLISTVSKKDFISV[p.L214F]FRGMDGSTNETASSRKKPKAKQTEVK	SKKDFISVF,VSKKDFISVF,KDFISVFRGM	LUSC
RRS1	c.135delC	p.N45fs	QRITVHKELELQFDLGNLLASDRNP[p.N45fs]RPGCGAPDPRRRPSYRPWRGTTRNCSSTSCGSCPRSAWKRR*	GSCPRSAWK,STSCGSCPR,RRRPSYRPW,SYRPWRGTT,LLASDRNPR,APDPRRRPS,CGSCPRSAW,SSTSCGSCPR,CGSCPRSAWK,GSCPRSAWKR,RRRPSYRPWR,SYRPWRGTTR,NLLASDRNPR,APDPRRRPSY,RPSYRPWRGT,RPWRGTTRNC	STAD
RSBN1	c.1714G>A	p.E572K	SPFKRRRSMNEIKNLQYLPRTSEPR[p.E572K]KVLFEDRTRAHADHVGQGFDWQSTAA	RTSEPRKVL,RTSEPRKVLF,LPRTSEPRKV	UCEC
RSF1	c.1158delA	p.K386fs	HEITEKSTEETEKLKNDQQAKIPLK[p.K386fs]NEKLN*	QAKIPLKNEK,AKIPLKNEKL	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
RSPO2	c.82C>T	p.R28C	FRLFSFALIILNCMDYSHCQGNRWR[p.R28C]CSKRASYVSNPICKGCLSCSKDNGCS	QGNRWRCSK,RWRCSKRAS,RCSKRASYV,WRCSKRASY,CQGNRWRCSK,RWRCSKRASY,QGNRWRCSKR	CRC
RTN1	c.308C>G	p.S103W	ASTGVAGVSSAMDHTFSTTSKDGEG[p.S103W]WCYTSLISDICYPPQEDSTYFTGILQ	EGWCYTSLI,GEGWCYTSL,TSKDGEGWCY,GEGWCYTSLI	LUAD
RTN2	c.938delC	p.P313fs	KTVPILELSPPLWTAIGWVQRGPTP[p.P313fs]LLLSSGFY*	VQRGPTPLL,PLLLSSGFY,WVQRGPTPL,TPLLLSSGF,VQRGPTPLLL,GWVQRGPTPL,TPLLLSSGFY	STAD
RUNX1	c.286_287insG	p.D96fs	LCSVLPTHWRCNKTLPIAFKVVALG[p.D96fs]GCSRWHSGHCDGWQ*	VVALGGCSR,VALGGCSRW,KVVALGGCSR,RWHSGHCDGW	BRCA
RUNX1	c.403A>G	p.R135G	DENYSAELRNATAAMKNQVARFNDL[p.R135G]GFVGRSGRGKSFTLTITVFTNPPQVA	LGFVGRSGR,VARFNDLGF,VARFNDLGFV,RFNDLGFVGR,DLGFVGRSGR,QVARFNDLGF	LAML
RUNX1	c.424_425insA	p.R142fs	LRNATAAMKNQVARFNDLRFVGRSG[p.R142fs]KREKLHSDHHCLHKPTASRHLPQSHQNHSGWAPRTSKTSAETR*	KLHSDHHCL,CLHKPTASR,HSDHHCLHK,SGWAPRTSK,VGRSGKREK,ASRHLPQSH,RTSKTSAET,RFVGRSGKR,QNHSGWAPR,APRTSKTSA,QSHQNHSGW,HQNHSGWAP,HSGWAPRTSK,RTSKTSAETR,KLHSDHHCLH,HQNHSGWAPR,HCLHKPTASR,LHKPTASRHL	BRCA
RUNX2	c.1010G>T	p.R337M	SPSIHSTTPLSSTRGTGLPAITDVP[p.R337M]MRISDDDTATSDFCLWPSTLSKKSQA	AITDVPMRI,LPAITDVPM,GLPAITDVPM	LUAD
RUNX2	c.1397C>A	p.P466H	STPYLYYGTSSGSYQFPMVPGGDRS[p.P466H]HSRMLPPCTTTSNGSTLLNPNLPNQN	RSHSRMLPP,HSRMLPPCT,RSHSRMLPPC,HSRMLPPCTT	KIRC
RUNX2	c.211C>G	p.Q71E	VAAQQQQQQQQQQQQQQQQQQQQQQQQ[p.Q71E]EEAAAAAAAAAAAAAAAAAVPRLRPP	QQQQEEAAA,QQQEEAAAA,QQEEAAAAA,QQQQEEAAAA,QQQEEAAAAA,QQEEAAAAAA,QEEAAAAAAA	KIRP,TGCT
RUSC2	c.1456delC	p.P486fs	SSTQAAAAVGPTVLEGQVYTNTSPP[p.P486fs]TSALDVSAPAAMIAACSAALLSAWARWNVC*	AMIAACSAA,MIAACSAAL,AALLSAWAR,ALLSAWARW,NTSPPTSAL,SALDVSAPA,DVSAPAAMI,SAPAAMIAA,IAACSAALL,SAALLSAWA,LSAWARWNV,APAAMIAAC,LDVSAPAAM,CSAALLSAW,AMIAACSAAL,MIAACSAALL,LLSAWARWNV,SAALLSAWAR,YTNTSPPTSA,TSALDVSAPA,DVSAPAAMIA,CSAALLSAWA,ALDVSAPAAM,AAMIAACSAA,ACSAALLSAW,AALLSAWARW	STAD
RUVBL1	c.1291G>A	p.E431K	SVQLLTPANLLAKINGKDSIEKEHV[p.E431K]KEISELFYDAKSSAKILADQQDKYMK	HVKEISELF,VKEISELFY,IEKEHVKEI,HVKEISELFY,KEHVKEISEL,KEISELFYDA	CRC
RUVBL1	c.349C>T	p.R117C	PFCPMVGSEVYSTEIKKTEVLMENF[p.R117C]CRAIGLRIKETKEVYEGEVTELTPCE	VLMENFCRA,EVLMENFCR,NFCRAIGLR,LMENFCRAI,VLMENFCRAI,NFCRAIGLRI,FCRAIGLRIK,ENFCRAIGLR,EVLMENFCRA,MENFCRAIGL	CRC
RWDD2B	c.761G>A	p.R254H	VEGPQSACEEFWSRLRKLNWKRILI[p.R254H]HHREDIPFDGTNDETERQRKFSIFEE	ILIHHREDI,IHHREDIPF,KLNWKRILIH,RILIHHREDI,NWKRILIHHR,LIHHREDIPF	CRC
RXFP1	c.668C>A	p.S223Y	HRLEWLIIEDNHLSRISPPTFYGLN[p.S223Y]YLILLVLMNNVLTRLPDKPLCQHMPR	GLNYLILLV,TFYGLNYLI,FYGLNYLIL,YGLNYLILL,NYLILLVLM,LNYLILLVL,YGLNYLILLV,GLNYLILLVL,TFYGLNYLIL,FYGLNYLILL,LNYLILLVLM,SPPTFYGLNY	UCEC
RXRA	c.1280C>A	p.S427Y	AYCKHKYPEQPGRFAKLLLRLPALR[p.S427Y]YIGLKCLEHLFFFKLIGDTPIDTFLM	LLRLPALRY,LPALRYIGL,LRYIGLKCL,RLPALRYIGL,LLRLPALRYI,ALRYIGLKCL,YIGLKCLEHL,LLLRLPALRY	BLCA
RXRA	c.1280C>T	p.S427F	AYCKHKYPEQPGRFAKLLLRLPALR[p.S427F]FIGLKCLEHLFFFKLIGDTPIDTFLM	LPALRFIGL,LLRLPALRF,LRFIGLKCL,RLPALRFIGL,FIGLKCLEHL,LLRLPALRFI,LLLRLPALRF	BLCA
RYR1	c.2002G>T	p.D668Y	IRPNIFVGRAEGTTQYSKWYFEVMV[p.D668Y]YEVTPFLTAQATHLRVGWALTEGYTP	MVYEVTPFL,KWYFEVMVY,VMVYEVTPF,YEVTPFLTA,FEVMVYEVT,WYFEVMVYEV,VMVYEVTPFL,MVYEVTPFLT,EVMVYEVTPF,SKWYFEVMVY,YEVTPFLTAQ,FEVMVYEVTP	TGCT
RYR1	c.7726G>A	p.A2576T	NRYLCLAVLPLITKCAPLFAGTEHR[p.A2576T]TIMVDSMLHTVYRLSRGRSLTKAQRD	RTIMVDSML,HRTIMVDSM,RTIMVDSMLH,LFAGTEHRTI,FAGTEHRTIM	UCEC
RYR2	c.13002G>T	p.M4334I	ICSLLLGGSLVEGAKKIKVAELLAN[p.M4334I]IPDPTQDEVRGDGEEGERKPLEAALP	KVAELLANI,LLANIPDPT,IPDPTQDEV,NIPDPTQDEV,IKVAELLANI,AELLANIPDP	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
RYR2	c.2131G>A	p.E711K	VTAEATHLRVGWASTEGYSPYPGGG[p.E711K]KEWGGNGVGDDLFSYGFDGLHLWSGC	KEWGGNGVG,SPYPGGGKEW	LUSC
RYR2	c.6069A>C	p.L2023F	DFHEDLMTHCGIELDEDGSLDGNSD[p.L2023F]FTIRGRLLSLVEKVTYLKKKQAEKPV	GSLDGNSDF,SLDGNSDFTI,FTIRGRLLSL	TGCT
RYR2	c.7239G>C	p.K2413N	IMTFYSALIDLLGRCAPEMHLIHAG[p.K2413N]NGEAIRIRSILRSLIPLGDLVGVISI	LIHAGNGEA,IHAGNGEAI,HLIHAGNGEA,LIHAGNGEAI	LUAD
RYR3	c.5008C>A	p.P1670T	DESKRHGLPGVGLRTCLKPGFRFST[p.P1670T]TCFVVTGEDHQKQSPEIPLESLRTKA	RFSTTCFVV,GFRFSTTCF,FRFSTTCFV,GFRFSTTCFV,PGFRFSTTCF,FRFSTTCFVV	LUAD
RYR3	c.8114G>A	p.R2705Q	LAVGWTVERTKEGEALVQQRENEKL[p.R2705Q]QSVSQANQGNSYSPAPLDLSNVVLSR	RENEKLQSV,RENEKLQSVS,NEKLQSVSQA	CRC
SACS	c.8717G>A	p.R2906Q	FHVNGHFALDSARRNLWRDDNGVGV[p.R2906Q]QSDWNNSLMTALIAPAYVELLIQLKK	QSDWNNSLM,VQSDWNNSL,VQSDWNNSLM	UCEC
SAFB	c.2393delG	p.W798fs	REGQHYPERHGGPERHGRDSRDGWG[p.W798fs]AMALTRG*	DSRDGWGAM,RDGWGAMAL,DGWGAMALTR,RDSRDGWGAM,SRDGWGAMAL	STAD
SAFB	c.2396G>T	p.G799V	EREGQHYPERHGGPERHGRDSRDGW[p.G799V]VGYGSDKRMSEGRGLPPPPRGRRDWG	DSRDGWVGY,VGYGSDKRM,RDSRDGWVGY	TGCT
SAGE1	c.685C>T	p.R229C	HNVCEQKMENVQPAPDNVLLTLRPR[p.R229C]CINMTDTGISPMSTRDPYATITYNVP	TLRPRCINM,RPRCINMTDT,RCINMTDTGI	CRC
SAGE1	c.894C>A	p.H298Q	STGLINVAGAGTPAISTNGLYSTVP[p.H298Q]QNVCEEKMENDQPQPNNVLSTVQPVI	LYSTVPQNV,GLYSTVPQNV	LUAD
SALL3	c.1777C>G	p.L593V	PGLNHVESGVSATAESPQSLLGGPP[p.L593V]VTKAEPVSLPCTNARAGDAPVGAQAS	SLLGGPPVT,LLGGPPVTK,LLGGPPVTKA,SLLGGPPVTK	ACC
SALL4	c.2983delG	p.V995fs	NQYTSMLNGGLAVKTNEISVIQSGG[p.V995fs]FLPSRFPWGPPPL*	FLPSRFPWG,GFLPSRFPW,RFPWGPPPL,ISVIQSGGF,IQSGGFLPS,SGGFLPSRF,SRFPWGPPP,FLPSRFPWGP,QSGGFLPSRF,GGFLPSRFPW,SRFPWGPPPL	STAD
SALL4	c.560G>T	p.R187L	PPTPQDISYLAKGKVANTNVTLQAL[p.R187L]LGTKVAVNQRSADALPAPVPGANSIP	ALLGTKVAV,LQALLGTKV,TLQALLGTK,TLQALLGTKV,VTLQALLGTK,NTNVTLQALL,LQALLGTKVA	LUAD
SAMD3	c.618G>T	p.Q206H	DMTKYLEGSLYPSTQQYNDVVNALL[p.Q206H]HAHPFLDEDGCGFFLWKRALKDRFKY	ALLHAHPFL,NALLHAHPF,VNALLHAHPF	LUSC
SAMD4B	c.1429C>T	p.R477W	APAPTDGSEPAPAPVADGDIPSQFT[p.R477W]WVMGKVCTQLLVSRPDEENITSYLQL	SQFTWVMGK,DIPSQFTWV,IPSQFTWVM,GDIPSQFTW,SQFTWVMGKV,WVMGKVCTQL,PSQFTWVMGK,DIPSQFTWVM	UCS
SBF1	c.3228delC	p.P1076fs	SRNLVKNAKKTIGRQHVTRKKYNPP[p.P1076fs]AGSTGASRPLRTRRTRSQCRRSWSPAR*	STGASRPLR,ASRPLRTRR,RTRRTRSQC,RTRSQCRRS,RSQCRRSWS,VTRKKYNPPA,ASRPLRTRRT,RTRRTRSQCR,RTRSQCRRSW,RSQCRRSWSP,QCRRSWSPAR,RPLRTRRTRS,KKYNPPAGST,SQCRRSWSPA	STAD
SBNO1	c.3415_3416insA	p.N1139fs	EVHQQNALFQYFADTLTAVVQNAKK[p.N1139fs]KWKI*	AVVQNAKKK,VQNAKKKWK,VVQNAKKKWK	STAD
SBSPON	c.397G>T	p.G133W	GGAPCPPLEERAGCLEYSTPQGQDC[p.G133W]WHTYVPAFITTSAFNKERTRQATSPH	GQDCWHTYV,CWHTYVPAF,QGQDCWHTY,CWHTYVPAFI,PQGQDCWHTY,YSTPQGQDCW	LUAD
SCAF1	c.624_625insC	p.P208fs	PPPAPSSASSSPSPSPSSSSPSPPP[p.P208fs]TPTAPCTPSPTCPPIRYL*	SPSPPPTPT,TPSPTCPPI,SPTCPPIRY,CTPSPTCPPI,SPSPPPTPTA,SPTCPPIRYL	KIRC
SCAF11	c.2776_2777delGA	p.E926fs	SSPGEKSRSQSRERESDRDGQRRER[p.E926fs]KENQKVV*	RERKENQKV,RERKENQKVV	GBM,KIRP
SCAF8	c.2218G>T	p.G740C	LVQPSLSMTPETVKDVGFGSLVIPG[p.G740C]CSVASNLATSALPAGNVFNAPTKQAE	SLVIPGCSV,LVIPGCSVA,SLVIPGCSVA,IPGCSVASNL	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
SCAPER	c.1097G>A	p.R366Q	AEKTQFTVSTLDDVKNSGSIRDNYV[p.R366Q]QTSEISAVHIDTECVSVMLQAGTPPL	VQTSEISAV,YVQTSEISAV,QTSEISAVHI,RDNYVQTSEI,VQTSEISAVH	UCEC
SCARF1	c.1841G>A	p.R614Q	SVSFAEGTKFAPQSRRSSGELSSPL[p.R614Q]QKPKRLSRGAQSGPEGREAEESTGPE	LSSPLQKPK,LQKPKRLSR,SPLQKPKRL	STAD
SCFD2	c.1633C>T	p.R545W	TDWDSSINLTFHKSKIAVDELFTSL[p.R545W]WDIAGARSLLKQFKSVYVPGNHTHQA	ELFTSLWDI,SLWDIAGAR,TSLWDIAGA,WDIAGARSL,FTSLWDIAGA,ELFTSLWDIA,TSLWDIAGAR,WDIAGARSLL,DELFTSLWDI	CRC
SCLT1	c.327delA	p.K109fs	MKLQLENVIKENERLHSELKDAVEK[p.K109fs]NWRPFPWAQR*	KNWRPFPWA,AVEKNWRPF,EKNWRPFPW,NWRPFPWAQR,VEKNWRPFPW,DAVEKNWRPF	STAD
SCML4	c.581G>A	p.R194Q	GKQHLRSLPVVNSIGYVLRFLAKLC[p.R194Q]QSLLCDDLFSHQPFPRGCSASEKVQE	FLAKLCQSL,FLAKLCQSLL,RFLAKLCQSL,CQSLLCDDLF	CRC
SCML4	c.783G>T	p.L261F	YLVNPVGMNRYSVDTSASTFNHRGS[p.L261F]FHPSSSLYCKRQNSGDSHLGGGPAAT	STFNHRGSF,SFHPSSSLY,GSFHPSSSL,STFNHRGSFH,GSFHPSSSLY,RGSFHPSSSL,ASTFNHRGSF	LUAD
SCN10A	c.3425G>A	p.R1142H	EGCIRHCPCCKLDTTKSPWDVGWQV[p.R1142H]HKTCYRIVEHSWFESFIIFMILLSSG	WQVHKTCYR,WQVHKTCYRI,VGWQVHKTCY,SPWDVGWQVH	MM
SCN10A	c.4709C>T	p.T1570M	IVVVLSIASLIFSAILKSLQSYFSP[p.T1570M]MLFRVIRLARIGRILRLIRAAKGIRT	SLQSYFSPM,LQSYFSPML,YFSPMLFRV,MLFRVIRLA,SYFSPMLFR,QSYFSPMLF,SPMLFRVIR,SLQSYFSPML,QSYFSPMLFR,MLFRVIRLAR,LQSYFSPMLF,SYFSPMLFRV,YFSPMLFRVI,KSLQSYFSPM,FSPMLFRVIR,SPMLFRVIRL	CRC
SCN2A	c.107G>A	p.R36K	PDSFRFFTRESLAAIEQRIAEEKAK[p.R36K]KPKQERKDEDDENGPKPNSDLEAGKS	RIAEEKAKK,KAKKPKQER,KAKKPKQERK	BRCA
SCN2A	c.464C>A	p.T155K	LFNMLIMCTILTNCVFMTMSNPPDW[p.T155K]KKNVEYTFTGIYTFESLIKILARGFC	TMSNPPDWK,MSNPPDWKK,WKKNVEYTF,MTMSNPPDWK,TMSNPPDWKK,DWKKNVEYTF	LUAD
SCN7A	c.4073G>A	p.R1358H	MTVGSYLVPPSLVQLILLSRIIHML[p.R1358H]HLGKGPKVFHNLMLPLMLSLPALLNI	IIHMLHLGK,MLHLGKGPK,LSRIIHMLH,SRIIHMLHL,HLGKGPKVF,MLHLGKGPKV,RIIHMLHLGK,HMLHLGKGPK,LSRIIHMLHL,LHLGKGPKVF	GBM
SCNN1G	c.1691G>A	p.R564H	MSCSVVCVIEIIEVFFIDFFSIIAR[p.R564H]HQWQKAKEWWAWKQAPPCPEAPRSPQ	IIARHQWQK,IARHQWQKA,DFFSIIARH,FSIIARHQW,HQWQKAKEW,IIARHQWQKA,SIIARHQWQK,FFSIIARHQW,IARHQWQKAK,HQWQKAKEWW	GBM
SCRIB	c.995G>T	p.G332V	SLGKLTKLTNLNVDRNHLEALPPEI[p.G332V]VGCVALSVLSLRDNRLAVLPPELAHT	IVGCVALSV,ALPPEIVGC,LEALPPEIV,PEIVGCVAL,LPPEIVGCV,ALPPEIVGCV,EIVGCVALSV,LPPEIVGCVA	TGCT
SCRT1	c.397T>G	p.S133A	VSEGYAADAFFITDGRSRRKASNAG[p.S133A]AAAAPSTASAAAPDGDAGGGGGAGGR	RRKASNAGA,KASNAGAAA,RKASNAGAA,KASNAGAAAA,RKASNAGAAA,AAAAPSTASA	ACC
SCUBE2	c.1024G>A	p.V342M	DGKTCKDIDECQTRNGGCDHFCKNI[p.V342M]MGSFDCGCKKGFKLLTDEKSCQDVDE	FCKNIMGSF,CDHFCKNIM,IMGSFDCGCK,HFCKNIMGSF	CRC
SDAD1	c.824delA	p.K275fs	YATGKKSSKNKKKLEKAMKVLKKQK[p.K275fs]RRKNQRCLTFQPFT*	KVLKKQKRR,VLKKQKRRK,KQKRRKNQR,RKNQRCLTF,QRCLTFQPF,KVLKKQKRRK,AMKVLKKQKR,NQRCLTFQPF,RRKNQRCLTF	STAD
SDHAP1	c.196C>T	p.H66Y	DYKVRIDEYDHSKPIQGQQKKPFEE[p.H66Y]YWRKHTLSYVDVSTGKVTVEYRPIID	YWRKHTLSY,QQKKPFEEY,EEYWRKHTL,EYWRKHTLSY,YWRKHTLSYV,GQQKKPFEEY,QQKKPFEEYW,FEEYWRKHTL	CESC
SDHAP2	c.110_111insTT	p.S37fs	VGRPPVPLHMVSTASGQTRCWTWLS[p.S37fs]LVRHVP*	CWTWLSLVR,TRCWTWLSL,WTWLSLVRHV,QTRCWTWLSL	CESC
SDHAP2	c.91C>T	p.R31C	LCPACTPVGRPPVPLHMVSTASGQT[p.R31C]CCWTWLSGQACALSIAESCRPGDKVP	SGQTCCWTW,GQTCCWTWL,TASGQTCCW	GBM,PRAD
SDHAP3	c.196G>A	p.A66T	AACASVHGANRLGANSLLDLVVFGQ[p.A66T]TCALSIEESCRPGDKVPPIKPNAGEE	VVFGQTCAL,FGQTCALSI,VFGQTCALSI,LVVFGQTCAL	GBM
SDK1	c.1524_1525insC	p.K508fs	RPVDTTVTDGMTAILRCEVSGAPKP[p.K508fs]RHHLEKRKPHSGQWLCPDS*	EVSGAPKPR,KRKPHSGQW,RKPHSGQWL,APKPRHHLEK,KPRHHLEKRK,KRKPHSGQWL	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
SDK1	c.3542C>T	p.T1181M	PSPYSPSSRVIQTLQAPPDVAPTSV[p.T1181M]MVRTASETSLRLRWVPLPDSQYNGNP	DVAPTSVMV,MVRTASETSL,DVAPTSVMVR,APTSVMVRTA	CRC
SDK1	c.6437A>G	p.Y2146C	ADASESEATDSDYEDALPKHSFVNH[p.Y2146C]CMSDPTYYNSWKRRAQGRAPAPHRYE	HCMSDPTYY,KHSFVNHCM,NHCMSDPTY,FVNHCMSDPT,VNHCMSDPTY	TGCT
SEC24D	c.150_151insC	p.A50fs	YGHYGDPSHTASPTGMMKPAGPLGA[p.A50fs]HRH*	MKPAGPLGAH	LUAD
SEC31B	c.2713C>T	p.P905S	GVRPASSQPQLLGGQRVQVPNPVGF[p.P905S]SGTWPLPGSPLPMACPGIMRPGSTSL	VGFSGTWPL,NPVGFSGTW	TGCT
SEC61A2	c.377G>T	p.G126V	EVGDTPKDRALFNGAQKLFGMIITI[p.G126V]VQAIVYVMTGMYGDPAEMGAGICLLI	ITIVQAIVY,MIITIVQAI,TIVQAIVYV,GMIITIVQA,IITIVQAIV,IVQAIVYVM,KLFGMIITIV,GMIITIVQAI,MIITIVQAIV,ITIVQAIVYV,IITIVQAIVY,TIVQAIVYVM	LUAD
SECISBP2	c.1824C>G	p.D608E	GMDELISTPSVEDKSEEPPGTELQR[p.D608E]ETEASHLAPNHTTFPKIHSRRFRDYC	LQRETEASH,RETEASHLA,TELQRETEA,LQRETEASHL,RETEASHLAP	KIRC
SELP	c.1285C>T	p.R429W	RAFQYDTNCSFRCAEGFMLRGADIV[p.R429W]WCDNLGQWTAPAPVCQALQCQDLPVP	VWCDNLGQW,MLRGADIVW,FMLRGADIVW,IVWCDNLGQW	UCEC
SELP	c.889G>A	p.A297T	NMTCLHSAKAFQHQSSCSFSCEEGF[p.A297T]TLVGPEVVQCTASGVWTAPAPVCKAV	FTLVGPEVV,FSCEEGFTL,FSCEEGFTLV,EGFTLVGPEV	TGCT
SEMA3A	c.241G>A	p.D81N	SYHTFLLDEERSRLYVGAKDHIFSF[p.D81N]NLVNIKDFQKIVWPVSYTRRDECKWA	FSFNLVNIK,IFSFNLVNI,KDHIFSFNL,HIFSFNLVNI,NLVNIKDFQK,SFNLVNIKDF,KDHIFSFNLV	CRC
SEMA4D	c.755G>A	p.R252Q	EDDRVYFFFTEVSVEYEFVFRVLIP[p.R252Q]QIARVCKGDQGGLRTLQKKWTSFLKA	VLIPQIARV,RVLIPQIAR,FVFRVLIPQI,RVLIPQIARV,VFRVLIPQIA	CRC
SEMG2	c.874C>T	p.R292C	QHQTKNLSQDQEHGRKAHKISYPSS[p.R292C]CTEERQLHHGEKSVQKDVSKGSISIQ	CTEERQLHH,HKISYPSSC	GBM
SENP7	c.2018C>A	p.S673Y	ELELSYPLSWVQAFPLFQNLSSKES[p.S673Y]YFIHYYCVSTCSFPAGVAVAEEMKLK	SYFIHYYCV,SSKESYFIH,KESYFIHYY,ESYFIHYYC,QNLSSKESY,NLSSKESYF,SKESYFIHY,NLSSKESYFI,SSKESYFIHY,FQNLSSKESY,SKESYFIHYY,ESYFIHYYCV,QNLSSKESYF,KESYFIHYYC	UCEC
SEPHS1	c.1112G>A	p.R371Q	GEGHQAWIIGIVEKGNRTARIIDKP[p.R371Q]QIIEVAPQVATQNVNPTPGATS*	QIIEVAPQV,RIIDKPQJI,IIDKPQIIEV	CRC
SEPHS1	c.37G>A	p.E13K	MSTRESFNPESY[p.E13K]KLDKSFRLTRFTELKGTGCKVPQDVL	ESFNPESYK,SFNPESYKL,SYKLDKSFR,ESYKLDKSF,YKLDKSFRL,KLDKSFRLTR,SYKLDKSFRL,ESYKLDKSFR,ESFNPESYKL	UCEC
SERPINA12	c.631C>G	p.R211G	HGKINNLIENIDPGTVMLLANYIFF[p.R211G]GARWKHEFDPNVTKEEDFFLEKNSSV	LLANYIFFG,YIFFGARWK,NYIFFGARW,FGARWKHEF,ANYIFFGAR,LANYIFFGA,MLLANYIFFG,LLANYIFFGA,LANYIFFGAR,FFGARWKHEF,ANYIFFGARW	BLCA
SERPINA12	c.757G>T	p.D253Y	FFLEKNSSVKVPMMFRSGIYQVGYD[p.D253Y]YKLSCTILEIPYQKNITAIFILPDEG	YQVGYDYKL,GIYQVGYDY,YDYKLSCTI,GIYQVGYDYK,IYQVGYDYKL,SGIYQVGYDY,YDYKLSCTIL,YKLSCTILEI	LUAD
SERPINA3	c.474G>C	p.K158N	LQLSMGNAMFVKEQLSLLDRFTEDA[p.K158N]NRLYGSEAFATDFQDSAAAKKLINDY	FTEDANRLY,NRLYGSEAF,RFTEDANRLY,ANRLYGSEAF	CESC
SERPINA4	c.292C>T	p.R98C	HQQILETGEGSPSLKIAPANADFAF[p.R98C]CFYYLIASETPGKNIFFSPLSISAAY	NADFAFCFY,FAFCFYYLI,DFAFCFYYL,ADFAFCFYY,ANADFAFCF,NADFAFCFYY,FAFCFYYLIA,DFAFCFYYLI,ANADFAFCFY,ADFAFCFYYL	CESC
SERPINA9	c.1242G>T	p.M414I	TTKFIVRSKDGPSYFTVSFNRTFLM[p.M414I]IITNKATDGILFLGKVENPTKS*	FLMIITNKA,TFLMIITNK,SFNRTFLMI,FNRTFLMII,FLMIITNKAT,RTFLMIITNK,VSFNRTFLMI,SFNRTFLMII	LUAD
SERPINB12	c.503delA	p.Q168fs	PICQEYLDGVIQFYHTTIESVDFQK[p.Q168fs]TLKNPDKRLTSGLNVNPKVKSRNSSARTLLMLRLCWYW*	NSSARTLLM,SVDFQKTLK,KTLKNPDKR,TSGLNVNPK,SARTLLMLR,LMLRLCWYW,KVKSRNSSA,KSRNSSART,RNSSARTLL,LLMLRLCWY,NVNPKVKSR,KRLTSGLNV,SRNSSARTL,SSARTLLML,IESVDFQKT,LTSGLNVNPK,SSARTLLMLR,RTLLMLRLCW,LLMLRLCWYW,FQKTLKNPDK,SGLNVNPKVK,KVKSRNSSAR,KSRNSSARTL,RNSSARTLLM,SARTLLMLRL,TLLMLRLCWY,NPDKRLTSGL,IESVDFQKTL,SRNSSARTLL	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
SERPINB3	c.626C>G	p.S209C	GQWENKFKKENTKEEKFWPNKNTYK[p.S209C]CVQMMRQYNSFNFALLEDVQAKVLEI	KCVQMMRQY,TYKCVQMMR,NTYKCVQMM,NTYKCVQMMR,WPNKNTYKCV,NKNTYKCVQM,YKCVQMMRQY	KIRC
SERPINC1	c.134G>T	p.R45L	SLLLIGFWDCVTCHGSPVDICTAKP[p.R45L]LDIPMNPMCIYRSPEKKATEDEGSEQ	TAKPLDIPM,VDICTAKPL,CTAKPLDIPM,KPLDIPMNPM	LUAD
SERPINI1	c.243delA	p.L81fs	GMMELGAQGSTQKEIRHSMGYDSLK[p.L81fs]MVKNFLS*	SLKMVKNFL,SMGYDSLKM,SMGYDSLKMV,MGYDSLKMVK,SLKMVKNFLS,HSMGYDSLKM	STAD
SESTD1	c.918T>G	p.I306M	VMQVVNWLEGPGSEQLRAQWGIGDS[p.I306M]MRASQALQQKHEEIESQHSEWFAVYV	SMRASQALQ,DSMRASQAL,AQWGIGDSM,SMRASQALQQ,RAQWGIGDSM	KIRC
SETDB2	c.2145delA	p.R715fs	YGYEAGTVPEKEIFCQCGVNKCRKK[p.R715fs]YYKYVTNACL*	KYYKYVTNA,KCRKKYYKY,GVNKCRKKY,YKYVTNACL,KYYKYVTNAC,YYKYVTNACL,VNKCRKKYYK,KCRKKYYKYV,GVNKCRKKYY,KKYYKYVTNA	STAD
SEZ6L	c.620C>T	p.S207L	VPLWLDRKESAVPTTPAPLQISPFT[p.S207L]LQPYVAHTLPQRPEPGEPGPDMAQEA	TLQPYVAHT,LQPYVAHTL,ISPFTLQPY,LQISPFTLQ,SPFTLQPYV,TLQPYVAHTL,QISPFTLQPY,ISPFTLQPYV,APLQISPFTL,LQISPFTLQP,SPFTLQPYVA	CRC
SEZ6L2	c.221G>C	p.R74P	EALAELLHGALLRRGPEMGYLPGSD[p.R74P]PDPTLATPPAGQTLAVPSLPRATEPG	YLPGSDPDPT,LPGSDPDPTL	ACC
SF1	c.763C>T	p.R255W	IETPEDQNDLRKMQLRELARLNGTL[p.R255W]WEDDNRILRPWQSSETRSITNTTVCT	TLWEDDNRI,LARLNGTLW,TLWEDDNRIL	CESC
SF3B1	c.1868A>G	p.Y623C	SNLAKAAGLATMISTMRPDIDNMDE[p.Y623C]CVRNTTARAFAVVASALGIPSLLPFL	CVRNTTARA,CVRNTTARAF	CLL
SF3B1	c.1876A>T	p.N626Y	AKAAGLATMISTMRPDIDNMDEYVR[p.N626Y]YTTARAFAVVASALGIPSLLPFLKAV	NMDEYVRYT,YTTARAFAV,YVRYTTARA,RYTTARAFA,EYVRYTTAR,VRYTTARAF,DEYVRYTTA,NMDEYVRYTT,YTTARAFAVV,RYTTARAFAV,YVRYTTARAF,IDNMDEYVRY,DEYVRYTTAR	CLL
SF3B1	c.1996A>G	p.K666E	IPSLLPFLKAVCKSKKSWQARHTGI[p.K666E]EIVQQIAILMGCAILPHLRSLVEIIE	QARHTGIEI,EIVQQIAIL,IEIVQQIAI,WQARHTGIEI,EIVQQIAILM,IEIVQQIAIL	CLL
SF3B1	c.2098A>G	p.K700E	MGCAILPHLRSLVEIIEHGLVDEQQ[p.K700E]EVRTISALAIAALAEAATPYGIESFD	GLVDEQQEV,EVRTISALA,QEVRTISAL,DEQQEVRTI,EVRTISALAI,QQEVRTISAL,DEQQEVRTIS,QEVRTISALA	BRCA,CLL
SF3B1	c.2704G>A	p.E902K	GNLGAADIDHKLEEQLIDGILYAFQ[p.E902K]KQTTEDSVMLNGFGTVVNALGKRVKP	ILYAFQKQT,KQTTEDSVM,ILYAFQKQTT,FQKQTTEDSV,QKQTTEDSVM,KQTTEDSVML	BLCA
SF3B1	c.2870G>A	p.R957Q	ICGTVLWRLNNKSAKVRQQAADLIS[p.R957Q]QTAVVMKTCQEEKLMGHLGVVLYEYL	DLISQTAVV,ISQTAVVMK,LISQTAVVM,ADLISQTAV,LISQTAVVMK,QAADLISQTA,DLISQTAVVM,RQQAADLISQ	UCEC
SFI1	c.2462G>A	p.R821Q	THHLQCVRKRLLHRQSTQLLAQRLS[p.R821Q]QTCFRQWRQQLAARRQEQRATVRALW	LLAQRLSQT,SQTCFRQWR,AQRLSQTCF,LSQTCFRQW,LLAQRLSQTC,AQRLSQTCFR,LSQTCFRQWR,LAQRLSQTCF,RLSQTCFRQW	HNSC
SFPQ	c.1832G>A	p.R611Q	EEQMRRQREESYSRMGYMDPRERDM[p.R611Q]QMGGGGAMNMGDPYGSGGQKFPPLGG	MQMGGGGAM,DMQMGGGGAM,QMGGGGAMNM,MQMGGGGAMN	CRC
SFRP4	c.695G>A	p.R232Q	QRSGCNEVTTVVDVKEIFKSSSPIP[p.R232Q]QTQVPLITNSSCQCPHILPHQDVLIM	IPQTQVPLI,SSSPIPQTQV,SPIPQTQVPL	UCEC
SFSWAP	c.1850C>A	p.S617Y	PLEKNRVKLDDDSDDDEESKEGQES[p.S617Y]YSSAANTNPAVAPPCVVVEEKKPQLT	ESKEGQESY,GQESYSSAA,YSSAANTNPA,KEGQESYSSA,EESKEGQESY,QESYSSAANT	CRC
SGCG	c.659C>T	p.A220V	ESPTRSLSMDAPRGVHIQAHAGKIE[p.A220V]VLSQMDILFHSSDGMLVLDAETVCLP	EVLSQMDIL,VLSQMDILF,GKIEVLSQM,IEVLSQMDI,IQAHAGKIEV,QAHAGKIEVL,IEVLSQMDIL,EVLSQMDILF	CRC
SGCZ	c.123T>G	p.I41M	REQYILATQQNNLPRTENAQLYPVG[p.I41M]MYGWRKRCLYFFVLLLLVTMIVNLAM	LYPVGMYGW,MYGWRKRCL,AQLYPVGMY,GMYGWRKRCL,MYGWRKRCLY,NAQLYPVGMY,QLYPVGMYGW	CRC
SGIP1	c.1505G>T	p.R502L	GVGDVSRPFSPPIHSSSPPPIAPLA[p.R502L]LAESTSSISSTNSLSAATTPTVENEQ	ALAESTSSI,ALAESTSSIS,SPPPIAPLAL,LALAESTSSI	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
SGK1	c.1100_1102delAGA	p.K367del	AKDDFMEIKSHVFFSLINWDDLINK[p.K367del]ITPPFNPNVSGPNDLRHFDPEFTEEPVP	LINKITPPF,DLINKITPPF	UCEC
SGK3	c.183delA	p.L61fs	SEWFVFRRYAEFDKLYNTLKKQFPA[p.L61fs]WP*	TLKKQFPAW	STAD
SGOL2	c.1220delA	p.E407fs	KKSNKKTNEHGMKTFRKVKDSSSEK[p.E407fs]REKDQRDSLKIVQMSILGKRLKTGQKDLMSWMAKGVQKIPVLFSIMNSWLR*	LMSWMAKGV,WMAKGVQKI,SLKIVQMSI,IVQMSILGK,MSILGKRLK,SWMAKGVQK,FSIMNSWLR,GVQKIPVLF,KDLMSWMAK,GQKDLMSWM,REKDQRDSL,RDSLKIVQM,LKIVQMSIL,KGVQKIPVL,QKIPVLFSI,KIPVLFSIM,VLFSIMNSW,DLMSWMAKGV,VLFSIMNSWL,SLKIVQMSIL,KIVQMSILGK,QMSILGKRLK,MSWMAKGVQK,SWMAKGVQKI,KGVQKIPVLF,KVKDSSSEKR,REKDQRDSLK,LGKRLKTGQK,RLKTGQKDLM,MAKGVQKIPV,IVQMSILGKR,LFSIMNSWLR,VQMSILGKRL,KRLKTGQKDL,GQKDLMSWMA,AKGVQKIPVL,VQKIPVLFSI,QKIPVLFSIM	STAD
SGSM1	c.2452G>A	p.E818K	VLDAQRNTPTVLRPRDGSVDDRQSS[p.E818K]KATTSQDEAPREELAVQDSLESDLLA	SVDDRQSSK,RQSSKATTS,GSVDDRQSSK,RQSSKATTSQ	CESC
SGSM1	c.3351C>A	p.F1117L	IALALVEVYRDIILENNMDFTDIIK[p.F1117L]LFNEMAERHNTKQVLKLARDLVYKVQ	FTDIIKLFN,KLFNEMAER,DFTDIIKLF,DIIKLFNEM,MDFTDIIKL,NMDFTDIIKL,DIIKLFNEMA,MDFTDIIKLF	CRC
SH3KBP1	c.1688_1689insC	p.P563fs	ISQVSDNKASLPPKPGTMAAGGGGP[p.P563fs]SPSVLSGALPPVILFGNSWTQSQLPVSVRHGRKTKDGACGQQPGGRGGAKDTGPRAEEHHRDHEGPAETRD*	VLSGALPPV,TQSQLPVSV,GALPPVILF,PVSVRHGRK,SVRHGRKTK,LPVSVRHGR,SPSVLSGAL,SWTQSQLPV,SQLPVSVRH,SVLSGALPPV,VLSGALPPVI,ILFGNSWTQS,WTQSQLPVSV,VSVRHGRKTK,QLPVSVRHGR,NSWTQSQLPV,SGALPPVILF,FGNSWTQSQL,SQLPVSVRHG,PPVILFGNSW	KIRC
SH3KBP1	c.1720delC	p.L574fs	LPPKPGTMAAGGGGPAPLSSAAPSP[p.L574fs]CHPLWEQLDTEPTPRLCSARKENQRWSLRPAARRPWRS*	RWSLRPAAR,RPAARRPWR,CSARKENQR,WSLRPAARR,RKENQRWSL,NQRWSLRPA,QRWSLRPAA,WEQLDTEPT,APSPCHPLW,RWSLRPAARR,SLRPAARRPW,EQLDTEPTPR,SAAPSPCHPL,RPAARRPWRS,NQRWSLRPAA	STAD
SH3PXD2A	c.2276C>T	p.S759L	SSDLITLPATTPPCPTKKEWEGPAT[p.S759L]LYMTCSAYQKVQDSEISFPAGVEVQV	TLYMTCSAY,ATLYMTCSA,KEWEGPATL,WEGPATLYM,ATLYMTCSAY,LYMTCSAYQK,KEWEGPATLY,KKEWEGPATL,WEGPATLYMT	LUAD
SH3RF2	c.952C>T	p.R318C	RKVPGQFSITTALNTLNRMVHSPSG[p.R318C]CHMVEISTPVLISSSNPSVITQPMEK	HSPSGCHMV,VHSPSGCHM,MVHSPSGCHM,SPSGCHMVEI,RMVHSPSGCH,CHMVEISTPV	GBM
SH3TC2	c.265C>T	p.R89C	RCVNGPLQEAARRRLWALENEDQEV[p.R89C]CMLFKDLSARLVSIQSQRAQFLITFK	NEDQEVCML,CMLFKDLSAR,LENEDQEVCM,NEDQEVCMLF,QEVCMLFKDL	CRC
SHB	c.1378G>A	p.A460T	RNSQTSKHDYSLSLRSNQGFMHMKL[p.A460T]TKTKEKYVLGQNSPPFDSVPEVIHYY	FMHMKLTKT,GFMHMKLTK,KLTKTKEKY,KLTKTKEKYV,FMHMKLTKTK,QGFMHMKLTK,HMKLTKTKEK,LTKTKEKYVL,MKLTKTKEKY	GBM
SHROOM4	c.3468_3470delAGA	p.1156_1157EE>E	EEEEEEEEEEEEEEEEEEAEEEEE[p.1156_1157EE>E]LPPQYFSSETSGSCALNPEEVLEQPQPL	EEAEEEEEL	PAAD
SI	c.3649G>T	p.V1217F	LDFYMFLGPTPEVATKQYHEVIGHP[p.V1217F]FMPAYWALGFQLCRYGYANTSEVREL	FMPAYWALG,PFMPAYWAL,IGHPFMPAY,HPFMPAYWA,YHEVIGHPF,HEVIGHPFM,FMPAYWALGF,QYHEVIGHPF,VIGHPFMPAY,EVIGHPFMPA,HPFMPAYWAL,YHEVIGHPFM,IGHPFMPAYW	LUAD
SI	c.5042T>A	p.I1681K	WFDYHTGKDIGVRGQFQTFNASYDT[p.I1681K]KNLHVRGGHILPCQEPAQNTFYSRQK	TFNASYDTK,QTFNASYDTK,ASYDTKNLHV	TGCT
SIGLEC1	c.954delC	p.P318fs	QAAWSDAGVYTCQAENGVGSLVSPP[p.P318fs]SASTSSWLRSR*	SASTSSWLR,STSSWLRSR,PPSASTSSW,ASTSSWLRSR,SPPSASTSSW	STAD
SIGLEC10	c.749C>T	p.T250M	SAQRTVRLRVAYAPRDLVISISRDN[p.T250M]MPALEPQPQGNVPYLEAQKGQFLRLL	ISRDNMPAL,MPALEPQPQ,SISRDNMPAL,LVISISRDNM,ISISRDNMPA,MPALEPQPQG	GBM
SIGLEC11	c.1088C>T	p.S363F	NRLGSQQQALDLSVQYPPENLRVMV[p.S363F]FQANRTVLENLGNGTSLPVLEGQSLR	MVFQANRTV,RVMVFQANR,VMVFQANRTV,RVMVFQANRT,MVFQANRTVL,FQANRTVLEN	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
SIK1	c.2032delC	p.Q678fs	EVLEQQRLLQLQHHPAAAPGCSQAP[p.Q678fs]SRPLPRL*	QAPSRPLPR,APSRPLPRL,CSQAPSRPL,SQAPSRPLP,SQAPSRPLPR	STAD
SIM1	c.637G>A	p.V213M	YLKIRQYSLDMSPFDGCYQNVGLVA[p.V213M]MGHSLPPSAVTEIKLHSNMFMFRASL	YQNVGLVAM,GLVAMGHSL,MGHSLPPSA,VAMGHSLPP,AMGHSLPPSA,CYQNVGLVAM,YQNVGLVAMG,MGHSLPPSAV	CESC
SIPA1L1	c.3188G>A	p.R1063Q	SETYRMPVMEYKMNEGVSYEFKFPF[p.R1063Q]QNNNKWQRNASKGPHSPQVPSQVQSP	KFPFQNNNK,FQNNNKWQR,FPFQNNNKW,YEFKFPFQN,KFPFQNNNKW,YEFKFPFQNN	CRC
SIPA1L1	c.3680C>A	p.S1227Y	PSWQRSEDSIADQMAYSYRGPQDFN[p.S1227Y]YFVLEQHEYTEPTCHLPAVSKVLPAF	RGPQDFNYF,YFVLEQHEY,YRGPQDFNY,YRGPQDFNYF,SYRGPQDFNY,NYFVLEQHEY,GPQDFNYFVL	CRC
SIPA1L3	c.2330G>C	p.G777A	RVHNPCTDNVCYSMAVTRSKDAPPF[p.G777A]APPIPSGTTFRKSDVFRDFLLAKVIN	RSKDAPPFA,DAPPFAPPI,RSKDAPPFAP,APPIPSGTTF,KDAPPFAPPI	KIRC
SIRPA	c.387_389delCGA	p.D131del	IRIGNITPADAGTYYCVKFRKGSPD[p.D131del]VEFKSGAGTELSVRAKPSAPVVSGPAAR	KGSPDVEFK,KFRKGSPDV,RKGSPDVEF,VKFRKGSPDV,FRKGSPDVEF	KIRC
SIRPA	c.697G>A	p.V233I	SIHSTAKVVLTREDVHSQVICEVAH[p.V233I]ITLQGDPLRGTANLSETIRVPPTLEV	QVICEVAHI,VICEVAHITL,SQVICEVAHI	PRAD
SIX1	c.571G>A	p.E191K	TQVSNWFKNRRQRDRAAEAKERENT[p.E191K]KNNNSSSNKQNQLSPLEGGKPLMSSS	KNNNSSSNK	UCEC
SIX3	c.79A>C	p.I27L	VFRSPLDLYSSHFLLPNFADSHHRS[p.I27L]LLLASSGGGNGAGGGGGAGGGSGGGN	FADSHHRSL,FADSHHRSLL	CLL
SKI	c.185C>G	p.A62G	AFSARWAQEAYKKESAKEAGAAAVP[p.A62G]GPVPAATEPPPVLHLPAIQPPPPVLP	GAAAVPGPV,KEAGAAAVPG	KIRP
SKOR1	c.2648A>G	p.Y883C	EEMVQQLQIVRDTLCNELDQERKAR[p.Y883C]CAIQQKLKEAHDALHHFSCKMLTPRH	KARCAIQQK,RCAIQQKLK,QERKARCAI,KARCAIQQKL	LUAD
SLAMF1	c.829delA	p.S277fs	LIMVVILQLRRRGKTNHYQTTVEKK[p.S277fs]ALRSMPKSRNQVLFRRNLTPSQLRTLAPPYMLLPQSLSQSLSRKQIPSQSMLV*	TLAPPYMLL,SMPKSRNQV,KQIPSQSML,QIPSQSMLV,KSRNQVLFR,SLSQSLSRK,QSLSQSLSR,RTLAPPYML,PYMLLPQSL,KKALRSMPK,ALRSMPKSR,RSMPKSRNQ,RNLTPSQLR,QLRTLAPPY,TTVEKKALR,MPKSRNQVL,TPSQLRTLA,LPQSLSQSL,VEKKALRSM,NQVLFRRNL,RRNLTPSQL,SQLRTLAPP,LRTLAPPYM,SQSLSRKQI,RKQIPSQSM,LLPQSLSQSL,KQIPSQSMLV,SMPKSRNQVL,KSRNQVLFRR,QSLSQSLSRK,RTLAPPYMLL,KALRSMPKSR,RSMPKSRNQV,QLRTLAPPYM,SQLRTLAPPY,QTTVEKKALR,MPKSRNQVLF,PPYMLLPQSL,YQTTVEKKAL,FRRNLTPSQL,YMLLPQSLSQ,SRKQIPSQSM,RKQIPSQSML	BLCA
SLC10A4	c.843C>G	p.F281L	YKYSRVADYIVKVSLWSLLVTLVVL[p.F281L]LIMTGTMLGPELLASIPAAVYVIAIF	LLVTLVVLL,LLIMTGTML,VLLIMTGTM,SLLVTLVVLL,LLVTLVVLLI	CESC
SLC10A6	c.326delG	p.G109fs	YLLAISFSLKPVQAIAVLIMGCCPG[p.G109fs]APSLTFSPSGLMEIWISASV*	LIMGCCPGA,GLMEIWISA,SLTFSPSGL,FSPSGLMEI,LTFSPSGLM,MEIWISASV,CPGAPSLTF,APSLTFSPS,SPSGLMEIW,VLIMGCCPGA,GLMEIWISAS,LMEIWISASV,SLTFSPSGLM,TFSPSGLMEI,MGCCPGAPSL,SPSGLMEIWI	STAD
SLC10A7	c.782C>T	p.S261L	LILFIIFSIQLSFMLLTFIFSTRNN[p.S261L]LGFTPADTVAIIFCSTHKSLTLGIPM	FIFSTRNNL,STRNNLGFT,RNNLGFTPA,FSTRNNLGF,NLGFTPADTV,TFIFSTRNNL,IFSTRNNLGF	UCEC
SLC12A1	c.875C>T	p.S292L	ANAVAVAMYVVGFAETVVDLLKESD[p.S292L]LMMVDPTNDIRIIGSITVVILLGISV	LLKESDLMM,LLKESDLMMV,LMMVDPTNDI	CRC
SLC12A2	c.2483G>A	p.R828Q	ALLHLVHDFTKNVGLMICGHVHMGP[p.R828Q]QRQAMKEMSIDQAKYQRWLIKNKMKA	MGPQRQAMK,HMGPQRQAM,PQRQAMKEM,HMGPQRQAMK,HVHMGPQRQA,GPQRQAMKEM,VHMGPQRQAM	UCEC
SLC12A7	c.2056delC	p.H686fs	WGDGIRGLSLNAARYALLRVEHGPP[p.H686fs]TPRTGGPRCW*	LRVEHGPPT,RVEHGPPTPR	STAD

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
SLC13A2	c.1478_1479insG	p.L493fs	IVLLLGGGYALAKGSERSGLSEWLG[p.L493fs]KQADPTAECASSSHCHHPLPPGGHLHRVH*	SGLSEWLGK,SSHCHHPLP,HPLPPGGHL,KQADPTAEC,SSSHCHHPL,SEWLGKQAD,GLSEWLGKQA,RSGLSEWLGK,KQADPTAECA,ASSSHCHHPL,SEWLGKQADP,LPPGGHLHRV	KIRC
SLC13A5	c.818A>C	p.Q273P	VNFASWFAFAFPNMLVMLLFAWLWL[p.Q273P]PFVYMRFNFKKSWGCGLESKKNEKAA	LLFAWLWLP,FAWLWLPFV,WLWLPFVYM,LFAWLWLPF,AWLWLPFVY,WLPFVYMRF,PFVYMRFNF,LWLPFVYMR,FAWLWLPFVY,LLFAWLWLPF,LFAWLWLPFV,AWLWLPFVYM,LWLPFVYMRF,PFVYMRFNFK,WLWLPFVYMR,LPFVYMRFNF	GBM
SLC16A14	c.1484G>A	p.R495Q	YDFSFYICGLLYMIGILFLLIQPCI[p.R495Q]QIIEQSRRKYMDGAHV*	LLIQPCIQI,CIQIIEQSR,FLLIQPCIQI,LLIQPCIQII,QIIEQSRRKY,CIQIIEQSRR	UCEC
SLC16A6	c.293_294insG	p.G98fs	LTFSAPLATVLSNRFGHRLVVMLGG[p.G98fs]ATCQHRDGGRLLLTRGFSYVRRHRHHLWSGILL*	LLTRGFSYV,RLVVMLGGA,LTRGFSYVR,YVRRHRHHL,RHRHHLWSG,LLLTRGFSY,GFSYVRRHR,CQHRDGGRL,GRLLLTRGF,RGFSYVRRH,RHHLWSGIL,HHLWSGILL,LLLTRGFSYV,RLLLTRGFSY,SYVRRHRHHL,LTRGFSYVR,RGFSYVRRHR,RHRHHLWSGI,MLGGATCQHR,ATCQHRDGGR,LLTRGFSYVR,VMLGGATCQH,CQHRDGGRLL,FSYVRRHRHH,YVRRHRHHLW,HRHHLWSGIL,RHHLWSGILL	STAD
SLC16A9	c.1407_1424delCTGCGTCCTGCTGGGAGG	p.CVLLGG470del	LGPPIVGWFYDWTQTYDIAFYFSGF[p.CVLLGG470del]FILLLAALPSWDTCNKQLPKPAPTTFLYKVASNV*	AFYFSGFFI,FYFSGFFIL,YFSGFFILL,IAFYFSGFF,IAFYFSGFFI,AFYFSGFFIL,FYFSGFFILL,YFSGFFILLL,DIAFYFSGFF	KIRC
SLC17A9	c.970G>A	p.V324I	HLINQGYRAITVRKLMQGMGLGLSS[p.V324I]IFALCLGHTSSFCESVVFASASFGLQ	GMGLGLSSI,GLSSIFALC,SIFALCLGH,MGLGLSSIF,LGLSSIFAL,LSSIFALCL,GLGLSSIFAL,GLSSIFALCL,GMGLGLSSIF,QGMGLGLSSI	GBM
SLC1A2	c.1044_1045insT	p.F348fs	LIIHGGIFLPLIYFVVTRKNPFSFF[p.F348fs]CWHFPSLDHCPGHRFQCWNFACHLSLPGRKSGD*	KNPFSFFCW,PFSFFCWHF,SFFCWHFPS,FFCWHFPSL,LDHCPGHRF,GHRFQCWNF,FQCWNFACH,WNFACHLSL,NPFSFFCWH,FPSLDHCPG,CPGHRFQCW,SFFCWHFPSL,FQCWNFACHL,CWNFACHLSL,FACHLSLPGR,FSFFCWHFPS,RKNPFSFFCW,NPFSFFCWHF,SLDHCPGHRF,FPSLDHCPGH	LUAD
SLC2DA1	c.984_985delAG	p.P328fs	PLQAVVEERTVSFKLGDLEEAPERE[p.P328fs]ASQRGLERGNQHR*	LEEAPEREA,RGLERGNQHR	UCEC
SLC22A15	c.602C>T	p.S201L	NGGMSLVAFVLLNECVGTAYWALAG[p.S201L]LIGGLFFAVGIAQYALLGYFIRSWRT	ALAGLIGGL,GLIGGLFFA,LIGGLFFAV,TAYWALAGL,AYWALAGLI,LAGLIGGLF,AGLIGGLFF,GLIGGLFFAV,GTAYWALAGL,ALAGLIGGLF,TAYWALAGLI,LAGLIGGLFF	CRC
SLC22A9	c.1220G>A	p.R407Q	LQTLFGAVILLANCVAPWALKYMNR[p.R407Q]QASQMLLMFLLAICLLAIIFVPQEMQ	YMNRQASQM,ALKYMNRQA,KYMNRQASQ,RQASQMLLM,MNRQASQML,QASQMLLMF,LKYMNRQAS,YMNRQASQML,KYMNRQASQM,RQASQMLLMF,MNRQASQMLL,LKYMNRQASQ,NRQASQMLLM	GBM
SLC24A2	c.401C>T	p.A134V	SENSTDHAQGDYPKDIFSLEERRKG[p.A134V]VIILHVIGMIYMFIALAIVCDEFFVP	RKGVIILHV,VIILHVIGMI,SLEERRKGVI,RKGVIILHVI,EERRKGVIIL	CRC
SLC24A5	c.103C>A	p.R35S	ARRALLLGILWATAHLPLSGTSLPQ[p.R35S]SLPRATGNSTQCVISPSSEFPEGFFT	SLPQSLPRA,TSLPQSLPR,LPQSLPRAT,GTSLPQSLPR	LUAD
SLC25A17	c.84delT	p.F28fs	LSYESLVHAVAGAVGSVTAMTVFFP[p.F28fs]WIQLDFDFRLMRKENPKLHTWCSWRSLKKKDSWHHIEGGFQ*	AMTVFFPWI,IQLDFDFRL,RLMRKENPK,KLHTWCSWR,CSWRSLKKK,TWCSWRSLK,TAMTVFFPW,FFPWIQLDF,PWIQLDFDF,SWHHIEGGF,LMRKENPKL,HTWCSWRSL,WIQLDFDFR,DFDFRLMRK,TVFFPWIQL,KENPKLHTW,RSLKKKDSW,KKKDSWHHI,RLMRKENPKL,HTWCSWRSLK,TWCSWRSLKK,VTAMTVFFPW,TAMTVFFPWI,VFFPWIQLDF,LMRKENPKLH,MTVFFPWIQL,IQLDFDFRLM,RKENPKLHTW,LHTWCSWRSL,LKKKDSWHHI,FPWIQLDFDF,NPKLHTWCSW	STAD
SLC25A32	c.247C>G	p.Q83E	LRPKYNGILHCLTTIWKLDGLRGLY[p.Q83E]EGVTPNIWGAGLSWGLYFFFYNAIKS	GLYEGVTPN,GLRGLYEGV,LYEGVTPNI,YEGVTPNIW,GLYEGVTPNI,LYEGVTPNIW	BRCA
SLC25A40	c.287G>A	p.R96Q	EGGNKLWYKKPGNFQGTLDAFFKII[p.R96Q]QNEGIKSLWSGLPPTLVMAVPATVIY	IQNEGIKSL,KIIQNEGIK,FKIIQNEGI,IQNEGIKSLW	CRC
SLC25A45	c.316G>T	p.G106C	LLVLTATSHQERRAQPPSYMHIFLA[p.G106C]CCTGGFLQAYCLAPFDLIKVRLQNQT	FLACCTGGF,YMHIFLACC,SYMHIFLAC,YMHIFLACCT,FLACCTGGFL,SYMHIFLACC,IFLACCTGGF,CCTGGFLQAY	BRCA

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
SLC25A48	c.199G>A	p.A67T	TLSCIRVVYRRESMFGFFKGMSFPL[p.A67T]TSIAVYNSVVFGVFSNTQRFLSQHRC	GMSFPLTSI,TSIAVYNSV,MSFPLTSIA,FPLTSIAVY,MSFPLTSIAV,GMSFPLTSIA,LTSIAVYNSV,KGMSFPLTSI,SFPLTSIAVY,TSIAVYNSVV	DLBCL
SLC25A48	c.301C>A	p.R101S	VFGVFSNTQRFLSQHRCGEPEASPP[p.R101S]STLSDLLLASMVAGVVSVGLGGPVDL	SPPSTLSDL,EPEASPPSTL	LUAD
SLC25A5	c.235A>T	p.I79F	IIDCVVRIPKEQGVLSFWRGNLANV[p.I79F]FRYFPTQALNFAFKDKYKQIFLGGVD	NLANVFRYF,RGNLANVFR,VFRYFPTQA,GNLANVFRY,WRGNLANVF,FRYFPTQAL,NVFRYFPTQA,FWRGNLANVF,VFRYFPTQAL,RGNLANVFRY,GNLANVFRYF	CESC
SLC25A5	c.352G>A	p.A118T	DKYKQIFLGGVDKRTQFWLYFAGNL[p.A118T]TSGGAAGATSLCFVYPLDFARTRLAA	WLYFAGNLT,LTSGGAAGA,NLTSGGAAGA,WLYFAGNLTS	KIRC
SLC26A3	c.262G>A	p.V88I	WLPAYRLKEWLLSDIVSGISTGIVA[p.V88I]ILQGLAFALLVDIPPVYGLYASFFPA	GISTGIVAI,GIVAILQGL,AILQGLAFA,ILQGLAFAL,VAILQGLAF,ISTGIVAIL,AILQGLAFAL,ILQGLAFALL,GISTGIVAIL,GIVAILQGLA,IVAILQGLAF,SGISTGIVAI	GBM
SLC26A7	c.1886delT	p.I629fs	LAHCTASLIKAMTYYGNLDSEKPIF[p.I629fs]LNRYLLQ*	KPIFLNRYL,NLDSEKPIFL,SEKPIFLNRY,DSEKPIFLNR,KPIFLNRYLL	STAD
SLC27A3	c.1927delC	p.P643fs	VNVYGVTVPGHEGRAGMAALVLRPP[p.P643fs]TLWTLCSSTPTCLRTCHLMPGPDSSGSRSLWPPQRPSNSRKFGWQMRASTPAPCLTHCTFWTRL*	WQMRASTPA,ALVLRPPTL,CSSTPTCLR,LTHCTFWTR,GSRSLWPPQ,PQRPSNSRK,QMRASTPAP,RASTPAPCL,NSRKFGWQM,LVLRPPTLW,RKFGWQMRA,APCLTHCTF,VLRPPTLWTL,TLCSSTPTCL,GSRSLWPPQR,RSLWPPQRPS,NSRKFGWQMR,QMRASTPAPC,LTHCTFWTRL,CLTHCTFWTR,TPTCLRTCHL,GPDSSGSRSL,AALVLRPPTL,ALVLRPPTLW,PQRPSNSRKF,SNSRKFGWQM,RKFGWQMRAS,WQMRASTPAP,MRASTPAPCL,RPSNSRKFGW,APCLTHCTFW	STAD
SLC2A6	c.689C>A	p.A230D	LIMILLLSFMPNSPRFLLSRGRDEE[p.A230D]DLRALAWLRGTDVDVHWEFEQIQDNV	DLRALAWLR,EEDLRALAW,DEEDLRALAW,EEDLRALAWL	PRAD
SLC2A7	c.193G>A	p.A65T	YNLSVVNTPHKVFKSFYNETYFERH[p.A65T]TTFMDGKLMLLLWSCTVSMFPLGGLL	TYFERHTTF,ETYFERHTT,HTTFMDGKL,YFERHTTFM,TTFMDGKLM,TYFERHTTFM,ETYFERHTTF	CRC
SLC2A7	c.804C>A	p.H268Q	LRGHTDMEAELEDMRAEARAERAEG[p.H268Q]QLSVLHLCALRSLRWQLLSIIVLMAG	RAEGQLSVL,AERAEGQLS,AEGQLSVLH,QLSVLHLCAL,AERAEGQLSV,AEGQLSVLHL,GQLSVLHLCA	TGCT
SLC30A9	c.581G>A	p.R194H	LRSDVEAKSLEVWGSPEALAREKKL[p.R194H]HKEAEIEYRERLFRNQKILREYRDFL	LAREKKLHK,LHKEAEIEY,REKKLHKEA,ALAREKKLHK,KLHKEAEIEY	CRC
SLC32A1	c.1480G>A	p.V494I	CFLLPSLFHLRLLWRKLLWHQVFFD[p.V494I]IAIFVIGGICSVSGFVHSLEGLIEAY	VFFDIAIFV,LWHQVFFDI,FFDIAIFVI,IAIFVIGGI,QVFFDIAIF,HQVFFDIAI,LLWHQVFFDI,QVFFDIAIFV,VFFDIAIFVI,DIAIFVIGGI,HQVFFDIAIF,WHQVFFDIAI	STAD
SLC33A1	c.1625C>T	p.S542L	CVFIGFGWWFFLGPKFKKLQDEGSS[p.S542L]LWKCKRNN*	KLQDEGSSL,LQDEGSSLW,KKLQDEGSSL,KLQDEGSSLW	CRC
SLC35D3	c.1250G>C	p.*417S	VWRLVRGTRYMKKDYLIENEELPSP[p.*417S]SEGGACTYLCAYTYFIC*	PSEGGACTY,CTYLCAYTY,YLCAYTYFI,TYLCAYTYF,GACTYLCAY,SEGGACTYL,YLCAYTYFIC,CTYLCAYTYF,TYLCAYTYFI,GGACTYLCAY,ACTYLCAYTY,SPSEGGACTY	HNSC
SLC35F3	c.838G>A	p.A280T	CNKAFVFLLSWIVLRDRFMGVRIVA[p.A280T]TILAIAGIVMMTYADGFHSHSVIGIA	FMGVRIVAT,RIVATILAI,IVATILAIA,ATILAIAGI,GVRIVATIL,TILAIAGIV,MGVRIVATI,FMGVRIVATI,RIVATILAIA,ATILAIAGIV,RFMGVRIVAT,GVRIVATILA,MGVRIVATIL,VRIVATILAI,TILAIAGIVM	CRC
SLC35G2	c.184delA	p.K62fs	INEGYGNFMEENPKKGLLSEMKKKG[p.K62fs]ELSLEPWIPYLHQQKTQ*	LSLEPWIPY,SLEPWIPYL,SEMKKKGEL,MKKKGELSL,GELSLEPWI,IPYLHQQKT,LSLEPWIPYL,EMKKKGELSL,ELSLEPWIPY,KKGELSLEPW	CESC
SLC37A1	c.1582G>A	p.V528I	ACALLFLIRLIHKELSCPGSATGDQ[p.V528I]IPFKEQ*	ATGDQIPFK,SATGDQIPF,SATGDQIPFK,GSATGDQIPF,CPGSATGDQI	TGCT
SLC38A1	c.298G>A	p.G100R	MSVFNLSNAIMGSGILGLAFALANT[p.G100R]RILLFLVLLTSVTLLSIYSINLLLIC	ALANTRILL,RILLFLVLL,LAFALANTR,NTRILLFLV,LANTRILLF,FALANTRIL,TRILLFLVL,ALANTRILLF,NTRILLFLVL,GLAFALANTR,LAFALANTRI,FALANTRILL	TGCT
SLC38A10	c.3213_3215delCAT	p.1071_1072II>I	SDLRRRRRDLGPHAEGQLAPRDGVI[p.1071_1072II>I]GLNPLPDVQVNDLRGALDAQLRQAAGGA	APRDGVIGL,RDGVIGLNPL	PAAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
SLC39A12	c.1883G>C	p.C628S	ILMNFISSLTAFMGLYIGLSVSADP[p.C628S]SVQDWIFTVTAGMFLYLSLVEMLPEM	SVQDWIFTV,DPSVQDWIF,GLSVSADPSV	LUAD
SLC39A6	c.158G>T	p.R53L	AFPQTTEKISPNWESGINVDLAIST[p.R53L]LQYHLQQLFYRYGENNSLSVEGFRKL	TLQYHLQQL,AISTLQYHL,LQYHLQQLF,DLAISTLQY,LQYHLQQLFY,TLQYHLQQLF,INVDLAISTL,VDLAISTLQY,LAISTLQYHL,STLQYHLQQL	LUAD
SLC39A7	c.1144C>T	p.R382C	LHEVPHEVGDFAILVQSGCSKKQAM[p.R382C]CLQLLTAVGALAGTACALLTEGGAVG	KQAMCLQLL,AMCLQLLTA,KKQAMCLQL,AMCLQLLTAV,SKKQAMCLQL,KKQAMCLQLL,KQAMCLQLLT	CRC
SLC39A7	c.1367_1368insG	p.L456fs	SVLPELLREASPLQSLLEVLGLLGG[p.L456fs]SYHDGADCPP*	VLGLLGGSY,LLGGSYHDGA,EVLGLLGGSY,LEVLGLLGGS	CLL
SLC43A1	c.398C>T	p.P133L	LVGSACFTASCTLMALASRDVEALS[p.P133L]LLIFLALSLNGFGGICLTFTSLTLPN	ALSLLIFLA,LLIFLALSL,EALSLLIFL,RDVEALSLL,VEALSLLIF,LSLLIFLAL,ALSLLIFLAL,SLLIFLALSL,ASRDVEALSL,EALSLLIFLA,RDVEALSLLI,VEALSLLIFL	CRC
SLC43A3	c.647G>A	p.R216H	LLYEKGISLRASFIFISVCSTWHVA[p.R216H]HTFLLMPRGHIPYPLPPNYSYGLCPG	STWHVAHTF,TWHVAHTFL,HVAHTFLLM,WHVAHTFLL,STWHVAHTFL,VAHTFLLMPR,CSTWHVAHTF,TWHVAHTFLL,WHVAHTFLLM	CRC
SLC44A5	c.208G>T	p.V70F	KPADTPSEEEDFGDPRTYDPDFKGP[p.V70F]FANRSCTDVLCCMIFLLCIIGYIVLG	FANRSCTDV,DFKGPFANR,TYDPDFKGPF,FANRSCTDVL	KIRC
SLC44A5	c.554G>A	p.R185H	CPEKFLTYVEMQLLYTKDKSYWEDY[p.R185H]HQFCKTTAKPVKSLTQLLLDDDCPTA	HQFCKTTAK,SYWEDYHQF,YHQFCKTTA,KSYWEDYHQF,SYWEDYHQFC,HQFCKTTAKP,WEDYHQFCKT	CRC
SLC4A3	c.3183delG	p.L1061fs	SQKARRLLKGSGFHLDLLLIGSLGG[p.L1061fs]SVGCLGCPGSRLPRSAPSPMSMR*	LLIGSLGGS,LIGSLGGSV,SLGGSVGCL,RSAPSPMSM,SAPSPMSMR,LPRSAPSPM,LLIGSLGGSV,RLPRSAPSPM,RSAPSPMSMR,GSRLPRSAPS	STAD
SLC4A5	c.1597A>G	p.I533V	WFPSDFYDGFHIQSISAILFIYLGC[p.I533V]VTNAITFGGLLGDATDNYQGVMESFL	ILFIYLGCV,YLGCVTNAI,GCVTNAITF,AILFIYLGCV,FIYLGCVTNA,YLGCVTNAIT,ILFIYLGCVT,IYLGCVTNAI,LGCVTNAITF	LUAD
SLC4A8	c.687C>G	p.N229K	LNDSMRVKVREALLKKHHHQNEKKR[p.N229K]KNLIPIVRSFAEVGKKQSDPHLMDKH	KKRKNLIPI,KRKNLIPIV,KKRKNLIPIV,EKKRKNLIPI,HQNEKKRKNL,KNLIPIVRSF	KIRC
SLC52A1	c.1108_1110delGGC	p.G370del	LSLLGMLFGAYLMALAILSPCPPLV[p.G370del]TTAGVVLVVLSWVLCLCVFSYVKVAASS	VTTAGVVLV,LVTTAGVVL,LVTTAGVVLV,VTTAGVVLVV,CPPLVTTAGV	KIRC
SLC52A2	c.1197_1198insG	p.G399fs	LSWVLCLGVFSYVKVAASSLLHGGG[p.G399fs]PAGIAGSRRGHPGGLSARRCCYVPPDQHLSRVPQQKGLCRPL*	SLLHGGGPA,LSARRCCYV,HLSRVPQQK,CYVPPDQHL,GSRRGHPGG,RGHPGGLSA,GLSARRCCY,QQKGLCRPL,LLHGGGPAGI,GLSARRCCYV,GSRRGHPGGL,RGHPGGLSAR,SARRCCYVPP,VPPDQHLSRV	KIRC
SLC5A1	c.157G>T	p.G53W	DISIIVIYFVVVMAVGLWAMFSTNR[p.G53W]WTVGGFFLAGRSMVVWWPIGASLFASN	WTVGGFFLA,WAMFSTNRW,MFSTNRWTV,RWTVGGFFL,AMFSTNRWT,TNRWTVGGF,NRWTVGGFF,AMFSTNRWTV,LWAMFSTNRW,RWTVGGFFLA,STNRWTVGGF,TNRWTVGGFF	LUAD
SLC5A7	c.1006G>T	p.G336C	KTTEEADMILPIVLQYLCPVYISFF[p.G336C]CLGAVSAAVMSSADSSILSASSMFAR	YISFFCLGA,CLGAVSAAV,ISFFCLGAV,VYISFFCLG,YISFFCLGAV,FCLGAVSAAV,VYISFFCLGA,CLGAVSAAVM,CPVYISFFCL	HNSC
SLC5A7	c.1325G>T	p.G442V	IFPQLLCVLFVKGTNTYGAVAGYVS[p.G442V]VLFLRITGGEPYLYLQPLIFYPGYYP	AVAGYVSVL,YVSVLFLRI,VAGYVSVLF,GYVSVLFLR,AGYVSVLFL,AGYVSVLFLR,AVAGYVSVLF,GYVSVLFLRI,YGAVAGYVSV,GAVAGYVSVL	LUAD
SLC6A10P	c.264A>C	p.K88N	WSFFTPLVCMGIFIFNVVYYKPLVY[p.K88N]NNTNVYPWWGEAMGWAFVLSSMLCMP	YYKPLVYNN,YYKPLVYNNT,KPLVYNNTNV	GBM,KIRC
SLC6A11	c.896G>T	p.W299L	TLPGASEGIKFYLYPDLSRLSDPQV[p.W299L]LVDAGTQIFFSYAICLGCLTALGSYN	RLSDPQVLV,VLVDAGTQI,SRLSDPQVL,LVDAGTQIF,LVDAGTQIFF,VLVDAGTQIF,LSRLSDPQVL	LUAD
SLC6A14	c.255_256insG	p.A85fs	FPYLTYSNGGGAFLIPYAIMLALAG[p.A85fs]FTFVLSGVFTGTIC*	LALAGFTFV,ALAGFTFVL,VLSGVFTGT,MLALAGFTF,FTFVLSGVF,AIMLALAGF,MLALAGFTFV,FVLSGVFTGT,VLSGVFTGTI,AIMLALAGFT,ALAGFTFVLS,AGFTFVLSGV,YAIMLALAGF,IMLALAGFTF,GFTFVLSGVF,FTFVLSGVFT,LALAGFTFVL	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
SLC6A9	c.281G>A	p.R94K	LLPQLMAQHSLAMAQNGAVPSEATK[p.R94K]KDQNLKRGNWGNQIEFVLTSVGYAVG	AVPSEATKK,ATKKDQNLK,ATKKDQNLKR	CLL
SLC6A9	c.727C>T	p.R243W	AYCNNPWNTHDCAGVLDASNLTNGS[p.R243W]WPAALPSNLSHLLNHSLQRTSPSEEY	NLTNGSWPA,WPAALPSNL,ASNLTNGSW,NLTNGSWPAA,SWPAALPSNL,LTNGSWPAAL,DASNLTNGSW	BLCA
SLC7A10	c.471delC	p.P157fs	TSLAVISMTFSNYVLQPVFPNCIPP[p.P157fs]PQPPGCCPWPA*	FPNCIPPPQ	STAD
SLC7A2	c.964C>T	p.R322W	TLAGAATCFYAFVGFDCIATTGEEV[p.R322W]WNPQKAIPIGIVTSLLVCFMAYFGVS	EVWNPQKAI,EEVWNPQKA,IATTGEEVW,EEVWNPQKAI,GEEVWNPQKA	UCEC
SLC8A1	c.1292G>A	p.R431H	VSKIFFEQGTYQCLENCGTVALTII[p.R431H]HRGGDLTNTVFVDFRTEDGTANAGSD	GTVALTIIH,TVALTIIHR,GTVALTIIHR	CRC
SLC8A1	c.1297G>T	p.G433C	KIFFEQGTYQCLENCGTVALTIIRR[p.G433C]CGDLTNTVFVDFRTEDGTANAGSDYE	CGDLTNTVF,RCGDLTNTVF	LUAD
SLC9A2	c.2237delC	p.T746fs	SPQSYKMEWKNEVDVDSGRDMPSTP[p.T746fs]QHPTAEKRAPRRQAYYSSPFSLKTSLAQRGKTV*	SLAQRGKTV,KTSLAQRGK,RQAYYSSPF,AYYSSPFSL,RAPRRQAYY,YYSSPFSLK,SLKTSLAQR,KRAPRRQAY,PTAEKRAPR,MPSTPQHPT,SPFSLKTSL,AYYSSPFSLK,STPQHPTAEK,FSLKTSLAQR,RQAYYSSPFS,QAYYSSPFSL,KRAPRRQAYY,PTAEKRAPRR,MPSTPQHPTA,SPFSLKTSLA,RRQAYYSSPF,AEKRAPRRQA	STAD
SLC9A4	c.1892G>A	p.R631H	RTLSYNKYNLKPQTSEKQAKEILIR[p.R631H]HQNTLRESMRKGHSLPWGKPAGTKNI	ILIRHQNTL,LIRHQNTLR,HQNTLRESM,KEILIRHQN,ILIRHQNTLR,HQNTLRESMR,EILIRHQNTL,KQAKEILIRH,RHQNTLRESM,KEILIRHQNT	GBM
SLC9A5	c.1341G>C	p.L447F	TKVPAKDYFVATTIVVVFFTVIVQG[p.L447F]FTIKPLVKWLKVKRSEHHKPTLNQEL	VIVQGFTIK,FFTVIVQGF,FTIKPLVKW,GFTIKPLVK,FTVIVQGFT,TVIVQGFTI,VQGFTIKPL,FTIKPLVKWL,TVIVQGFTIK,QGFTIKPLVK,VFFTVIVQGF,GFTIKPLVKW,FTVIVQGFTI	BLCA
SLC9B1	c.1338_1339delGT	p.V446fs	FAGFSFKEKIFIALAWMPKATVQAV[p.V446fs]RSSGSRNSKSLRTPLGTICEGCDDSSIFSHLDHSSKWSSTYGHSGA*	HSSKWSSTY,SLRTPLGTI,RSSGSRNSK,FSHLDHSSK,GSRNSKSLR,SSKWSSTYG,NSKSLRTPL,SHLDHSSKW,SKWSSTYGH,AVRSSGSRNS,KSLRTPLGTI,IFSHLDHSSK,SSKWSSTYGH,MPKATVQAVR,RNSKSLRTPL,CEGCDDSSIF,FSHLDHSSKW	KIRC
SLCO2A1	c.1437G>C	p.M479I	IFHPVCGDNGIEYLSPCHAGCSNIN[p.M479I]ISSATSKQLIYLNCSCVTGGSASAKT	ISSATSKQL,NINISSATSK,ISSATSKQLI	CESC
SLIT1	c.4379G>T	p.R1460L	SGTKGAHCVCDPGFSGELCEQESEC[p.R1460L]LGDPVRDFHQVQRGYAICQTTRPLSW	ESECLGDPV,CLGDPVRDF,QESECLGDPV	LUAD
SLITRK1	c.134delA	p.K45fs	TGDVCKEKICSCNEIEGDLHVDCEK[p.K45fs]RASQVCSVSLPRLPSFTIYFCMAIPSLDFSLMSSLTFIMRLVCTWKTMACMKSFRGLFWGCSW*	FTIYFCMAI,SLMSSLTFI,LMSSLTFIM,SLTFIMRLV,IMRLVCTWK,TMACMKSFR,QVCSVSLPR,MSSLTFIMR,VSLPRLPSF,RLPSFTIYF,YFCMAIPSL,CMAIPSLDF,FSLMSSLTF,FIMRLVCTW,KTMACMKSF,CMKSFRGLF,RGLFWGCSW,TWKTMACMK,KSFRGLFWG,LPRLPSFTI,IPSLDFSLM,RLVCTWKTM,KRASQVCSV,ASQVCSVSL,SQVCSVSLP,LDFSLMSSL,CTWKTMACM,MKSFRGLFW,CEKRASQVC,LPSFTIYFC,SLPRLPSFTI,RLPSFTIYFC,SLDFSLMSSL,FSLMSSLTFI,SLMSSLTFIM,RLVCTWKTMA,LMSSLTFIMR,FIMRLVCTWK,CTWKTMACMK,KTMACMKSFR,SQVCSVSLPR,SFTIYFCMAI,IYFCMAIPSL,FCMAIPSLDF,DFSLMSSLTF,TFIMRLVCTW,CMKSFRGLFW,SSLTFIMRLV,MAIPSLDFSL,MSSLTFIMRL,RASQVCSVSL,LPRLPSFTIY,LPSFTIYFCM,MACMKSFRGL,SVSLPRLPSF,MRLVCTWKTM,WKTMACMKSF,ACMKSFRGLF,FRGLFWGCSW,CEKRASQVCS	STAD
SLITRK1	c.155G>A	p.R52H	KICSCNEIEGDLHVDCEKKGFTSLQ[p.R52H]HFTAPTSQFYHLFLHGNSLTRLFPNE	SLQHFTAPT,KGFTSLQHF,HFTAPTSQF,FTSLQHFTA,LQHFTAPTS,HFTAPTSQFY,KKGFTSLQHF,LQHFTAPTSQ,QHFTAPTSQF	CRC
SLITRK3	c.641G>T	p.R214L	PTNLFKAVSLTHLDLRGNRLKVLFY[p.R214L]LGMLDHIGRSLMELQLEENPWNCTCE	FYLGMLDHI,RLKVLFYLG,KVLFYLGML,LKVLFYLGM,LFYLGMLDHI,RLKVLFYLGM,YLGMLDHIGR,LKVLFYLGML	LUSC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
SLITRK3	c.893C>T	p.S298L	REIRKTELCPLLSDSEVEASLGIPH[p.S298L]LSSSKENAWPTKPSSMLSSVHFTASS	GIPHLSSSK,LSSSKENAW,LGIPHLSSSK,VEASLGIPHL,HLSSSKENAW	CRC
SLITRK5	c.1403G>T	p.R468M	NRISMIQDRAFGDLTNLRRLYLNGN[p.R468M]MIERLSPELFYGLQSLQYLFLQYNLI	RLYLNGNMI,YLNGNMIER,RRLYLNGNM,YLNGNMIERL,NMIERLSPEL,LYLNGNMIER,LRRLYLNGNM,RRLYLNGNMI,MIERLSPELF	LUAD
SLITRK5	c.203G>T	p.R68L	YYGEICDNACPCEEKDGILTVSCEN[p.R68L]LGIISLSEISPPRFPIYHLLLSGNLL	ILTVSCENL,TVSCENLGI,CENLGIISL,NLGIISLSEI,LTVSCENLGI,CENLGIISLS	LUAD
SLITRK6	c.2223C>A	p.N741K	HLQRSLLEQENHSPLTGSNMKYKTT[p.N741K]KQSTEFLSFQDASSLYRNILEKEREL	KQSTEFLSF,SNMKYKTTK,KYKTTKQST,TTKQSTEFL,KTTKQSTEF,GSNMKYKTTK,KTTKQSTEFL,MKYKTTKQST,YKTTKQSTEF,TKQSTEFLSF	LUAD
SMAD2	c.962G>A	p.R321Q	SLTVDGFTDPSNSERFCLGLLSNVN[p.R321Q]QNATVEMTRRHIGRGVRLYYIGGEVF	LLSNVNQNA,VNQNATVEM,GLLSNVNQNA,NVNQNATVEM	CRC
SMAD4	c.1082G>A	p.R361H	GETFKVPSSCPIVTVDGYVDPSGGD[p.R361H]HFCLGQLSNVHRTEAIERARLHIGKG	YVDPSGGDHF,DPSGGDHFCL	CRC
SMAP1	c.506delA	p.E169fs	QPLVSSPSLQAAVDKNKLEKEKEKK[p.E169fs]RKRKREKRSQKSRQNHLQLKSCRRKISNWSLKKVPALKKLRSPLWIF*	ALKKLRSPL,KISNWSLKK,SLKKVPALK,KLRSPLWIF,KKRKRKREK,RKREKRSQK,RSQKSRQNH,SQKSRQNHL,KSRQNHLQL,RRKISNWSL,RKISNWSLK,KVPALKKLR,HLQLKSCRR,WSLKKVPAL,RQNHLQLKS,KKVPALKKL,LKKLRSPLW,KKLRSPLWI,KISNWSLKKV,KSRQNHLQLK,SLKKVPALKK,WSLKKVPALK,KRKREKRSQK,RSQKSRQNHL,HLQLKSCRRK,RRKISNWSLK,CRRKISNWSL,NWSLKKVPAL,QKSRQNHLQL,RQNHLQLKSC,LQLKSCRRKI,ALKKLRSPLW,KKLRSPLWIF	UCS
SMARCA4	c.1142G>A	p.R381Q	QKPRGLDPVEILQEREYRLQARIAH[p.R381Q]QIQELENLPGSLAGDLRTKATIELKA	LQARIAHQI,RIAHQIQEL,HQIQELENL,RLQARIAHQI,ARIAHQIQEL	CRC
SMARCA4	c.2738C>T	p.P913L	NHHCKLTQVLNTHYVAPRRLLLTGT[p.P913L]LLQNKLPELWALLNFLLPTIFKSCST	RLLLTGTLL,LLQNKLPEL,LTGTLLQNK,RRLLLTGTL,TLLQNKLPEL,LLTGTLLQNK,RRLLLTGTLL	HNSC
SMARCA5	c.468_471delAGAA	p.T156fs	KQNLLSVGDYRHRRTEQEEDEELLT[p.T156fs]APKQPMFALDLKTLHRM*	APKQPMFAL,LLTAPKQPM,LTAPKQPMF,KQPMFALDL,LDLKTLHRM,KQPMFALDLK,LTAPKQPMFA,FALDLKTLHR,TAPKQPMFAL,LLTAPKQPMF,PMFALDLKTL,QEEDEELLTA	TGCT
SMC3	c.2908G>C	p.E970Q	ELGSLPQEAFEKYQTLSLKQLFRKL[p.E970Q]QQCNTELKKYSHVNKKALDQFVNFSE	KLQQCNTEL,KLQQCNTELK,QQCNTELKKY,RKLQQCNTEL	TGCT
SMCR8	c.523G>A	p.E175K	VRPFCMAYISADQHKIMQQFQELSA[p.E175K]KFSRASECLKTGNRKAFAGELEKKLK	ELSAKFSRA,QQFQELSAK,QFQELSAKF,AKFSRASEC,MQQFQELSAK,KFSRASECLK,QQFQELSAKF,AKFSRASECL,QELSAKFSRA	UCEC
SMG1	c.8087C>A	p.P2696H	LICNTTVERCQELYRKYEMQYAPQP[p.P2696H]HPTVCQFITATEMTLQRYAADINSRL	YAPQPHPTV,APQPHPTVC,QPHPTVCQF,MQYAPQPHP,QYAPQPHPTV,YEMQYAPQPH,MQYAPQPHPT,HPTVCQFITA,QPHPTVCQFI	TGCT
SMG7	c.2536_2537insA	p.E846fs	TQDPIKLFEPSLQPPVMQQQPLEKK[p.E846fs]NEAFSHGAI*	NEAFSHGAI,QPLEKKNEAF,KKNEAFSHGA	PRAD
SNAPC1	c.633delT	p.D211fs	QNMKHVISVDKSKPDKALSLIKDDF[p.D211fs]LTJLRT*	LIKDDFLTI,IKDDFLTIL,SLIKDDFLTI,ALSLIKDDFL,LIKDDFLTIL	STAD
SNAPC2	c.875delC	p.T292fs	IPAGGSLGPAAEGDGAGSKAPEETP[p.T292fs]QPPRRPSTAN*	TPQPPRRPS,TPQPPRRPST	STAD
SND1	c.112C>G	p.Q38E	GPAVPTVQRGIIKMVLSGCAIIVRG[p.Q38E]EPRGGPPPERQINLSNIRAGNLARRA	AIIVRGEPR,CAIIVRGEPR	CESC
SND1	c.2163delC	p.H721fs	VQDVETGTQLEKLMENMRNDIASHP[p.H721fs]L*	RNDIASHPL,MRNDIASHPL	STAD
SOAT1	c.190delT	p.F64fs	GRIDIKQLIAKKIKLTAEAEELKPF[p.F64fs]L*	AEAEELKPFL	STAD
SOLH	c.2141G>A	p.R714H	GFLMGASCGGGNMKVDDSAYESLGL[p.R714H]HPRHAYSILDVRDVQGTRLLRLRNPW	GLHPRHAYS,LGLHPRHAY,HPRHAYSIL,SAYESLGLH,YESLGLHPR,GLHPRHAYSI,SLGLHPRHAY,YESLGLHPRH	LIHC
SON	c.2723C>T	p.S908L	AQMLASGTMDAQMLASSTQDSAMLG[p.S908L]LKSPDPYRLAQDPYRLAQDPYRLGHD	GLKSPDPYR,LGLKSPDPY,TQDSAMLGL,LKSPDPYRL,GLKSPDPYRL,TQDSAMLGLK,MLGLKSPDPY,STQDSAMLGL	LUSC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
SON	c.4075_4098delGTCCTGGAGTCTTCGGCTGTGACC	p.VLESSAVT1359del	LAESILEPPAMAAPESSAMAVLESS[p.VLESSAVT1359del]TVTVLESSTVTVLEPSVVTVPEPPVVAEPDYVTIPVPVVSALEPSVPVL	AMAVLESST,MAVLESSTV,AMAVLESSTV,AVLESSTVTV	KIRC
SORBS1	c.1710C>A	p.F570L	VLTNEKMSRDISPEEIDLKNEPWYK[p.F570L]LFSELEFGKPPPKKIWDYTPGDCSiL	KNEPWYKLF,PWYKLFSEL,LKNEPWYKL,YKLFSELEF,KLFSELEFGK,WYKLFSELEF,EPWYKLFSEL,LKNEPWYKLF	CRC
SORBS1	c.3466G>A	p.V1156M	AERGAGERGPGGPKISKKSCLKPSD[p.V1156M]MVRCLSTEQRLSDLNTPEESRPGKPL	CLKPSDMVR,KPSDMVRCL,MVRCLSTEQR,KKSCLKPSDM	CRC
SORBS2	c.2596C>T	p.P866S	VFEALDSALKDICDQIKAEKKRGSL[p.P866S]SDNSILHRLISELLPDVPERNSSLRA	RGSLSDNSI,LSDNSILHRL,SLSDNSILHR,RGSLSDNSIL	PAAD
SORBS2	c.3472delG	p.E1158fs	DRIHSLSSNKPQRPVFTHENIQGGG[p.E1158fs]NRFRLCITILPGMKMSWSSEKVMSLMSWKSVMTAGLWGPQEEPNSLVLSPETTSRGCELRSLLL*	SSEKVMSLM,KMSWSSEKV,SLMSWKSVM,LMSWKSVMT,KVMSLMSWK,CITILPGMK,RFRLCITIL,ILPGMKMSW,MSLMSWKSV,MSWKSVMTA,TTSRGCELR,MTAGLWGPQ,ETTSRGCEL,GPQEEPNSL,MSWSSEKVM,NRFRLCITI,ITILPGMKM,WSSEKVMSL,EKVMSLMSW,WKSVMTAGL,KSVMTAGLW,QEEPNSLVL,SEKVMSLMS,VMSLMSWKSV,SLMSWKSVMT,LMSWKSVMTA,RLCITILPGM,GMKMSWSSEK,LVLSPETTSR,RFRLCITILP,MSLMSWKSVM,SWKSVMTAGL,NIQGGGNRFR,ETTSRGCELR,WSSEKVMSLM,KMSWSSEKVM,IQGGGNRFRL,NRFRLCITIL,MKMSWSSEKV,SEKVMSLMSW,MSWKSVMTAG,WKSVMTAGLW	STAD
SORCS2	c.958C>T	p.R320W	FWSVSGVDADPDLVHVEAQDLGGDF[p.R320W]WYVTCAIHNCSEKMLTAPFAGPIDHG	DLGGDFWYV,DFWYVTCAI,GDFWYVTCA,AQDLGGDFWY,GDFWYVTCAI,EAQDLGGDFW	CRC
SORL1	c.614G>T	p.R205L	ADAYAQYLWITFDFCNTLQGFSIPF[p.R205L]LAADLLLHSKASNLLLGFDRSHPNKQ	LQGFSIPFL,PFLAADLLL,IPFLAADLL,TLQGFSIPFL,FLAADLLLHS,LAADLLLHSK,FSIPFLAADL,IPFLAADLLL	LUAD
SOS1	c.697A>T	p.N233Y	FMAEIRQYIRELNLIIKVFREPFVS[p.N233Y]YSKLFSANDVENIFSRIVDIHELSVK	PFVSYSKLF,VFREPFVSY,VSYSKLFSA,EPFVSYSKL,REPFVSYSK,FVSYSKLFSA,KVFREPFVSY,VFREPFVSYS,REPFVSYSKL,EPFVSYSKLF	LUAD,UCEC
SOWAHA	c.371G>C	p.R124P	AAQPSKPTSTVLPRSASAPGAPPLV[p.R124P]PVPRPVEPPGDLGLPTEPQDTPGGPA	APGAPPLVPV	ACC
SOX17	c.1208G>T	p.S403I	PYQGHDSGVNLPDSHGAISSVVSDA[p.S403I]ISAVYYCNYPDV*	VSDAISAVY,ISAVYYCNY,VVSDAISAV,ISSVVSDAI,SDAISAVYY,VVSDAISAVY,VSDAISAVYY,SVVSDAISAV,AISSVVSDAI,AISAVYYCNY	UCEC
SOX6	c.2155C>T	p.R719W	HLEKYPNYKYKPRPKRTCIVDGKKL[p.R719W]WIGEYKQLMRSRRQEMRQFFTVGQQP	LWIGEYKQL,GKKLWIGEY,KLWIGEYKQL,LWIGEYKQLM,WIGEYKQLMR	CRC
SOX7	c.925delC	p.L309fs	RRIPHLPGHPYSPEYAPSPLHCSHP[p.L309fs]WAPWPLASPPASP*	SHPWAPWPL,SPLHCSHPW,HPWAPWPLA,HCSHPWAPW,WPLASPPAS,CSHPWAPWPL,APWPLASPPA,LHCSHPWAPW,HPWAPWPLAS	STAD
SOX9	c.223G>A	p.E75K	ENTFPKGEPDLKKESEEDKFPVCIR[p.E75K]KAVSQVLKGYDWTLVPMPVRVNGSSK	CIRKAVSQV,RKAVSQVLK,FPVCIRKAV,IRKAVSQVL,CIRKAVSQVL,IRKAVSQVLK,KAVSQVLKGY,FPVCIRKAVS	LUAD
SP4	c.17_19delAGG	p.E11del	MSDQKKEEEE[p.E11del]AAAAAAMATEGGKTSEPENNNKKPKTSG	KEEEEAAAA,KEEEEAAAAA	LUSC
SP4	c.19G>A	p.E7K	MSDQKK[p.E7K]KEEEEAAAAAAMATEGGKTSEPENNN	KEEEEAAAA,KEEEEAAAAA	TGCT
SPAG16	c.1315G>T	p.V439L	GDTTVKLWDLCKGDCILTFEGHSRA[p.V439L]LWSCTWHSCGNFVASSSLDKTSKIWD	ALWSCTWHS,HSRALWSCT,FEGHSRALW,SRALWSCTW,RALWSCTWH,ALWSCTWHSC,LTFEGHSRAL,TFEGHSRALW,HSRALWSCTW	LUAD
SPAG16	c.1462C>T	p.P488S	WDVNSERCRCTLYGHTDSVNSIEFF[p.P488S]SFSNTLLTSSADKTLSIWDARTGICE	EFFSFSNTL,NSIEFFSFS,VNSIEFFSF,IEFFSFSNT,FSFSNTLLT,SVNSIEFFSF,EFFSFSNTLL,IEFFSFSNTL,FSFSNTLLTS	SKCM
SPAG17	c.3790delC	p.Q1264fs	GQESTGQYVIDEEPTWDIMVRQSYP[p.Q1264fs]RG*	IMVRQSYPR,MVRQSYPRG,DIMVRQSYPR	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
SPAM1	c.1037G>A	p.R346Q	LVYTFGETVALGASGIVIWGTLSIM[p.R346Q]QSMKSCLLLDNYMETILNPYIINVTL	IMQSMKSCL,MQSMKSCLL,TLSIMQSMK,GTLSIMQSM,QSMKSCLLL,IMQSMKSCLL,SIMQSMKSCL,MQSMKSCLLL,GTLSIMQSMK,WGTLSIMQSM	GBM
SPATA17	c.215G>A	p.R72K	QVRAYIRHLNRIVTIIQKWWRSFLG[p.R72K]KKQYQLTVQVAYYTMMMNLYNAMAVR	FLGKKQYQL,KWWRSFLGK,WWRSFLGKK,RSFLGKKQY,GKKQYQLTV,FLGKKQYQLT,SFLGKKQYQL,KWWRSFLGKK,WRSFLGKKQY,KKQYQLTVQV	CESC
SPATA22	c.449C>T	p.S150L	NDFKPQCKRTNLVANDGKNSCPVSS[p.S150L]VAQQQKQLRIPEPPNLSRNKETELLR	VSSVAQQQK,SVAQQQKQLR,GKNSCPVSSV	CRC
SPATA5L1	c.2055delT	p.C685fs	KVCTKTMPIGPDVSLENLAAETCFF[p.C685fs]LELILETSAQKLLCWLCKKMD*	LAAETCFFL,LILETSAQK,KLLCWLCKK,ETCFFLELI,AETCFFLEL,LETSAQKLL,LELILETSA,NLAAETCFFL,FLELILETSA,LILETSAQKL,KLLCWLCKKM,AQKLLCWLCK,ETCFFLELIL,AETCFFLELI	STAD
SPATA9	c.566G>T	p.C189F	AVLKKVKNIFQEEESIRQNREESEN[p.C189F]FRKAFSEPVLSEPMFAEGEIKAKPYR	FRKAFSEPV,EESENFRKA,NFRKAFSEPV,RQNREESENF,EESENFRKAF,FRKAFSEPVL,REESENFRKA	KIRC
SPEG	c.2831C>T	p.A944V	EAEGGLCRLRILAAERGDAGFYTCK[p.A944V]VVNEYGARQCEARLEVRAHPESRSLA	YTCKVVNEY,DAGFYTCKV,FYTCKVVNEY	CRC
SPEG	c.2975_2976insG	p.A992fs	AVLAPLQDVDVGAGEMALFECLVAG[p.A992fs]AH*	FECLVAGAH,ALFECLVAGA	KIRC
SPEN	c.2407_2408delGA	p.E803fs	RLERYTKNEKTDKERTFDPERVERE[p.E803fs]TLNTEGKSGKGQN*	TLNTEGKSGK	GBM
SPESP1	c.363C>G	p.F121L	EETTTFPTGGFTPEIGKKKHTESTP[p.F121L]LWSIKPNNVSIVLHAEEPYIENEEPE	KKHTESTPL,KHTESTPLW,TESTPLWSI,KKKHTESTPL,KKHTESTPLW	BLCA
SPG20	c.696delT	p.F232fs	QPPPLETLGLDADELILIPNGVQIF[p.F232fs]L*	IPNGVQIFL,LIPNGVQIFL	STAD
SPIN2B	c.448A>G	p.M150V	ANTIIGKAVEHMFEGEHGSKDEWRG[p.M150V]VVLAQAPIMKAWFYITYEKDPVLYMY	KDEWRGVVL,VVLAQAPIM,DEWRGVVLA,VVLAQAPIMK,SKDEWRGVVL,RGVVLAQAPI,DEWRGVVLAQ	TGCT
SPIN4	c.512A>G	p.Y171C	PVMDTWFYITYEKDPVLYMYTLLDD[p.Y171C]CKDGDLRIIPDSNYYFPTAEQEPGEV	YMYTLLDDC,YMYTLLDDCK	LUAD
SPINT1	c.947C>T	p.A316V	LREEECILACRGVQGGPLRGSSGAQ[p.A316V]VTFPQGPSMERRHPVCSGTCQPTQFR	VTFPQGPSM,GSSGAQVTF,RGSSGAQVTF,AQVTFPQGPS	GBM
SPOP	c.148G>A	p.E50K	TQIKVVKFSYMWTINNFSFCREEMG[p.E50K]KVIKSSTFSSGANDKLKWCLRVNPKG	KVIKSSTFS,GKVIKSSTF,FSFCREEMGK,MGKVIKSSTF	UCEC
SPOP	c.304T>G	p.F102V	DEESKDYLSLYLLLVSCPKSEVRAK[p.F102V]VKFSILNAKGEETKAMESQRAYRFVQ	KSEVRAKVK,RAKVKFSIL,KVKFSILNA,SEVRAKVKF,KVKFSILNAK,RAKVKFSILN,EVRAKVKFSI,KSEVRAKVKF,VRAKVKFSIL,AKVKFSILNA,CPKSEVRAKV	PRAD
SPOP	c.305T>G	p.F102C	DEESKDYLSLYLLLVSCPKSEVRAK[p.F102C]CKFSILNAKGEETKAMESQRAYRFVQ	KSEVRAKCK,RAKCKFSIL,KCKFSILNA,SEVRAKCKF,RAKCKFSILN,KCKFSILNAK,EVRAKCKFSI,KSEVRAKCKF,VRAKCKFSIL	PRAD
SPOP	c.391T>G	p.W131G	ILNAKGEETKAMESQRAYRFVQGKD[p.W131G]GGFKKFIRRDFLLDEANGLLPDDKLT	QGKDGGFKK,GGFKKFIRR,GKDGGFKKF,RFVQGKDGGF	PRAD
SPOP	c.397T>A	p.F133I	NAKGEETKAMESQRAYRFVQGKDWG[p.F133I]IKKFIRRDFLLDEANGLLPDDKLTLF	FVQGKDWGI,DWGIKKFIR,WGIKKFIRR,GKDWGIKKF,RFVQGKDWGI,DWGIKKFIRR	PRAD
SPOP	c.397T>G	p.F133V	NAKGEETKAMESQRAYRFVQGKDWG[p.F133V]VKKFIRRDFLLDEANGLLPDDKLTLF	FVQGKDWGV,DWGVKKFIR,GKDWGVKKF,DWGVKKFIRR	PRAD
SPOP	c.398T>G	p.F133C	NAKGEETKAMESQRAYRFVQGKDWG[p.F133C]CKKFIRRDFLLDEANGLLPDDKLTLF	DWGCKKFIR,GKDWGCKKF,DWGCKKFIRR	PRAD
SPOP	c.399C>G	p.F133L	NAKGEETKAMESQRAYRFVQGKDWG[p.F133L]LKKFIRRDFLLDEANGLLPDDKLTLF	FVQGKDWGL,DWGLKKFIR,GKDWGLKKF,LKKFIRRDF,FVQGKDWGLK,RFVQGKDWGL,DWGLKKFIRR	PRAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
SPTA1	c.5195A>C	p.K1732T	EKLKEAYALFQFFQDLDDEESWIEE[p.K1732T]TLIRVSSQDYGRDLQGVQNLLKKHKR	WIEETLIRV,EESWIEETL,SWIEETLIRV,TLIRVSSQDY,ESWIETLIR,DEESWIEETL,EESWIEETLI	STAD
SPTA1	c.6032C>T	p.A2011V	PEITDLKDKLISAQHNQSKAIEERY[p.A2011V]VALLKRWEQLLEASAVHRQKLLEKQL	RYVALLKRW,AIEERYVAL,KAIEERYVA,IEERYVALL,AIEERYVALL,KAIEERYVAL	GBM
SPTA1	c.6727G>T	p.D2243Y	DLGDNLEDALILDIKYSTIGLAQQW[p.D2243Y]YQLYQLGLRMQHNLEQQIQAKDIKGV	LAQQWYQLY,GLAQQWYQL,QQWYQLYQL,WYQLYQLGL,AQQWYQLYQ,STIGLAQQWY,AQQWYQLYQL,QWYQLYQLGL,GLAQQWYQLY,WYQLYQLGLR,YQLYQLGLRM	LUAD
SPTA1	c.7099G>T	p.G2367C	FLIDKESENIKSSDEIENAFQALAE[p.G2367C]CKSYITKEDMKQALTPEQVSFCATHM	ALAECKSYI,QALAECKSY,ALAECKSYIT,NAFQALAECK,FQALAECKSY,CKSYITKEDM	LUAD
SPTB	c.256C>T	p.R86C	KWVNSHLARVSCRITDLYKDLRDGR[p.R86C]LLIKLLEVLSGEMLPKPTKGKMRIHC	RLLIKLLEV,LLIKLLEVL,RDGRLLIKL,RLLIKLLEVL,DLRDGRLLIK	CRC
SPTB	c.5591C>T	p.T1864I	AFERELHLLGVQVQQFQDVATRLQT[p.T1864I]VYAGEKAEAIQNKEQEVSAAWQALLD	ATRLQTVYA,VATRLQTVY,DVATRLQTV,RLQTVYAGEK,VYAGEKAEAI,ATRLQTVYAG,TVYAGEKAEA,DVATRLQTVY,LQTVYAGEKA	KIRC
SPTBN4	c.5978C>T	p.A1993V	ADKPRDVSSVEVLMNYHQGLKTELE[p.A1993V]VRVPELTTCQELGRSLLLNKSAMADE	ELEVRVPEL,TELEVRVPE,GLKTELEVRV,HQGLKTELEV,TELEVRVPEL,LEVRVPELTT	CRC
SPTLC3	c.290G>A	p.R97K	IGTLFGYLRDFLRNWGIEKCNAAVE[p.R97K]KKEQKDFVPLYQDFENPYTRNLYMRI	KKEQKDFVPL	SKCM
SPTY2D1	c.1454delC	p.P485fs	GSSRGPGRPVSSPHELRRPVSGLGP[p.P485fs]RGGLSVALGDP*	GPRGGLSVA,GLGPRGGLSV,GPRGGLSVAL	STAD
SRCAP	c.5625_5626insC	p.Q1875fs	RSGPPSPPSTATSFGGPRPRRQPPP[p.Q1875fs]TTSFPFLSGLPGGKAEAAAV*	GLPGGKAEA,RQPPPTTSF,TSFPFLSGL,RPRRQPPPT,FPFLSGLPG,FLSGLPGGKA,GLPGGKAEAA,TTSFPFLSGL,RPRRQPPTT,QPPPTTSFPF,RRQPPPTTSF,FPFLSGLPGG	KIRP
SRCAP	c.5626_5627insC	p.P1876fs	RSGPPSPPSTATSFGGPRPRRQPPP[p.P1876fs]TTSFPFLSGLPGGKAEAAAV*	GLPGGKAEA,RQPPPTTSF,TSFPFLSGL,RPRRQPPPT,FPFLSGLPG,FLSGLPGGKA,GLPGGKAEAA,TTSFPFLSGL,RPRRQPPTT,QPPPTTSFPF,RRQPPPTTSF,FPFLSGLPGG	STAD
SRCIN1	c.2595delC	p.P865fs	LSQSPKKVTAETDFNKSVDFEMPPP[p.P865fs]APR*	FEMPPPAPR,VDFEMPPPA,DFEMPPPAPR	STAD
SREBF2	c.2289delC	p.H763fs	LSRAQSLCGPEHSAVPDSLRWLCHP[p.H763fs]WARSFSWSGAGL*	RWLCHPWAR,RSFSWSGAG,HPWARSFSW,SLRWLCHPW,LCHPWARSF,SLRWLCHPWA,CHPWARSFSW,RWLCHPWARS,WARSFSWSGA,RSFSWSGAGL,HPWARSFSWS,WLCHPWARSF,DSLRWLCHPW	STAD
SRGAP1	c.182C>T	p.T61M	EQQTEMRVQLLQDLQDFFRKKAEIE[p.T61M]MEYSRNLEKLAERFMAKTRSTKDHQQ	MEYSRNLEK,KKAEIEMEY,IEMEYSRNL,RKKAEIEMEY,MEYSRNLEKL	MM
SRPRB	c.40G>A	p.G14S	MASADSRRVADGG[p.G14S]SAGGTFQPYLDTLRQELQQTDPTLLS	SAGGTFQPY,GSAGGTFQPY,ADGGSAGGTF	BLCA
SRRM2	c.6769G>T	p.A2257S	IPAASAAAMNLASARTPAIPTAVNL[p.A2257S]SDSRTPAAAAAMNLASPRTAVAPSAV	NLSDSRTPA,NLSDSRTPAA	TGCT
SRSF11	c.51_52insG	p.G17fs	MSNTTVVPSTAGPGPSGG[p.G17fs]ARWRRWWWRRRRRHRGNPGD*	RWRRWWWRR,RWWWRRRRR,GARWRRWWWR,RWRRWWWRRR,RWWWRRRRRH,WWWRRRRRHR	PRAD
SSPO	c.12593delC	p.S4198fs	PRGQQSRFRSSTSGSWAPECREEQS[p.S4198fs]RASPALSPRAHPCACRALAPAPWGTAGCRGSASGAPAPRRV*	ALAPAPWGT,ALSPRAHPC,RASPALSPR,SASGAPAPR,QSRASPALS,RAHPCACRA,RGSASGAPA,SPALSPRAH,SPRAHPCAC,APAPWGTAG,EQSRASPAL,CRALAPAPW,EEQSRASPA,ALAPAPWGTA,ALSPRAHPCA,GSASGAPAPR,RASPALSPRA,RAHPCACRAL,REEQSRASPA,EEQSRASPAL,ACRALAPAPW	PRAD
ST18	c.2334C>A	p.H778Q	KTLKSLMAANSQELKCPTPGCDGSG[p.H778Q]QVTGNYASHRSLSGCPRARKGGVKMT	GSGQVTGNY,GQVTGNYAS,QVTGNYASHR,GQVTGNYASH	LUAD
ST6GALNAC1	c.1061G>A	p.S354N	ELNYSLVQKVVTRFPPVPQQQLLLA[p.S354N]NLPAGSLRCITCAVVGNGGILNNSHM	LLANLPAGS,QQQLLLANL,LANLPAGSL,LLANLPAGSL,NLPAGSLRCI,LANLPAGSLR,QQLLLANLPA	TGCT

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
STAB1	c.3358_3359insC	p.P1120fs	ASVDVADLLATNGVLHILSQVLLPP[p.P1120fs]PRGCARWAGVAAAAGLGACLQPLPGIAAAPWVGAPD*	GLGACLQPL,RGCARWAGV,CARWAGVAA,RWAGVAAAA,IAAAPWVGA,QPLPGIAAA,ARWAGVAAA,LQPLPGIAA,LPGIAAAPW,GIAAAPWVGA,RGCARWAGVA,CARWAGVAAA,LLPPPRGCAR,ARWAGVAAAA,AAAAGLGACL,AGLGACLQPL,LQPLPGIAAA,LPPPRGCARW,LPGIAAAPWV	STAD
STAC3	c.349G>T	p.G117W	FKDHFFKKPKFCDVCARMIVLNNKF[p.G117W]WLRCKNCKTNIHEHCQSYVEMQRCFG	VLNNKFWLR,WLRCKNCKT,IVLNNKFWLR,RMIVLNNKFW,KFWLRCKNCK,MIVLNNKFWL	LUAD
STAMBPL1	c.427T>C	p.Y143H	TDELKNDLLKKYNVEYQEYLQSKNK[p.Y143H]HKAEILKKLEHQRLIEAERKRIAQMR	KHKAEILKK,YLQSKNKHKA,KNKHKAEILK,SKNKHKAEIL	TGCT
STARD8	c.1985G>C	p.G662A	RRNKTPDYRGQHVFGVPPLIHVQRT[p.G662A]AQPLPQSIQQAMRYLRSQCLDQVGIF	HVQRTAQPL,RTAQPLPQSI,IHVQRTAQPL	TGCT
STAT2	c.1466_1467insC	p.P489fs	AWASVLWFNLLSPNLQNQQFFSNPP[p.P489fs]NGPLELAGPCSQLAVLLLCWPRPQLRPAEHAEKQAVRAEL*	LLCWPRPQL,AVLLLCWPR,FSNPPNGPL,ELAGPCSQL,NPPNGPLEL,WPRPQLRPA,RPQLRPAEH,QQFFSNPPN,AEHAEKQAV,LLLCWPRPQL,QLRPAEHAEK,SQLAVLLLCW,LAVLLLCWPR,LLCWPRPQLR,ELAGPCSQLA,WPRPQLRPAE,RPQLRPAEHA,RPAEHAEKQA,QQFFSNPPNG,FFSNPPNGPL,LELAGPCSQL,AEKQAVRAEL	STAD
STAT3	c.1982A>T	p.D661V	SVEPYTKQQLNNMSFAEIIMGYKIM[p.D661V]VATNILVSPLVYLYPDIPKEEAFGKY	IIMGYKIMV,IMGYKIMVA,IMVATNILV,KIMVATNIL,YKIMVATNI,IIMGYKIMVA,KIMVATNILV,IMGYKIMVAT,GYKIMVATNI,EIIMGYKIMV,YKIMVATNIL,IMVATNILVS,VATNILVSPL	HNSC
STAT5B	c.1101_1102insC	p.P367fs	KTQTKFAATVRLLVGGKLNVHMNPP[p.P367fs]PGEGHHHQ*	HMNPPPGEGH	STAD
STAT6	c.1061_1062insC	p.P354fs	QVLKTQTKFQAGVRFLLGLRFLGAP[p.P354fs]SQASAGQGRHGDREAGAGAECASGSWGWSRKHWRNHQQHCALGEQHSWELLLCPVQEPASQEDQAV*	LLCPVQEPA,ASGSWGWSR,SGSWGWSRK,SWGWSRKHW,RFLGAPSQA,WSRKHWRNH,WGWSRKHWR,REAGAGAEC,RNHQQHCAL,CALGEQHSW,GEQHSWELL,EQHSWELLL,WELLLCPVQ,FLGAPSQASA,ALGEQHSWEL,HSWELLLCPV,LLLCPVQEPA,CASGSWGWSR,ASGSWGWSRK,HWRNHQQHCA,SWGWSRKHWR,LRFLGAPSQA,SQASAGQGRH,REAGAGAECA,AGAECASGSW,AECASGSWGW,GSWGWSRKHW,RKHWRNHQQH,WRNHQQHCAL,QQHCALGEQH,GEQHSWELLL	KIRC
STAT6	c.1402G>C	p.D468H	LGPGKLPIQLQALSLPLVVIVHGNQ[p.D468H]HNNAKATILWDNAFSEMDRVPFVVAE	HGNQHNNAK,NQHNNAKAT,NQHNNAKATI	DLBCL
STK11	c.837delC	p.G279fs	EGDNIYKLFENIGKGSYAIPGDCGP[p.G279fs]RSLTC*	YAIPGDCGPR,IPGDCGPRSL	LUSC
STK11IP	c.464C>A	p.A155E	PLHCLHGLRGIYSQLETLICSRSLQ[p.A155E]ELEELLSACGGDFCSALPWLALLSAN	SLQELEELL,QELEELLSA,LICSRSLQEL,RSLQELEELL,LQELEELLSA,QELEELLSAC	KIRC
STK19	c.265G>A	p.D89N	RGARPGGGDAGGTPGETVRHCSAPE[p.D89N]NPIFRFSSLHSYPFPGTIKSRDMSWK	SAPENPIFR,NPIFRFSSL,CSAPENPIF,CSAPENPIFR,SAPENPIFRF,RHCSAPENPI,HCSAPENPIF,NPIFRFSSLH	SKCM
STK19	c.52_53insG	p.R18fs	MQKWFSAFDDAIIQRQWR[p.R18fs]GKPLPGRGRCELHEGG*	IIQRQWRGK,LPGRGRCEL,QRQWRGKPL,RQWRGKPLP,AIIQRQWRGK,QWRGKPLPGR,RGKPLPGRGR,IQRQWRGKPL,RQWRGKPLPG	PRAD
STOML3	c.256G>T	p.D86Y	VVFRLGRIQADKAKGPGLILVLPCI[p.D86Y]YVFVKVDLRTVTCNIPPQEILTRDSV	ILVLPCIYV,VLPCIYVFV,YVFVKVDLR,LVLPCIYVF,IYVFVKVDL,LILVLPCIY,LILVLPCIYV,LVLPCIYVFV,VLPCIYVFVK,ILVLPCIYVF,GLILVLPCIY,IYVFVKVDLR,LPCIYVFVKV	LUAD
STON1-GTF2A1L	c.1352A>G	p.N451S	KVTKEGKFVESAVITQIYCLCFVNG[p.N451S]SLECFLTLNDLELPKRDESYYEKDSE	CLCFVNGSL,FVNGSLECF,GSLECFLTL,FVNGSLECFL,CFVNGSLECF	TGCT
STRA6	c.203A>G	p.Q68R	QPAGNQTSPGATEDYSYGSWYIDEP[p.Q68R]RGGEELQPEGEVPSCHTSIPPGLYHA	GSWYIDEPR	BRCA

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
STRADA	c.997delC	p.R333fs	EELTMSPSRSVANSGLSDSLTTSTP[p.R333fs]GPPTVTRPPTPTTEPSPPTSTTLWSSAFSATRMPGPVPAPS*	TLWSSAFSA,WSSAFSATR,VTRPPTPTT,ATRMPGPVP,TTLWSSAFS,STTLWSSAF,SSAFSATRM,TRMPGPVPA,MPGPVPAPS,SPPTSTTLW,TLWSSAFSAT,FSATRMPGPV,TTLWSSAFSA,ATRMPGPVPA,STPGPPTVTR,LWSSAFSATR,TTSTPGPPTV,EPSPPTSTTL,TSTTLWSSAF,WSSAFSATRM	STAD
STRN3	c.654G>T	p.K218N	LDVRSQRVRSLLGLSNSEPNGSVET[p.K218N]NNLEQILNGGESPKQKGQEIKRSSGD	ETNNLEQIL,VETNNLEQI,VETNNLEQIL	UCEC
STT3B	c.1747G>T	p.D583Y	TSNAYSSPSVVLASYNHDGTRNILD[p.D583Y]YFREAYFWLRQNTDEHARVMSWWDYG	ILDYFREAY,NILDYFREA,DYFREAYFW,YFREAYFWL,GTRNILDYF,LDYFREAYF,GTRNILDYFR,DYFREAYFWL,YFREAYFWLR,NILDYFREAY,ILDYFREAYF	CRC
STX2	c.320G>T	p.R107L	KKTANKIRAKLKAIEQSFDQDESGN[p.R107L]LTSVDLRIRRTQHSVLSRKFVEAMAE	DESGNLTSV,LTSVDLRIRR	LUAD
STX2	c.756delA	p.K252fs	MINNIERNVMNATDYVEHAKEETKK[p.K252fs]LSNIRARQEGKSG*	NIRARQEGK,ETKKLSNIR	STAD
STXBP6	c.274G>A	p.D92N	QFEGSTSFVRRSQWMLEQLRQVNGI[p.D92N]NPNGDSAEFDLLFENAFDQWVASTAS	RQVNGINPN,NPNGDSAEF,RQVNGINPNG	UCEC
SULT1C4	c.254G>A	p.R85Q	WTQEIVELIQNEGDVEKSKRAPTHQ[p.R85Q]QFPFLEMKIPSLGSGLEQAHAMPSPR	QQFPFLEMK,QFPFLEMKI,APTHQQFPF,HQQFPFLEM,KRAPTHQQF,HQQFPFLEMK,RAPTHQQFPF,KSKRAPTHQQ,APTHQQFPFL,SKRAPTHQQF,THQQFPFLEM,QQFPFLEMKI	CRC
SULT1E1	c.230G>A	p.R77Q	WVSEIVYMIYKEGDVEKCKEDVIFN[p.R77Q]QIPFLECRKENLMNGVKQLDEMNSPR	VIFNQIPFL,DVIFNQIPF,KEDVIFNQI,DVIFNQIPFL	UCEC
SUMF2	c.329G>A	p.G110E	IFPVTNKDFRDFVREKKYRTEAEMF[p.G110E]EWSFVFEDFVSDELRNKATQPMKSVL	EMFEWSFVF,EWSFVFEDF,AEMFEWSFV,FEWSFVFED,EAEMFEWSF,TEAEMFEWS,AEMFEWSFVF,EAEMFEWSFV,TEAEMFEWSF,FEWSFVFEDF	LUAD
SUN3	c.1016C>A	p.P339Q	TFELQHAVSEYLLCVKLNIFSNWGH[p.P339Q]QKYTCLYRFRVHGTPGKHI*	FSNWGHQKY,IFSNWGHQK,HQKYTCLYR,GHQKYTCLY,WGHQKYTCL,QKYTCLYRF,NIFSNWGHQK,HQKYTCLYRF,IFSNWGHQKY,WGHQKYTCLY	LUAD
SUN3	c.370C>A	p.L124I	LRMPKEQLELLKKESQNLENNFRQI[p.L124I]IFLIEQIDVLKALLRDMKDGMDNNHN	QIIFLIEQI,NFRQIIFLI,LENNFRQII,RQIIFLIEQ,RQIIFLIEQI,IFLIEQIDVL,LENNFRQIIF	UCEC
SUN3	c.382G>A	p.E128K	KEQLELLKKESQNLENNFRQILFLI[p.E128K]KQIDVLKALLRDMKDGMDNNHNWNTH	FLIKQIDVL,KQIDVLKAL,LIKQIDVLK,ILFLIKQIDV,KQIDVLKALL,RQILFLIKQI,FLIKQIDVLK,NFRQILFLIK,IKQIDVLKAL	CRC
SUPT6H	c.2869G>A	p.A957T	SSDEDILCLKFHPLQEHVVKEELLN[p.A957T]TLYCEFINRVNEVGVDVNRAIAHPYS	TLYCEFINR,LLNTLYCEF,VKEELLNTL,KEELLNTLY,LLNTLYCEFI,TLYCEFINRV,NTLYCEFINR,ELLNTLYCEF,VKEELLNTLY	CRC
SUSD1	c.1027C>T	p.R343C	SRRINPKISYVISIKGQRLDPMESV[p.R343C]CEETVNLTTDSRTPEVCLALYPGTNY	MESVCEETV,CEETVNLTT	UCEC
SUSD5	c.1538C>T	p.T513M	YELTSSTLEILTVNTVKQTPNHIPS[p.T513M]MIMATTQPPVETTVPEIQDSFPYLLS	TPNHIPSMI,SMIMATTQP,MIMATTQPP,IPSMIMATT,MIMATTQPPV,KQTPNHIPSM,QTPNHIPSMI,TPNHIPSMIM,SMIMATTQPP	GBM
SV2A	c.412delG	p.E138fs	MADGAPLAGVRGGLSDGEGPPGGRG[p.E138fs]RHNDGKNEKNWPNSMKPSYGSVATAASSGHCILCLVWR*	SMKPSYGSV,KPSYGSVAT,WPNSMKPSY,NEKNWPNSM,MKPSYGSVA,AASSGHCIL,SMKPSYGSVA,GGRGRHNDGK,NWPNSMKPSY,NSMKPSYGSV,KPSYGSVATA,KNEKNWPNSM,MKPSYGSVAT,TAASSGHCIL,SGHCILCLVW	STAD
SV2C	c.179C>A	p.P60Q	DRAQDEYTQRSYSRFQDEEDDDDYY[p.P60Q]QAGETYNGEANDDEGSSEATEGHDED	YYQAGETYNG,DDYYQAGETY	LUAD
SVIL	c.278T>C	p.M93T	EKQTRSKYCTETSGVHGDSPYGSGT[p.M93T]TDTHSLESKAERIARYKAERRRQLAE	TTDTHSLESK	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
SVIL	c.5586delG	p.G1862fs	EERGAQVQVLQGKEPPCFLQCFQGG[p.G1862fs]WWCTRGGGKRKKKMCKVSGGCTACVERCPWKGICWKWPVTVAA*	KGICWKWPV,PWKGICWKW,CTRGGGKRK,RGGGKRKKK,CWKWPVTVA,FQGGWWCTR,LQCFQGGWW,CKVSGGCTA,WKWPVTVAA,VERCPWKGI,KVSGGCTACV,GICWKWPVTV,TACVERCPWK,CFLQCFQGGW,GWWCTRGGGK,CTRGGGKRKK,GGKRKKKMCK,CWKWPVTVAA,CFQGGWWCTR,CPWKGICWKW	STAD
SYCP2	c.1422A>T	p.K474N	KPSKYIKNSDKGNRNNSQLEKTTPS[p.K474N]NRKMSEASMIVSGADRYTMRSPVLFS	KTTPSNRKM,NRKMSEASM,TPSNRKMSEA,SQLEKTTPSN,SNRKMSEASM	HNSC
SYMPK	c.1007C>G	p.A336G	HPASLEFQAQITTLLVDLGTPQAEI[p.A336G]GRNMPSSKDTRKRPRDDSDSTLKKMK	IGRNMPSSK,PQAEIGRNM,AEIGRNMPS,TPQAEIGRNM,AEIGRNMPSS	TGCT
SYN2	c.99_101delAGC	p.A34del	LSDSSFIANLPNGYMTDLQRPEPQQ[p.A34del]PTPPPPGPGAASAAAPPTASPGPERTPP	LQRPEPQQPT	BLCA,KIRP,PRAD
SYNDIG1	c.403G>T	p.D135Y	CCETTFIEDRSPTKDSLEYPDGKFI[p.D135Y]YLSADDIKIHTLSYDVEEEEEFQELE	YLSADDIKI,FIYLSADDI,YPDGKFIYL,FIYLSADDIK,EYPDGKFIYL,KFIYLSADDI,IYLSADDIKI,LEYPDGKFIY	LUAD
SYNE2	c.9309G>T	p.K3103N	ESRRLNAQILSQRIEKAKCLCDEII[p.K3103N]NKLNENKTFDDSFKEKEILQIKLNAE	CLCDEIINK,IINKLNENK,NKLNENKTF,CLCDEIINKL	CRC
SYNGR4	c.506G>A	p.R169Q	QAAIAFTFFSILVWIFQAYLAFQDL[p.R169Q]QNDAPVPYKRFLDEGGMVLTTLPLPS	LQNDAPVPY,FQDLQNDAPV,LQNDAPVPYK,DLQNDAPVPY	CRC
SYNJ1	c.2041A>T	p.I681F	KTISRDNKYVLLASEQLVGVCLFVF[p.I681F]FRPQHAPFIRDVAVDTVKTGMGGATG	FVFFRPQHA,GVCLFVFFR,VGVCLFVFF,FFRPQHAPF,VFFRPQHAPF,FFRPQHAPFI,VGVCLFVFFR	CLL
SYNJ2	c.2495A>C	p.K832T	WRKKHPFDKTAGELNLLDSDLDVDT[p.K832T]TVRHTWSPGALQYYGRAELQASDHRP	TVRHTWSPG,TVRHTWSPGA	KIRC
SYNJ2	c.3331_3332insC	p.P1111fs	HRSPSRSLSVPNRPRPPQPPQRPPP[p.P1111fs]SNRFNGEKVGFRCVHLLRHPWTVFNFADGKTSTRSTSATSQGSDWNK*	HLLRHPWTV,TVFNFADGK,TSQGSDWNK,RFNGEKVGF,RHPWTVFNF,KVGFRCVHL,GFRCVHLLR,KTSTRSTSA,STRSTSATS,LLRHPWTVF,CVHLLRHPW,HPWTVFNFA,GEKVGFRCV,VGFRCVHLLR,WTVFNFADGK,ATSQGSDWNK,HLLRHPWTVF,LRHPWTVFNF,KVGFRCVHLL,GFRCVHLLRH,KTSTRSTSAT,STRSTSATSQ,RFNGEKVGFR,NFADGKTSTR,PQRPPPSNRF,NRFNGEKVGF,RCVHLLRHPW	STAD
SYNM	c.1547G>A	p.R516Q	RTVILGKKTEVKATREQERNRPETI[p.R516Q]QTKPEEKMFDSKEKASEERNLRWEEL	TIQTKPEEK,IQTKPEEKM,RNRPETIQTK,IQTKPEEKMF	UCEC
SYNPO	c.1856_1857insC	p.G619fs	SSHLKGQAVPASKTGILEESMARRG[p.G619fs]QPQIHVYFRGEAQGDPESRLAGSGTDSG*	GQPQIHVYF,MARRGQPQI,RGQPQIHVY,QPQIHVYFR,AQGDPESRL,SMARRGQPQI,RGQPQIHVYF,MARRGQPQIH,RRGQPQIHVY	KIRC
SYT4	c.1delA	p.M1fs	[p.M1fs]WLRSPPAGKNLMKSPQWWGSSVHLAWSSQSLSLHGSAVRENHPSLTRLLHTSLCMCLRELIFTLKT*	HLAWSSQSL,SLSLHGSAV,CLRELIFTL,LLHTSLCMC,SLCMCLREL,WLRSPPAGK,HTSLCMCLR,QWWGSSVHL,AVRENHPSL,LTRLLHTSL,LSLHGSAVR,SPPAGKNLM,SPQWWGSSV,RLLHTSLCM,KNLMKSPQW,PQWWGSSVH,WGSSVHLAW,AWSSQSLSL,CMCLRELIF,RELIFTLKT,SLTRLLHTSL,LLHTSLCMCL,SLCMCLREL,CLRELIFTLK,WWGSSVHLAW,KSPQWWGSSV,AVRENHPSLT,SLSLHGSAVR,HPSLTRLLHT,LAWSSQSLSL,GKNLMKSPQW,PQWWGSSVHL,VHLAWSSQSL,SQSLSLHGSA,SAVRENHPSL,RENHPSLTRL,TRLLHTSLCM,LCMCLRELIF,SPQWWGSSVH	STAD
SYT7	c.1046C>T	p.T349M	TMKRNLNPIFNESFAFDIPTEKLRE[p.T349M]MTIIITVMDKDKLSRNDVIGKIYLSW	KLREMTIII,IPTEKLREM,REMTIIITV,EMTIIITVM,MTIIITVMDK,KLREMTIII,REMTIIITVM	CRC
SYT8	c.1117C>T	p.R373W	GARASGQPLQHWADMLAHARRPIAQ[p.R373W]WHPLRPAREVDRMLALQPRLRLRLPL	QWHPLRPAR,PIAQWHPLR,RPIAQWHPL,HARRPIAQW,AQWHPLRPA,HARRPIAQWH,RPIAQWHPLR,AHARRPIAQW,RRPIAQWHPL	ACC
SYTL2	c.1320C>G	p.I440M	FPINGLHSHSEVLTARPQSMENSPT[p.I440M]MNEPKDKSSELTRLESVLPRSPADEL	QSMENSPTM,PQSMENSPTM	BLCA

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
TAB3	c.632G>C	p.R211T	HIPRYSTNPITVTVSQNLPSGQTVP[p.R211T]TALQILPQIPSNLYGSPGSIYIRQTS	QTVPTALQI,LPSGQTVPT,TALQILPQI,GQTVPTALQI,LPSGQTVPTA	BLCA
TADA2B	c.199G>A	p.E67K	IGHHRRYHGYQLVDGGRFTLWGPEA[p.E67K]KGGWTSREEQLLLDAIEQFGFGNWED	FTLWGPEAK,EAKGGWTSR,RFTLWGPEAK	CESC
TAF1	c.2527C>T	p.R843W	SKDRPRRIRMEDIKKAFPSHSESSI[p.R843W]WKRLKLCADFKRTGMDSNWWVLKSDF	IWKRLKLCA,HSESSIWKR,SESSIWKRL,FPSHSESSIW,WKRLKLCADF	UCEC
TAF1A	c.514_515CG>AT	p.R172M	HGMLKDAKRNLSEAETWRHGENTSS[p.R172M]MEILINLIQAYKGLLQYYTWSEKKMEL	SSMEILINL,SMEILINLI,NTSSMEILI,RHGENTSSM,GENTSSMEI,MEILINLIQ,SSMEILINLI,WRHGENTSSM,GENTSSMEIL,MEILINLIQA	SKCM
TAF1B	c.874C>T	p.R292C	GIESWPDYEDIYKKTVEVGTFLDLP[p.R292C]CFPDITEDCYLHPNILCMKYLMEVNL	GTFLDLPCF,LDLPCFPDI,FLDLPCFPDI,VGTFLDLPCF	BLCA
TAF1L	c.2553delA	p.K851fs	QVFIYRLFWKSKDRPRRIRMEDIKK[p.K851fs]PFLPIQKAASGRG*	DIKKPFLPI,RMEDIKKPF,MEDIKKPFL,KPFLPIQKAA,IRMEDIKKPF,RMEDIKKPFL	STAD
TAF5	c.388T>G	p.S130A	RQSKLREAEEALRREAGLLEEAVAG[p.S130A]AGAPGEVDSAGAEVTSALLSRVTASA	LLEEAVAGA,EEAVAGAGA,GLLEEAVAGA,LEEAVAGAGA	ACC
TANK	c.1139C>T	p.S380L	LDSPGKAIRGPQQPIWKPFPNQDSD[p.S380L]LVVLSGTDSELHIPRVCEFCQAVFPP	NQDSDLVVL,FPNQDSDLV,KPFPNQDSDL,FPNQDSDLVV	CRC
TAOK2	c.2696_2697insG	p.Q899fs	QRVEEELLALQTGRSERIRSLLERQ[p.Q899fs]GP*	RIRSLLERQG	KIRC
TARBP1	c.2344C>G	p.L782V	VLTELINLHLKVGWKRGNPIWRVIS[p.L782V]VLKNASIQHLQEMDSGQEPTVGSQIQ	RVISVLKNA,IWRVISVLK,NPIWRVISV,VLKNASIQHL,PIWRVISVLK,NPIWRVISVL	LUSC
TARS2	c.595G>A	p.E199K	RGSELPVLERICQELTAAARPFRRL[p.E199K]KASRDQLRQLFKDNPFKLHLIEEKVT	AARPFRRLK,RLKASRDQL,RPFRRLKAS,AAARPFRRLK,AARPFRRLKA,RPFRRLKASR,RLKASRDQLR,RRLKASRDQL	LUAD
TARSL2	c.1097G>A	p.G366D	KGPHVRHTGKIKTIKIFKNSSTYWE[p.G366D]DNPEMETLQRIYGISFPDNKMMRDWE	TYWEDNPEM,STYWEDNPEM,WEDNPEMETL	GBM
TAS1R2	c.808C>T	p.R270C	PNQNMTSEERQRLVTIVDKLQQSTA[p.R270C]CVVVVFSPDLTLYHFFNEVLRQNFTG	KLQQSTACV,LQQSTACVV,STACVVVVF,QSTACVVVV,QQSTACVVV,KLQQSTACVV,QQSTACVVVV,STACVVVVFS,LQQSTACVVV,QSTACVVVVF	CRC
TAS1R3	c.1573G>A	p.E525K	SRQCQEGQVRRVKGFHSCCYDCVDC[p.E525K]KAGSYRQNPDDIACTFCGQDEWSPER	CVDCKAGSY,CVDCKAGSYR	BLCA
TAS2R1	c.549C>A	p.F183L	KFFSQNATIQKEDTLAIQIFSFVAE[p.F183L]LSVPLLIFLFAVLLLIFSLGRHTRQM	QIFSFVAEL,FVAELSVPL,FSFVAELSV,ELSVPLLIF,AELSVPLLI,IQIFSFVAEL,FVAELSVPLL,IFSFVAELSV,SFVAELSVPL,LSVPLLIFLF,ELSVPLLIFL,FSFVAELSVP,AELSVPLLIF	CRC
TAS2R16	c.531G>T	p.Q177H	IQLLTMEHLPRNSTVTDKLENFHQY[p.Q177H]HFQAHTVALVIPFILFLASTIFLMAS	QYHFQAHTV,HFQAHTVAL,LENFHQYHF,FHQYHFQAH,HQYHFQAHT,YHFQAHTVA,HQYHFQAHTV,KLENFHQYHF,YHFQAHTVAL	LUAD
TAS2R16	c.691G>A	p.V231I	QIQHHSTGHCNPSMKARFTALRSLA[p.V231I]ILFIVFTSYFLTILITIIGTLFDKRC	RSLAILFIV,FTALRSLAI,ILFIVFTSY,SLAILFIVF,ALRSLAILF,TALRSLAIL,ALRSLAILFI,FTALRSLAIL,SLAILFIVFT,RFTALRSLAI,TALRSLAILF,RSLAILFIVF,ILFIVFTSYF,AILFIVFTSY	MM
TAS2R30	c.707_708insT	p.L236fs	HGKGSQDPSTKVHIKALQTVTSFLL[p.L236fs]VMCHLLSVHDHISL*	FLLVMCHLL,LVMCHLLSV,HLLSVHDHI,SFLLVMCHL,QTVTSFLLV,TVTSFLLVM,VMCHLLSVH,LSVHDHISL,LLVMCHLLSV,LLSVHDHISL,SFLLVMCHLL,QTVTSFLLVM,LVMCHLLSVH,LQTVTSFLLV,TSFLLVMCHL	KICH
TAS2R38	c.932T>C	p.I311T	MAACPSGHAAILISGNAKLRRAVMT[p.I311T]TLLWAQSSLKVRADHKADSRTLC*	AVMTTLLWA,TLLWAQSSL,RAVMTTLLW,KLRRAVMTT,LRRAVMTTL,RRAVMTTLL,KLRRAVMTTL,TLLWAQSSLK,RRAVMTTLLW,RAVMTTLLWA,TTLLWAQSSL,LRRAVMTTLL	KIRC
TAS2R41	c.763G>A	p.A255T	TRALKSLISFLILYALSFLSLIIDA[p.A255T]TKFISMQNDFYWPWQIAVYLCISVHP	FLSLIIDAT,LIIDATKFI,LSLIIDATK,SLIIDATKF,IDATKFISM,SLIIDATKFI,LSLIIDATKF,IIDATKFISM,TKFISMQNDF	GBM
TAS2R8	c.294G>C	p.W98C	PDVYTKNKQQIVIFTFWTFANYLNM[p.W98C]CITTCLNVFYFLKIASSSHPLFLWLK	YLNMCITTC,FANYLNMCI,LNMCITTCL,CITTCLNVF,YLNMCITTCL,NMCITTCLNV,TFANYLNMCI,CITTCLNVFY,MCITTCLNVF	TGCT

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
TAS2R9	c.487G>C	p.E163Q	FLISLIISVPKNDDMWYHLFKVSHE[p.E163Q]QNITWKFKVSKIPGTFKQLTLNLGVM	HEQNITWKF,FKVSHEQNI,VSHEQNITW,VSHEQNITWK,KVSHEQNITW,SHEQNITWKF	BLCA
TAT	c.1100G>A	p.R367H	TLSFLKSNADLCYGALAAIPGLRPV[p.R367H]HPSGAMYLMVGIEMEHFPEFENDVEF	GLRPVHPSG,PVHPSGAMY,RPVHPSGAM,HPSGAMYLM,GLRPVHPSGA,RPVHPSGAMY,HPSGAMYLMV,AAIPGLRPVH,LRPVHPSGAM	GBM
TBC1D1	c.212C>T	p.S71F	EVRRLSRQSTRKEPVTKQVRLCVSP[p.S71F]FGLRCEPEPGRSQQWDPLIYSSIFEC	RLCVSPFGL,QVRLCVSPF,RLCVSPFGLR,KQVRLCVSPF,QVRLCVSPFG,VRLCVSPFGL	BLCA
TBC1D1	c.830A>G	p.H277R	DGGLRSSGFFSSFEESDIENHLISG[p.H277R]RNIVQPTDIEENRTMLFTIGQSEVYL	HLISGRNIV,DIENHLISGR	KIRC
TBC1D12	c.1823T>A	p.F608Y	PDVGYVQGMSFIAAVLILNLEEADA[p.F608Y]YIAFANLLNKPCQLAFFRVDHSMMLK	NLEEADAYI,AYIAFANLL,EADAYIAFA,DAYIAFANL,EEADAYIAF,LNLEEADAY,LEEADAYIA,YIAFANLLNK,ILNLEEADAY,DAYIAFANLL,LEEADAYIAF,EEADAYIAFA,ADAYIAFANL	KIRC
TBC1D2B	c.2759G>A	p.R920Q	ILDARKLISISFGDLNPFPLRQIRN[p.R920Q]QRAYHLEKVRLELTELEAIREDFLRE	QIRNQRAYH,NQRAYHLEK,RQIRNQRAY,IRNQRAYHL,RQIRNQRAYH,QIRNQRAYHL,RNQRAYHLEK,LRQIRNQRAY,NQRAYHLEKV	BLCA,KIRP,PRAD
TBC1D9	c.3697C>A	p.P1233T	DWAITFEQFLASLLTEPALVKYFDK[p.P1233T]TVCMMARITSAKNIRMMGKPLTSASD	ALVKYFDKT,KTVCMMARI,KYFDKTVCM,YFDKTVCMM,ALVKYFDKTV,KYFDKTVCMM,VKYFDKTVCM	PRAD
TBCD	c.1426C>T	p.R476C	DEKRGACSVGTNVRDAACYVCWAFA[p.R476C]CAYEPQELKPFVTAISSALVIAAVFD	YVCWAFACA,CAYEPQELK,VCWAFACAY,YVCWAFACAY,FACAYEPQEL	LUSC
TBL1XR1	c.377delA	p.N126fs	DKLAQQQAAAAAAAAAAASQQGSAK[p.N126fs]MEKTQQMGRRMEHIL*	QMGRRMEHI,KTQQMGRRM,MGRRMEHIL,ASQQGSAKM,AKMEKTQQM,QQMGRRMEH,QQMGRRMEH!,SQQGSAKMEK,AASQQGSAKM,TQQMGRRMEH	STAD
TBX3	c.559C>T	p.H187Y	RYKFHNSRWMVAGKADPEMPKRMYI[p.H187Y]YPDSPATGEQWMSKVVTFHKLKLTNN	YIYPDSPAT,EMPKRMYIY,MYIYPDSPA,RMYIYPDSP,RMYIYPDSPA,PEMPKRMYIY	BRCA
TBX4	c.1109delC	p.S370fs	LDLPCKRSYLEAPSSVGEDHYFRSP[p.S370fs]LPTTSKC*	RSPLPTTSK,GEDHYFRSPL	STAD
TCEB3C	c.922G>A	p.E308K	DLLSAFEAMTSQANPEALSAPALQE[p.E308K]KAAFPGRRVNAKMPVYSGSRPACQLQ	LSAPALQEK,KAAFPGRRV,LQEKAAFPG,ALSAPALQEK,APALQEKAAF	SKCM
TCF7	c.419A>C	p.H140P	GMYKETVYSAFNLLMHYPPPSGAGQ[p.H140P]PPQPQPPLHKANQPPHGVPQLSLYEH	QPPQPQPPL,GQPPQPQPPL	KIRC
TCHP	c.515delA	p.E172fs	KLREMELDLHQKHVVNSWEMQKEEK[p.E172fs]NSKKPPQSKRTNGMKMNMKGPEGRR*	MQKEEKNSK,NSKKPPQSK,QSKRTNGMK,RTNGMKMNM,KMNMKGPEG,MNMKGPEGR,NMKGPEGRR,SKRTNGMKM,RTNGMKMNMK,MQKEEKNSKK,KNSKKPPQSK,KMNMKGPEGR,NSKKPPQSKR,MNMKGPEGRR,KRTNGMKMNM,MKMNMKGPEG	STAD
TCOF1	c.4084_4086delAAG	p.K1366del	GWESRKRKLSGDQPAARTPRSKKKK[p.K1366del]LGAGEGGEASVSPEKTSTTSKGKAKRDK	RSKKKKLGA,TPRSKKKKL,RSKKKKLGAG	PRAD
TCOF1	c.791A>G	p.K264R	APAPGKVGDVTPQVKGGALPPAKRA[p.K264R]RKPEEESESSEEGSESEEEAPAGTRS	ALPPAKRARK	LUAD
TCTE1	c.380G>T	p.S127I	PEHQQKVLNHLSPDLPLAVTANLID[p.S127I]IENYWLRCCMHRWPVCHVAHHGGSWK	NLIDIENYWL,IENYWLRCCM,TANLIDIENY	LUAD
TCTEX1D2	c.221C>T	p.S74L	HAVLKEELANAEYSPEEMPQLTKHL[p.S74L]LENIKDKLKEMGFDRYKMVVQVVIGE	MPQLTKHLL,QLTKHLLENI,LTKHLLENIK	CESC
TDO2	c.591G>C	p.Q197H	RVPYNRRHYRDNFKGEENELLLKSE[p.Q197H]HEKTLLELVEAWLERTPGLEPHGFNF	LLLKSEHEK,LKSEHEKTL,NELLLKSEH,HEKTLLELV,LKSEHEKTLL,SEHEKTLLEL	LUAD
TDRD10	c.828G>T	p.W276C	CLAEYHLGDYGHAWNRCWVLDRVDT[p.W276C]CAVVMFIDFGQLATIPVQSLRSLDSD	DTCAVVMFI,RVDTCAVVM,CAVVMFIDF,VLDRVDTCAV,RVDTCAVVMF	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
TDRD10	c.965C>T	p.S322L	SLDSDDFWTIPPLTQPFMLEKDILS[p.S322L]LYEVVHRILKGKITGALNSAVTAPAS	MLEKDILSL,SLYEVVHRI,LYEVVHRIL,LEKDILSLY,DILSLYEVV,KDILSLYEV,MLEKDILSLY,FMLEKDILSL,SLYEVVHRIL,ILSLYEVVHR,KDILSLYEVV	CRC
TEAD2	c.894_895insC	p.P298fs	DVRQIYDKFPEKKGGLRELYDRGPP[p.P298fs]PCLLPGQVLGGPELGPKW*	GQVLGGPEL,VLGGPELGPK,RELYDRGPPP	STAD
TECTB	c.85C>A	p.L29I	KAFVLLAIFAEASAKSCAPNKADVI[p.L29I]IVFCYPKTIITKIPECPYGWEVHQLA	VIIVFCYPK,APNKADVII,NKADVIIVF,IVFCYPKTI,KADVIIVFCY,DVIIVFCYPK,APNKADVIIV,IVFCYPKTII	CRC
TEDDM1	c.498G>A	p.M166I	LLVLTAELWAPNMCHLQLMETFLIL[p.M166I]IMGSWLMQAGFILYRPVSGYPWQDDD	LMETFLIL!,ILIMGSWLM,IMGSWLMQA,METFLILIM,FLILIMGSW,QLMETFLILI,FLILIMGSWL,LIMGSWLMQA,TFLILIMGSW,ETFLILIMGS,LMETFLILIM,LILIMGSWLM	CESC
TEKT5	c.1202G>A	p.R401H	LLERSIMAKEGPLKVAQTRLECRTR[p.R401H]HPNMELCRDIPQLKLVNEVFTIDDTL	RTRHPNMEL,RTRHPNMELC,LECRTRHPNM,HPNMELCRDI	CRC
TET1	c.4415C>G	p.T14725S	AAVREIMENRYGQKGNAIRIEIVVY[p.T1472S]SGKEGKSSHGCPIAKWVLRRSSDEEK	VVYSGKEGK,RIEIVVYSGK,IVVYSGKEGK	TGCT
TEX15	c.4954G>C	p.E1652Q	ASSLQILQEETKVCLNILPLFVEAF[p.E1652Q]QRKQECSVEQILISRELLVDQNLWNN	FQRKQECSV	CESC
TFE3	c.1444_1445insG	p.G482fs	SLKPEQLDIEEEGRPGAATFHVGGG[p.G482fs]TCPECSPSAAPCTALRCPSGPALSQRPPGGPGRPLPPGAGGHSDGGGGGGGGGRTVGGCPVPTAGCLRSPALFSVPCCLQGQQPPQQLQHGRGVLIRPHPSPGTFPPRKGGPVRMRPRLFPHPPMRLPCPGILGEEEM*	ALFSVPCCL,ALRCPSGPA,RMRPRLFPH,RLFPHPPMR,SAAPCTALR,LFPHPPMRL,LIRPHPSPG,PPGGPGRPL,CPVPTAGCL,SPALFSVPC,RPHPSPGTF,FPPRKGGPV,GPVRMRPRL,RPRLFPHPP,LRCPSGPAL,SQRPPGGPG,GCLRSPALF,LRSPALFSV,QQLQHGRGV,LQHGRGVLI,MRLPCPGIL,HPSPGTFPP,CLRSPALFSV,RLFPHPPMRL,ALRCPSGPAL,SQRPPGGPGR,KGGPVRMRPR,RMRPRLFPHP,RPRLFPHPPM,HPSPGTFPPR,SPSAAPCTAL,RPPGGPGRPL,PPRKGGPVRM,GPVRMRPRLF,FPHPPMRLPC,AGCLRSPALF,LQGQQPPQQL,GQQPPQQLQH,QQLQHGRGVL,IRPHPSPGTF,CPGILGEEEM	STAD
TFG	c.1145C>T	p.A382V	YQPRPGFTSLPGSTMTPPPSGPNPY[p.A382V]VRNRPPFGQGYTQPGPGYR*	PYVRNRPPF,YVRNRPPFG,NPYVRNRPPF	CLL
TFPI2	c.616C>T	p.R206C	RTCDAFTYTGCGGNDNNFVSREDCK[p.R206C]CACAKALKKKKKMPKLRFASRIRKIR	CACAKALKK,KCACAKALK,CKCACAKAL,REDCKCACA,CACAKALKKK,KCACAKALKK	GBM
TFPI2	c.664C>T	p.R222C	NFVSREDCKRACAKALKKKKKMPKL[p.R222C]CFASRIRKIRKKQF*	LCFASRIRK,CFASRIRKI,MPKLCFASR,KLCFASRIR,KKKMPKLCF,KKMPKLCFA,KLCFASRIRK,KKKMPKLCFA,KMPKLCFASR,CFASRIRKIR,MPKLCFASRI,KKKKMPKLCF,KKMPKLCFAS	BLCA
TFPT	c.75SC>G	p.S252C	EALDSSWVSRGPDKLLPYPTLASPA[p.S252C]CD*	YPTLASPAC	BRCA
TGFBR1	c.722C>T	p.S241L	FGEVWRGKWRGEEVAVKIFSSREER[p.S241L]LWFREAEIYQTVMLRHENILGFIAAD	RLWFREAEI,LWFREAEIY,SSREERLWF,EERLWFREA,FSSREERLW,SSREERLWFR,IFSSREERLW,KIFSSREERL,RLWFREAEIY,FSSREERLWF,REERLWFREA	CRC
TGM6	c.1073delC	p.T358fs	WNESWFARQDLGPSYNGWQVLDATP[p.T358fs]RRRVKVCSGAAQPQSPPSARVMCTWLTMAPSCLRRSTPTTSPGCGTRMRAGSVYTQTRRRLGDASAPRRWAVTPAWTSLTSTSIRKGPGKRGRCTARR*	RVMCTWLTM,VMCTWLTMA,WLTMAPSCL,LTMAPSCLR,TMAPSCLRR,SVYTQTRRR,SLTSTSIRK,RLGDASAPR,TSLTSTSIR,TSIRKGPGK,RVKVCSGAA,SARVMCTWL,GTRMRAGSV,RMRAGSVYT,QTRRRLGDA,ASAPRRWAV,SIRKGPGKR,QVLDATPRR,TTSPGCGTR,WTSLTSTSI,APSCLRRST,AVTPAWTSL,TPRRRVKVC,AQPQSPPSA,TRMRAGSVY,RRWAVTPAW,TPAWTSLTS,RVMCTWLTMA,LTMAPSCLRR,TSLTSTSIRK,STSIRKGPGK,TWLTMAPSCL,RVKVCSGAAQ,SARVMCTWLT,GTRMRAGSVY,RMRAGSVYTQ,RAGSVYTQTR,SVYTQTRRRL,QVLDATPRRR,WLTMAPSCLR,WTSLTSTSIR,TSIRKGPGKR,DASAPRRWAV,WAVTPAWTSL,RLGDASAPRR,QPQSPPSARV,APRRWAVTPA,TPAWTSLTST,RRVKVCSGAA,PQSPPSARVM,ARVMCTWLTM,AWTSLTSTSI,PPSARVMCTW	STAD
THADA	c.5822C>T	p.S1941L	RLLAFLEGKEGEDTLVLSVWDSYAE[p.S1941L]LRQLTLPRTEAAC*	SVWDSYAEL,ELRQLTLPR,YAELRQLTL,SVWDSYAELR,SYAELRQLTL,LSVWDSYAEL	UCEC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
THAP5	c.860C>A	p.S287Y	EELNTNKESVIAIFVPAENSKPSVN[p.S287Y]YFISAQKETTEMEDTDIEDSLYKDVD	VNYFISAQK,NSKPSVNYF,SVNYFISAQK,NSKPSVNYFI,KPSVNYFISA,AENSKPSVNY	CRC
THEM4	c.50T>G	p.L17R	MLRSCAARLRTLGALC[p.L17R]RPPVGRRLPGSEPRPELRSFSSEEVI	ALCRPPVGR,TLGALCRPPV,RLRTLGALCR,RPPVGRRLPG	ACC
THRAP3	c.1652A>G	p.K551R	YKAVQEKSSSPPPRKTSESRDKLGA[p.K551R]RGDFPTGKSSFSITREAQVNVRMDSF	ESRDKLGAR,GARGDFPTGK	KIRC
THSD7B	c.268C>T	p.R90C	VCDWHSDLFQWEVSDWHHCVLVPYA[p.R90C]CGEVKPRTAECVTAQHGLQHRMVRCI	LVPYACGEV,VLVPYACGEV	GBM
THSD7B	c.269G>A	p.R90H	VCDWHSDLFQWEVSDWHHCVLVPYA[p.R90H]HGEVKPRTAECVTAQHGLQHRMVRCI	LVPYAHGEV,YAHGEVKPR,VLVPYAHGEV	CRC
THSD7B	c.376G>A	p.E126K	VTAQHGLQHRMVRCIQKLNRTVVAN[p.E126K]KICEHFALQPPTEQACLIPCPRDCVV	LNRTVVANK,VANKICEHF,NKICEHFAL,KLNRTVVANK,VVANKICEHF	SKCM
TIAM1	c.739_740GG>AT	p.G247M	QLSTCQRANSLGDLYAQKNSGVTAN[p.G247M]MGPGSKFAGYCRNLVSDIPNLANHKMP	TANMGPGSK,KNSGVTANM,ANMGPGSKF,VTANMGPGSK,MGPGSKFAGY,QKNSGVTANM,TANMGPGSKF	TGCT
TIFAB	c.129C>A	p.D43E	GPSAFANVPPRLQHDTSPLLLGRGQ[p.D43E]EAHLQLQLPRLSRRHLSLEPYLEKGS	LLLGRGQEA,RGQEAHLQL,QEAHLQLQL,LLGRGQEAHL,EAHLQLQLPR,GQEAHLQLQL	LUAD
TIGD4	c.935C>T	p.S312F	VESFPAHPEVKNLKSIELAFFPSCL[p.S312F]FSKCIAMKQGVIKSLKIKYRHCLIKK	CLFSKCIAM,LFSKCIAMK,LAFFPSCLF,FPSCLFSKC,AFFPSCLFSK,CLFSKCIAMK,ELAFFPSCLF,SCLFSKCIAM,FPSCLFSKCI	LUAD
TIMD4	c.455_457delCAA	p.T152del	VRLNLQRASTTTHRTATTTTRRTTT[p.T152del]SPTTTRQMTTTPAALPTTVVTTPDLTTG	RTTTSPTTTR,TTRRTTTSPT	PRAD
TIMM44	c.249delA	p.K83fs	GFLSGLLDNVKQELAKNKEMKESIK[p.K83fs]NSVTRPEG*	ESIKNSVTR,KESIKNSVT,EMKESIKNSV,KEMKESIKNS	STAD
TIMP3	c.596_597insC	p.A199fs	YQSKHYACIRQKGGYCSWYRGWAPP[p.A199fs]G*	SWYRGWAPPG	STAD
TINAG	c.1207G>A	p.E403K	MQVREDFFHYKTGIYRHVTSTNKES[p.E403K]KKYRKLQTHAVKLTGWGTLRGAQGQK	VTSTNKESK,STNKESKKY,KKYRKLQTH,VTSTNKESKK,STNKESKKYR,HVTSTNKESK,KKYRKLQTHA	MM
TLL1	c.158C>A	p.P53Q	CAGLDYDYTFDGNEEDKTETIDYKD[p.P53Q]QCKAAVFWGDIALDDEDLNIFQIDRT	KDQCKAAVF,YKDQCKAAVF	LUAD
TLL1	c.458C>T	p.T153M	VKGKVPLQFSGQNEKNRVPRAATSR[p.T153M]MERIWPGGVIPYVIGGNFTGSQRAMF	RAATSRMER,VPRAATSRM,MERIWPGGV,RMERIWPGGV,RVPRAATSRM,RAATSRMERI,MERIWPGGVI	CRC
TLL2	c.2615C>T	p.S872L	LGRFCGSKKPDPTVASGSSMFLRFY[p.S872L]LDASVQRKGFQAVHSTECGGRLKAEV	FLRFYLDAS,SSMFLRFYL,FYLDASVQR,LRFYLDASV,SMFLRFYLDA,FLRFYLDASV,RFYLDASVQR	CRC
TLN2	c.623C>T	p.S208L	REQGVDENETLLLRRKFFYSDQNVD[p.S208L]LRDPVQLNLLYVQARDDILNGSHPVS	FFYSDQNVDL	UCEC
TLR2	c.980A>T	p.D327V	RVIDPGKVETLTIRRLHIPRFYLFY[p.D327V]VLSTLYSLTERVKRITVENSKVFLVP	YLFYVLSTL,YVLSTLYSL,VLSTLYSLT,FYLFYVLST,LFYVLSTLY,IPRFYLFYV,HIPRFYLFYV,YLFYVLSTLY,FYLFYVLSTL,FYVLSTLYSL,RFYLFYVLST,IPRFYLFYVL	CLL
TLR4	c.1492T>G	p.L498V	LEVLKMAGNSFQENFLPDIFTELRN[p.L498V]VTFLDLSQCQLEQLSPTAFNSLSSLQ	DIFTELRNV,FTELRNVTF,TELRNVTFL,LRNVTFLDL,IFTELRNVTF,ELRNVTFLDL	STAD
TM6SF1	c.44C>G	p.S15W	MSASAATGVFVLSL[p.S15W]WAIPVTYVFNHLAAQHDSWTIVGVAA	VLSLWAIPV,VFVLSLWAI,WAIPVTYVF,SLWAIPVTY,GVFVLSLWAI,FVLSLWAIPV,VLSLWAIPVT,SLWAIPVTYV,LWAIPVTYVF,LSLWAIPVTY	BLCA
TM9SF2	c.272G>A	p.R91H	RLDSVESVLPYEYTAFDFCQASEGK[p.R91H]HPSENLGQVLFGERIEPSPYKFTFNK	HPSENLGQV,HPSENLGQVL,SEGKHPSENL	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
TMC5	c.826C>T	p.R276C	DYGSSETPKMTRGVLSRTSSIQPSF[p.R276C]CHRSDDPVGSLWGENDYPEGIEMASM	SIQPSFCHR,SSIQPSFCHR,RTSSIQPSFC	SKCM
TMCC3	c.329G>A	p.R110H	EQTSRDGNVAEYLKLVNNADKQQAG[p.R110H]HIKQVFEKKNQKSAHSIAQLQKKLEQ	QQAGHIKQV,HIKQVFEKK,QAGHIKQVF,AGHIKQVFEK,QQAGHIKQVF,KQQAGHIKQV	CRC
TMCO2	c.43_44delTC	p.S15fs	MSTSSSSSWDNLLESLS[p.S15fs]QHSMELDTSKFFGRD*	SLSQHSMEL,HSMELDTSK,MELDTSKFF,LESLSQHSM,SQHSMELDT,SMELDTSKF,ELDTSKFFGR,ESLSQHSMEL,HSMELDTSKF,LLESLSQHSM,SQHSMELDTS,SMELDTSKFF,MELDTSKFFG	BLCA
TMEM102	c.328G>C	p.A110P	AELLLLRGGIREGSLDLGHAPLGPY[p.A110P]PRGPHYDAGFTLLVPMFSLDGTELQL	HAPLGPYPR,YPRGPHYDA,GPYPRGPHY,LGPYPRGPHY,YPRGPHYDAG	KIRC
TMEM121	c.879_881delGCC	p.P299del	FPPPALSLELQPPPPQRNSVPPPPP[p.P299del]LHGPPGRPHMSSPTRDPLDT*	NSVPPPPPL,RNSVPPPPPL	PRAD
TMEM131	c.3955G>C	p.E1319Q	AHSPLEQHPQPPLPPPVPQPQEPQP[p.E1319Q]QRLSPAPLAHPSHPERASSARHSSED	PQRLSPAPL,QPQEPQPQRL,EPQPQRLSPA,QPQRLSPAPL	CESC
TMEM132A	c.1441C>T	p.R481C	EACDAVFVAGKESRGARGVRVDFWW[p.R481C]CRLRASLRLTVWAPLLPLRIELTDTT	RVDFWWCRLR,FWWCRLRASL,GVRVDFWWCR,WWCRLRASLR,WCRLRASLRL,VRVDFWWCRL	CRC
TMEM132D	c.1732C>T	p.R578W	GDSEEEEDDERRGRGCTLQYQHAMV[p.R578W]WVLTQFVAEAAGPGGHLAHLLGSDWQ	YQHAMVWVL,MVWVLTQFV,AMVWVLTQF,LQYQHAMVW,QYQHAMVWV,LQYQHAMVWV,YQHAMVWVLT,AMVWVLTQFV,MVWVLTQFVA,WVLTQFVAEA,QYQHAMVWVL,HAMVWVLTQF,TLQYQHAMVW	CRC
TMEM132D	c.618delC	p.P206fs	SCRLQGDLGLCVAELELLSSWFSPP[p.P206fs]RWLPGGGSPWTSRRGPPWSSTTPCTQGVREGTASGKTRGEAMGSGQATVTSMSPGPPCRGSGASSFIRHTGNPP*	AMGSGQATV,STTPCTQGV,LSSWFSPPR,SMSPGPPCR,GSGASSFIR,SWFSPPRWL,TSRRGPPWS,GVREGTASG,KTRGEAMGS,RGSGASSFI,SGKTRGEAM,SSWFSPPRW,WLPGGGSPW,WTSRRGPPW,SGQATVTSM,CRGSGASSF,GEAMGSGQA,WLPGGGSPWT,LLSSWFSPPR,GVREGTASGK,TSMSPGPPCR,RWLPGGGSPW,KTRGEAMGSG,RGSGASSFIR,STTPCTQGVR,SSTTPCTQGV,EAMGSGQATV,SPWTSRRGPP,LSSWFSPPRW,SSWFSPPRWL,ASGKTRGEAM,GEAMGSGQAT,GSGQATVTSM	STAD
TMEM147	c.275C>T	p.A92V	FIGEFMKASVDVADLIGLNLVMSRN[p.A92V]VGKGEYKIMVAALGWATAELIMSRCI	LVMSRNVGK,SRNVGKGEY,GLNLVMSRNV,MSRNVGKGEY	GBM
TMEM156	c.241C>T	p.R81C	SFVTFLQPVRETQIIMRIFLNPSNF[p.R81C]CNFTRTCQDITGEFKMCSSCLVCESK	PSNFCNFTR,FLNPSNFCNF,NPSNFCNFTR	GBM
TMEM161B	c.425T>C	p.L142P	VYLVTEVYYNFMKPTQEMNISLVWC[p.L142P]PLVLSFAIKVLFSLTTHYFKVEDGGE	ISLVWCPLV,SLVWCPLVL,VWCPLVLSF,NISLVWCPL,CPLVLSFAI,NISLVWCPLV,ISLVWCPLVL,LVWCPLVLSF,MNISLVWCPL	KIRC
TMEM161B	c.944G>A	p.R315Q	KDYIMNPPLGKESIPLMTEATFDTL[p.R315Q]QLWLIILLCALRLAMMRSHLQAYLNL	TLQLWLIIL,LQLWLIILL,EATFDTLQL,ATFDTLQLW,TLQLWLIILL,QLWLIILLCA,ATFDTLQLWL,TFDTLQLWLI,TEATFDTLQL,EATFDTLQLW	UCEC
TMEM19	c.993delT	p.G331fs	LDNNAVNLFSSVLIALLLPTAAWGF[p.G331fs]GPGGELYFISTG*	GFGPGGELY,WGFGPGGEL,GELYFISTG,GFGPGGELYF,WGFGPGGELY	BLCA
TMEM230	c.419A>G	p.D140G	LFLIGAFLIIIGSLLLSGYISKGGA[p.D140G]GRAVPVLIIGILVFLPGFYHLRIAYY	ISKGGAGRA,AGRAVPVLI,YISKGGAGR,SKGGAGRAV,YISKGGAGRA,AGRAVPVLII	KIRC
TMEM247	c.382C>G	p.Q128E	EMELEKVRMEFELTRLKYLHEKNQR[p.Q128E]ERQHEVVMEQLQRERQHEVVMEQLQQ	NQRERQHEV,YLHEKNQRER,NQRERQHEVV	ACC
TMEM41A	c.467delT	p.F156fs	VVSYFPDKVALLQRKVEENRNSLFF[p.F156fs]SYCF*	NSLFFSYCF,NRNSLFFSY,RNSLFFSYCF,ENRNSLFFSY	STAD
TMEM41B	c.690delT	p.F230fs	RITPFLPNWFINITSPVINVPLKVF[p.F230fs]LLVLF*	NVPLKVFLL,LKVFLLVLF,VPLKVFLLV,NVPLKVFLLV,VPLKVFLLVL	STAD
TMEM47	c.259G>A	p.G87S	ASLDIWHCESTLSSDWQIATLALLL[p.G87S]SGAAIILIAFLVGLISICVGSRRRFY	TLALLLSGA,ALLLSGAAI,LLLSGAAII,LLSGAAIIL,ALLLSGAAII,LLLSGAAIIL,LLSGAAIILI,TLALLLSGAA,SGAAIILIAF,LALLLSGAAI	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
TMEM55A	c.566G>A	p.R189Q	MELRFNTLAKCPHCKKISSVGSALP[p.R189Q]QRRCCAYITIGMICIFIGVGLTVGTP	SVGSALPQR,LPQRRCCAY,SSVGSALPQR,ALPQRRCCAY,LPQRRCCAYI	CRC
TMEM60	c.231delA	p.K77fs	LIVKMAGRCKSGFDPRHGSHNIKKK[p.K77fs]PGTSLQCYLN*	IKKKPGTSL,NIKKKPGTSL,KKPGTSLQCY	KIRP
TMEM71	c.188G>A	p.R63Q	DSLDGYHSFECGSIDPLTGSHYTCR[p.R63Q]QSPRLLTNGYYIWTEDSFLCDKDGNI	HYTCRQSPR,RQSPRLLTN,SHYTCRQSPR,QSPRLLTNGY,RQSPRLLTNG	BRCA
TMEM74	c.374G>A	p.R125Q	CNCCSQELETSFTYVDKNINLEQRN[p.R125Q]QSSPSAKGHNHPGELGWENPNEWSQE	RNQSSPSAK,EQRNQSSPSA	CRC
TMEM79	c.481_482insC	p.P161fs	ERQPQEDLIVRCEAGEGECRTFMPP[p.P161fs]PGHPPRPH*	RTFMPPPGH,MPPPGHPPR,RTFMPPPGHP,FMPPPGHPPR,GECRTFMPPP	STAD
TMPRSS11A	c.863C>T	p.S288L	IHEKYRSAAREYDIAVVQVSSRVTF[p.S288L]LDDIRQICLPEASASFQPNLTVHITG	QVSSRVTFL,FLDDIRQICL,VQVSSRVTFL,SSRVTFLDDI	CRC
TMPRSS11E	c.775G>T	p.G259C	FTTYKNPARWTASFGVTIKPSKMKR[p.G259C]CLRRIIVHEKYKHPSHDYDISLAELS	KMKRCLRRI,PSKMKRCLR,KPSKMKRCL,MKRCLRRII,CLRRIIVHEK,KMKRCLRRII,SKMKRCLRRI,MKRCLRRIIV	LUAD
TMPRSS11F	c.821G>A	p.R274Q	CFWKNKDPTQWIATFGATITPPAVK[p.R274Q]QNVRKIILHENYHRETNENDIALVQL	KQNVRKIIL,TPPAVKQNV,KQNVRKIILH,ITPPAVKQNV,VKQNVRKIIL	LUSC
TMPRSS3	c.47G>A	p.R16Q	MGENDPPAVEAPFSF[p.R16Q]QSLFGLDDLKISPVAPDADAVAAQIL	FSFQSLFGL,EAPFSFQSL,APFSFQSLF,VEAPFSFQS,QSLFGLDDLK,VEAPFSFQSL,FQSLFGLDDL	UCEC
TMPRSS6	c.904G>A	p.V302I	ITSVYGCSRQEPVVEVLASGAIMAV[p.V302I]IWKKGLHSYYDPFVLSVQPVVFQACE	AIMAVIWKK,GAIMAVIWK,IWKKGLHSY,SGAIMAVIW,IMAVIWKKGL,SGAIMAVIWK,GAIMAVIWKK,VIWKKGLHSY,IWKKGLHSYY,LASGAIMAVI,ASGAIMAVIW	GBM
TMTC2	c.1226C>G	p.T409R	RTQLPSTENIVVLSLSLLIIPFVPA[p.T409R]RNLFFYVGFVIAERVLYIPSMGFCLL	LIIPFVPAR,PFVPARNLF,FVPARNLFF,RNLFFYVGF,PARNLFFYV,VPARNLFFY,IPFVPARNL,FVPARNLFFY,PFVPARNLFF,RNLFFYVGFV,LLIIPFVPAR,VPARNLFFYV,IPFVPARNLF,ARNLFFYVGF	HNSC
TMTC4	c.1831C>T	p.R611C	EAAEQSYRTAIKHRRKYPDCYYNLG[p.R611C]CLYADLNRHVDALNAWRNATVLKPEH	CYYNLGCLY,CLYADLNRHV	STAD
TMX3	c.451C>T	p.R151C	AHRVSGALIRPLPSQQMFEHMQKRH[p.R151C]CVFFVYVGGESPLKEKYIDAASELIV	HMQKRHCVF,MQKRHCVFF,KRHCVFFVY,EHMQKRHCV,MQKRHCVFFV,HMQKRHCVFF,KRHCVFFVYV,QKRHCVFFVY,EHMQKRHCVF,FEHMQKRHCV	LUAD
TNF	c.139C>T	p.L47F	GGPQGSRRCLFLSLFSFLIVAGATT[p.L47F]FFCLLHFGVIGPQREEFPRDLSLISP	ATTFFCLLH,IVAGATTFF,TTFFCLLHF,LIVAGATTF,TFFCLLHFGV,FLIVAGATTF,ATTFFCLLHF,FFCLLHFGVI,LIVAGATTFF	DLBCL
TNFSF9	c.694G>A	p.A232T	SAGQRLGVHLHTEARARHAWQLTQG[p.A232T]TTVLGLFRVTPEIPAGLPSPRSE*	WQLTQGTTV,QLTQGTTVL,GTTVLGLFR,TTVLGLFRV,TQGTTVLGL,TQGTTVLGLF,WQLTQGTTVL	GBM
TNIP2	c.217C>G	p.R73G	LRARLAALEGDAAPSLVDALLEQVA[p.R73G]GFREQLRRQEGGAAEAQMRQEIERLT	ALLEQVAGF,QVAGFREQL,ALLEQVAGFR,QVAGFREQLR,EQVAGFREQL,DALLEQVAGF	ACC
TNIP2	c.415G>A	p.A139T	QPQHEREKEVVLLRRSMAEGERARA[p.A139T]TSDVLCRSLANETHQLRRTLTATAHM	RARATSDVL,AEGERARAT,RARATSDVLC,GERARATSDV	CRC
TNK2	c.1894_1895insC	p.P632fs	PTRALPRPLHPTPVVDWDARPLPPP[p.P632fs]ARL*	RPLPPPARL,DARPLPPPAR	STAD
TNKS2	c.1856_1857insA	p.T619fs	HEAAAKGKYEICKLLLQHGADPTKK[p.T619fs]KQGWKYSFGSC*	PTKKKQGWK,KKQGWKYSF,PTKKKQGWKY,KKKQGWKYSF	CESC,CLL
TNR	c.2074C>A	p.L692I	SAVMNSQQSVPATMNARTELDSPRD[p.L692I]IMVTASSETSISLIWTKASGPIDHYR	IMVTASSET,SPRDIMVTA,TELDSPRDI,DSPRDIMVTA,SPRDIMVTAS,TELDSPRDIM,IMVTASSETS	LUAD
TNS1	c.547C>T	p.P183S	GQPSQRRYVHYFSGLLSGSIKMNNK[p.P183S]SLFLHHVIMHGIPNFESKGGCRPFLR	KMNNKSLFL,KSLFLHHVI,SIKMNNKSL,SLFLHHVIM,IKMNNKSLF,KMNNKSLFLH,SIKMNNKSLF,KSLFLHHVIM,IKMNNKSLFL,NKSLFLHHVI,SLFLHHVIMH	TGCT
TNXB	c.2116_2117delGT	p.V706fs	EEPPASACPGGCGPRELCRAGQCVC[p.V706fs]RGLPRP*	RAGQCVCRGL	ACC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
TOP2A	c.2207G>T	p.R736L	NERSIPSMVDGLKPGQRKVLFTCFK[p.R736L]LNDKREVKVAQLAGSVAEMSSYHHGE	KVLFTCFKL,KLNDKREVK,FTCFKLNDK,KLNDKREVKV,FTCFKLNDKR,RKVLFTCFKL	LUAD
TOP2A	c.3595A>G	p.K1199E	FIEELEAVEAKEKQDFQVGLPGKGG[p.K1199E]EAKGKKTQMAEVLPSPRGQRVIPRIT	KGGEAKGKK,GEAKGKKTQM	THCA
TOP2B	c.1967G>A	p.R656H	IKYYKGLGTSTAKEAKEYFADMERH[p.R656H]HILFRYAGPEDDAAITLAFSKKKIDD	DMERHHILF,MERHHILFR,RHHILFRYA,ADMERHHIL,FADMERHHI,YFADMERHHI,MERHHILFRY,DMERHHILFR,FADMERHHIL,ADMERHHILF	CRC
TOPBP1	c.4141delA	p.I1381fs	ILDVLTGINVQQRRLALAAMRWRKK[p.I1381fs]SSKDKNLALLREHLVGGRLFYMWISLEKQASNAFFSQEEQRCYLVILYLYLKRPHIFFLT*	FSQEEQRCY,LVGGRLFYM,RLFYMWISL,YLVILYLYL,YLYLKRPHI,NLALLREHL,HLVGGRLFY,LVILYLYLK,FYMWISLEK,VILYLYLKR,VGGRLFYMW,CYLVILYLY,LYLKRPHIF,YLKRPHIFF,KSSKDKNLA,SSKDKNLAL,GGRLFYMWI,AFFSQEEQR,AMRWRKKSS,EQRCYLVIL,LKRPHIFFL,LEKQASNAF,REHLVGGRL,EKQASNAFF,KQASNAFFS,SQEEQRCYL,RCYLVILYL,EEQRCYLVI,QEEQRCYLV,NLALLREHLV,HLVGGRLFYM,YMWISLEKQA,YLKRPHIFFL,AMRWRKKSSK,LFYMWISLEK,YLVILYLYLK,LVGGRLFYMW,CYLVILYLYL,LYLYLKRPHI,YLYLKRPHIF,LYLKRPHIFF,RWRKKSSKDK,SSKDKNLALL,EQRCYLVILY,RCYLVILYLY,LLREHLVGGR,NAFFSQEEQR,LVILYLYLKR,SLEKQASNAF,LEKQASNAFF,KSSKDKNLAL,KNLALLREHL,REHLVGGRLF,GRLFYMWISL,KQASNAFFSQ,ILYLYLKRPH,EEQRCYLVIL,QEEQRCYLVI	STAD
TOR1AIP2	c.436G>A	p.G146R	PSDKVGRADAHLGSSSVALPKEASD[p.G146R]RTGASQEPPTTDSQEAQSPGHSSAGQ	KEASDRTGA	TGCT
TOR3A	c.37T>C	p.F13L	MLRGPWRQLWLF[p.F13L]LLLLLPGAPEPRGASRPWEGTDEPGS	RQLWLFLLL,QLWLFLLLL,FLLLLLPGA,PWRQLWLFL,LWLFLLLLL,RQLWLFLLLL,QLWLFLLLLL,PWRQLWLFLL,GPWRQLWLFL	ACC
TOX	c.1061C>T	p.S354L	RASLVSKSYSEPVDVKTSQPPQLIN[p.S354L]LKPSVFHGPSQAHSALYLSSHYHQQP	QLINLKPSV,LINLKPSVF,SQPPQLINL,SQPPQLINLK,QLINLKPSVF	CRC
TP53	c.1010G>T	p.R337L	TSSSPQPKKKPLDGEYFTLQIRGRE[p.R337L]LFEMFRELNEALELKDAQAGKEPGGS	ELFEMFREL,LQIRGRELF,RGRELFEMF,TLQIRGREL,IRGRELFEM,RGRELFEMFR,TLQIRGRELF,IRGRELFEMF,RELFEMFREL	LUAD,LUSC
TP53	c.173delC	p.P58fs	SPLPSQAMDDLMLSPDDIEQWFTED[p.P58fs]QVQMKLPECQRLLPPWPLHQQLLHRRPLHQPPPGPCHLLSLPRKPTRAATVSVWASCILGQPSL*	KLPECQRLL,SLPRKPTRA,RLLPPWPLH,LSLPRKPTR,PTRAATVSV,RAATVSVWA,QMKLPECQR,TVSVWASCI,LPRKPTRAA,QQLLHRRPL,MKLPECQRL,QRLLPPWPL,TRAATVSVW,VSVWASCIL,WPLHQQLLH,TEDQVQMKL,SLPRKPTRAA,CQRLLPPWPL,LLSLPRKPTR,ATVSVWASCI,TVSVWASCIL,LPPWPLHQQL,LPRKPTRAAT,KPTRAATVSV,HQQLLHRRPL,QWFTEDQVQM,MKLPECQRLL,QQLLHRRPLH,HQPPPGPCHL,ASCILGQPSL,IEQWFTEDQV	HNSC
TP53	c.216delC	p.P72fs	DDIEQWFTEDPGPDEAPRMPEAAPP[p.P72fs]WPLHQQLLHRRPLHQPPPGPCHLLSLPRKPTRAATVSVWASCILGQPSL*	SLPRKPTRA,RMPEAAPPW,LSLPRKPTR,PTRAATVSV,RAATVSVWA,TVSVWASCI,LPRKPTRAA,QQLLHRRPL,TRAATVSVW,VSVWASCIL,WPLHQQLLH,PEAAPPWPL,SLPRKPTRAA,LLSLPRKPTR,ATVSVWASCI,TVSVWASCIL,MPEAAPPWPL,APPWPLHQQL,LPRKPTRAAT,KPTRAATVSV,HQQLLHRRPL,QQLLHRRPLH,HQPPPGPCHL,ASCILGQPSL	LUAD
TP53	c.313G>T	p.G105C	PTPAAPAPAPSWPLSSSVPSQKTYQ[p.G105C]CSYGFRLGFLHSGTAKSVTCTYSPAL	YQCSYGFRL,KTYQCSYGF,CSYGFRLGF,SQKTYQCSY,TYQCSYGFR,KTYQCSYGFR,TYQCSYGFRL,PSQKTYQCSY,QKTYQCSYGF,YQCSYGFRLG,CSYGFRLGFL	LUAD
TP53	c.323delG	p.G108fs	AAPAPAPSWPLSSSVPSQKTYQGSY[p.G108fs]VSVWASCILGQPSL*	YVSVWASCI,TYQGSYVSV,YQGSYVSVW,SYVSVWASC,KTYQGSYVS,VSVWASCIL,KTYQGSYVSV,YQGSYVSVWA,SQKTYQGSYV,YVSVWASCIL,TYQGSYVSVW,SYVSVWASCI,ASCILGQPSL	BRCA
TP53	c.328delC	p.R110fs	PAPAPSWPLSSSVPSQKTYQGSYGF[p.R110fs]VWASCILGQPSL*	TYQGSYGFV,YQGSYGFVW,SYGFVWASC,YGFVWASCI,KTYQGSYGFV,YQGSYGFVWA,TYQGSYGFVW,SYGFVWASCI,YGFVWASCIL,ASCILGQPSL	BRCA

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
TP53	c.329G>T	p.R110L	PAPAPSWPLSSSVPSQKTYQGSYGF[p.R110L]LLGFLHSGTAKSVTCTYSPALNKMFC	YQGSYGFLL,FLLGFLHSG,TYQGSYGFL,SYGFLLGFL,GSYGFLLGF,FLLGFLHSGT,KTYQGSYGFL,LLGFLHSGTA,TYQGSYGFLL,YQGSYGFLLG,QGSYGFLLGF	HNSC,LUAD
TP53	c.396G>C	p.K132N	YGFRLGFLHSGTAKSVTCTYSPALN[p.K132N]NMFCQLAKTCPVQLWVDSTPPPGTRV	ALNNMFCQL,NMFCQLAKT,TYSPALNNM,YSPALNNMF,ALNNMFCQLA,TYSPALNNMF,CTYSPALNNM	BLCA,BRCA
TP53	c.396G>T	p.K132N	YGFRLGFLHSGTAKSVTCTYSPALN[p.K132N]NMFCQLAKTCPVQLWVDSTPPPGTRV	ALNNMFCQL,NMFCQLAKT,TYSPALNNM,YSPALNNMF,ALNNMFCQLA,TYSPALNNMF,CTYSPALNNM	OV
TP53	c.421T>G	p.C141G	SGTAKSVTCTYSPALNKMFCQLAKT[p.C141G]GPVQLWVDSTPPPGTRVRAMAIYKQS	CQLAKTGPV,KTGPVQLWV,AKTGPVQLW,QLAKTGPVQL,KMFCQLAKTG,LAKTGPVQLW	PRAD
TP53	c.422G>A	p.C141Y	SGTAKSVTCTYSPALNKMFCQLAKT[p.C141Y]YPVQLWVDSTPPPGTRVRAMAIYKQS	CQLAKTYPV,KTYPVQLWV,MFCQLAKTY,LAKTYPVQL,AKTYPVQLW,QLAKTYPVQL,KMFCQLAKTY,LAKTYPVQLW,YPVQLWVDST	BRCA
TP53	c.427G>A	p.V143M	TAKSVTCTYSPALNKMFCQLAKTCP[p.V143M]MQLWVDSTPPPGTRVRAMAIYKQSQH	KTCPMQLWV,CQLAKTCPM,AKTCPMQLW,MQLWVDSTP,QLAKTCPMQL,FCQLAKTCPM,LAKTCPMQLW,MQLWVDSTPP,CPMQLWVDST	HNSC
TP53	c.451C>A	p.P151T	YSPALNKMFCQLAKTCPVQLWVDST[p.P151T]TPPGTRVRAMAIYKQSQHMTEVVRRC	STTPPGTRV,VQLWVDSTT,STTPPGTRVR,TPPGTRVRAM,VQLWVDSTTP	HNSC
TP53	c.455delC	p.P152fs	SPALNKMFCQLAKTCPVQLWVDSTP[p.P152fs]RPAPASAPWPSTSSHST*	QLWVDSTPR,TPRPAPASA,RPAPASAPW,APWPSTSSH,WPSTSSHST,STPRPAPASA,TPRPAPASAP,APASAPWPST	STAD
TP53	c.461G>T	p.G154V	ALNKMFCQLAKTCPVQLWVDSTPPP[p.G154V]VTRVRAMAIYKQSQHMTEVVRRCPHH	WVDSTPPPV,VTRVRAMAI,DSTPPPVTR,STPPPVTRV,PPVTRVRAM,VTRVRAMAIY,DSTPPPVTRV,LWVDSTPPPV	LUAD
TP53	c.464C>A	p.T155N	LNKMFCQLAKTCPVQLWVDSTPPPG[p.T155N]NRVRAMAIYKQSQHMTEVVRRCPHHE	STPPPGNRV,PPGNRVRAM,GNRVRAMAI,NRVRAMAIY,GNRVRAMAIY,DSTPPPGNRV	GBM
TP53	c.469G>T	p.V157F	KMFCQLAKTCPVQLWVDSTPPPGTR[p.V157F]FRAMAIYKQSQHMTEVVRRCPHHERC	RFRAMAIYK,GTRFRAMAI,TRFRAMAIY,PPGTRFRAM,TRFRAMAIYK,GTRFRAMAIY,RFRAMAIYKQ,STPPPGTRFR	HNSC,LIHC,LUAD,LUSC,OV
TP53	c.473G>A	p.R158H	MFCQLAKTCPVQLWVDSTPPPGTRV[p.R158H]HAMAIYKQSQHMTEVVRRCPHHERCS	RVHAMAIYK,GTRVHAMAI,PPGTRVHAM,TRVHAMAIY,GTRVHAMAIY	GBM,LIHC
TP53	c.473G>T	p.R158L	MFCQLAKTCPVQLWVDSTPPPGTRV[p.R158L]LAMAIYKQSQHMTEVVRRCPHHERCS	RVLAMAIYK,GTRVLAMAI,TPPPGTRVL,PPGTRVLAM,TRVLAMAIY,GTRVLAMAIY	LUAD,LUSC
TP53	c.475G>C	p.A159P	FCQLAKTCPVQLWVDSTPPPGTRVR[p.A159P]PMAIYKQSQHMTEVVRRCPHHERCSD	RVRPMAIYK,GTRVRPMAI,PPGTRVRPM,TRVRPMAIY,GTRVRPMAIY,RVRPMAIYKQ	LUAD
TP53	c.476C>T	p.A159V	FCQLAKTCPVQLWVDSTPPPGTRVR[p.A159V]VMAIYKQSQHMTEVVRRCPHHERCSD	RVRVMAIYK,GTRVRVMAI,RVMAIYKQS,TRVRVMAIY,GTRVRVMAIY,RVRVMAIYKQ,VMAIYKQSQH	BLCA,OV
TP53	c.488A>G	p.Y163C	AKTCPVQLWVDSTPPPGTRVRAMAI[p.Y163C]CKQSQHMTEVVRRCPHHERCSDSDGL	RVRAMAICK,AICKQSQHM,GTRVRAMAIC,RVRAMAICKQ,MAICKQSQHM	BRCA,HNSC,LUAD,LUSC,OV
TP53	c.517G>A	p.V173M	DSTPPPGTRVRAMAIYKQSQHMTEV[p.V173M]MRRCPHHERCSDSDGLAPPQHLIRVE	MRRCPHHER,QSQHMTEVM,VMRRCPHHER,KQSQHMTEVM	BRCA,HNSC
TP53	c.517G>T	p.V173L	DSTPPPGTRVRAMAIYKQSQHMTEV[p.V173L]LRRCPHHERCSDSDGLAPPQHLIRVE	VLRRCPHHER,QSQHMTEVLR,KQSQHMTEVL	BRCA,HNSC
TP53	c.523C>G	p.R175G	TPPPGTRVRAMAIYKQSQHMTEVVR[p.R175G]GCPHHERCSDSDGLAPPQHLIRVEGN	TEVVRGCPH,VVRGCPHHER	LUSC
TP53	c.523C>T	p.R175C	TPPPGTRVRAMAIYKQSQHMTEVVR[p.R175C]CCPHHERCSDSDGLAPPQHLIRVEGN	TEVVRCCPH,VVRCCPHHER	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
TP53	c.524G>A	p.R175H	TPPPGTRVRAMAIYKQSQHMTEVVR[p.R175H]HCPHHERCSDSDGLAPPQHLIRVEGN	TEVVRHCPH,VVRHCPHHER,SQHMTEVVRH	BLCA,BRCA,CLL,CRC,GBM,HNSC,LUAD,OV,PAAD,PRAD,STAD,UCS
TP53	c.527G>A	p.C176Y	PPPGTRVRAMAIYKQSQHMTEVVRR[p.C176Y]YPHHERCSDSDGLAPPQHLIRVEGNL	HMTEVVRRY,TEVVRRYPH,VVRRYPHHER,QHMTEVVRRY	OV
TP53	c.527G>T	p.C176F	PPPGTRVRAMAIYKQSQHMTEVVRR[p.C176F]FPHHERCSDSDGLAPPQHLIRVEGNL	HMTEVVRRF,TEVVRRFPH,VVRRFPHHER,QHMTEVVRRF	BRCA,LUAD,STAD
TP53	c.535C>T	p.H179Y	GTRVRAMAIYKQSQHMTEVVRRCPH[p.H179Y]YERCSDSDGLAPPQHLIRVEGNLRVE	VVRRCPHYE,EVVRRCPHY,VVRRCPHYER,TEVVRRCPHY,YERCSDSDGL	HNSC
TP53	c.536A>G	p.H179R	GTRVRAMAIYKQSQHMTEVVRRCPH[p.H179R]RERCSDSDGLAPPQHLIRVEGNLRVE	EVVRRCPHR,VVRRCPHRER,RERCSDSDGL	BRCA,GBM,HNSC,OV,UCS
TP53	c.536A>T	p.H179L	GTRVRAMAIYKQSQHMTEVVRRCPH[p.H179L]LERCSDSDGLAPPQHLIRVEGNLRVE	EVVRRCPHL,VVRRCPHLER,TEVVRRCPHL,LERCSDSDGL	LUSC
TP53	c.572_574delCTC	p.P191del	SQHMTEVVRRCPHHERCSDSDGLAP[p.P191del]QHLIRVEGNLRVEYLDDRNTFRHSVVVP	GLAPQHLIR,GLAPQHLIRV	OV
TP53	c.577C>T	p.H193Y	HMTEVVRRCPHHERCSDSDGLAPPQ[p.H193Y]YLIRVEGNLRVEYLDDRNTFRHSVVV	GLAPPQYLI,YLIRVEGNL,DSDGLAPPQY,GLAPPQYLIR,QYLIRVEGNL,YLIRVEGNLR	BRCA
TP53	c.578A>G	p.H193R	HMTEVVRRCPHHERCSDSDGLAPPQ[p.H193R]RLIRVEGNLRVEYLDDRNTFRHSVVV	GLAPPQRLI,RLIRVEGNL,RLIRVEGNLR	BRCA,LIHC,OV,UCS
TP53	c.578A>T	p.H193L	HMTEVVRRCPHHERCSDSDGLAPPQ[p.H193L]LLIRVEGNLRVEYLDDRNTFRHSVVV	GLAPPQLLI,LLIRVEGNL,GLAPPQLLIR,LLIRVEGNLR	BRCA,HNSC,LUSC
TP53	c.581T>G	p.L194R	MTEVVRRCPHHERCSDSDGLAPPQH[p.L194R]RIRVEGNLRVEYLDDRNTFRHSVVVP	GLAPPQHRI,RIRVEGNLR,APPQHRIRV,RIRVEGNLRV	BRCA,OV
TP53	c.584T>C	p.I195T	TEVVRRCPHHERCSDSDGLAPPQHL[p.I195T]TRVEGNLRVEYLDDRNTFRHSVVVPY	GLAPPQHLT,LTRVEGNLR,GLAPPQHLTR,LTRVEGNLRV,HLTRVEGNLR	BRCA,OV
TP53	c.587G>C	p.R196P	EVVRRCPHHERCSDSDGLAPPQHLI[p.R196P]PVEGNLRVEYLDDRNTFRHSVVVPYE	HLIPVEGNL,APPQHLIPV,IPVEGNLRV,HLIPVEGNLR,LAPPQHLIPV	HNSC
TP53	c.596G>T	p.G199V	RRCPHHERCSDSDGLAPPQHLIRVE[p.G199V]VNLRVEYLDDRNTFRHSVVVPYEPPE	HLIRVEVNL,LIRVEVNLR,EVNLRVEYL,VEVNLRVEY,LIRVEVNLRV,RVEVNLRVEY,HLIRVEVNLR,VEVNLRVEYL	BRCA
TP53	c.614A>G	p.Y205C	ERCSDSDGLAPPQHLIRVEGNLRVE[p.Y205C]CLDDRNTFRHSVVVPYEPPEVGSDCT	CLDDRNTFR,ECLDDRNTFR,VECLDDRNTF,VEGNLRVECL	OV
TP53	c.626_627delGA	p.R209fs	DSDGLAPPQHLIRVEGNLRVEYLDD[p.R209fs]KHFST*	YLDDKHFST,VEYLDDKHF,RVEYLDDKHF	BRCA
TP53	c.641A>G	p.H214R	APPQHLIRVEGNLRVEYLDDRNTFR[p.H214R]RSVVVPYEPPEVGSDCTTIHYNYMCN	NTFRRSVVV,FRRSVVVPY,TFRRSVVVPY,YLDDRNTFRR	LUSC
TP53	c.644G>T	p.S215I	PPQHLIRVEGNLRVEYLDDRNTFRH[p.S215I]IVVVPYEPPEVGSDCTTIHYNYMCNS	NTFRHIVVV,RNTFRHIVV,FRHIVVVPY,TFRHIVVVPY	LUAD
TP53	c.645T>G	p.S215R	PPQHLIRVEGNLRVEYLDDRNTFRH[p.S215R]RVVVPYEPPEVGSDCTTIHYNYMCNS	NTFRHRVVV,RHRVVVPYE,FRHRVVVPY,TFRHRVVVPY	OV

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
TP53	c.646G>A	p.V216M	PQHLIRVEGNLRVEYLDDRNTFRHS[p.V216M]MVVPYEPPEVGSDCTTIHYNYMCNSS	NTFRHSMVV,DRNTFRHSM,FRHSMVVPY,MVVPYEPPEV,TFRHSMVVPY	BRCA,GBM,OV
TP53	c.659A>C	p.Y220S	IRVEGNLRVEYLDDRNTFRHSVVVP[p.Y220S]SEPPEVGSDCTTIHYNYMCNSSCMGG	VVPSEPPEV,VVVPSEPPEV	BRCA
TP53	c.659A>G	p.Y220C	IRVEGNLRVEYLDDRNTFRHSVVVP[p.Y220C]CEPPEVGSDCTTIHYNYMCNSSCMGG	VVPCEPPEV,VVVPCEPPEV	BRCA,GBM,HNSC,LUSC,OV,UCEC
TP53	c.701A>G	p.Y234C	RNTFRHSVVVPYEPPEVGSDCTTIH[p.Y234C]CNYMCNSSCMGGMNRRPILTIITLED	CTTIHCNYM,TTIHCNYMC,CNYMCNSSCM	BRCA,GBM,LUSC,OV
TP53	c.706T>G	p.Y236D	TFRHSVVVPYEPPEVGSDCTTIHYN[p.Y236D]DMCNSSCMGGMNRRPILTIITLEDSS	NDMCNSSCM	HNSC
TP53	c.707A>G	p.Y236C	TFRHSVVVPYEPPEVGSDCTTIHYN[p.Y236C]CMCNSSCMGGMNRRPILTIITLEDSS	YNCMCNSSCM	HNSC,OV
TP53	c.711G>A	p.M237I	FRHSVVVPYEPPEVGSDCTTIHYNY[p.M237I]ICNSSCMGGMNRRPILTIITLEDSSG	CTTIHYNYI,YNYICNSSCM	HNSC
TP53	c.711G>C	p.M237I	FRHSVVVPYEPPEVGSDCTTIHYNY[p.M237I]ICNSSCMGGMNRRPILTIITLEDSSG	CTTIHYNYI,YNYICNSSCM	LUAD
TP53	c.713G>A	p.C238Y	RHSVVVPYEPPEVGSDCTTIHYNYM[p.C238Y]YNSSCMGGMNRRPILTIITLEDSSGN	TTIHYNYMY,YMYNSSCMG,YNYMYNSSC,CTTIHYNYMY,YMYNSSCMGG,YNYMYNSSCM,IHYNYMYNSS,MYNSSCMGGM	BRCA,GBM
TP53	c.713G>T	p.C238F	RHSVVVPYEPPEVGSDCTTIHYNYM[p.C238F]FNSSCMGGMNRRPILTIITLEDSSGN	YMFNSSCMG,TTIHYNYMF,NYMFNSSCM,YNYMFNSSC,YMFNSSCMGG,CTTIHYNYMF,YNYMFNSSCM,IHYNYMFNSS,MFNSSCMGGM	BRCA,GBM,HNSC
TP53	c.722C>A	p.S241Y	VVVPYEPPEVGSDCTTIHYNYMCNS[p.S241Y]YCMGGMNRRPILTIITLEDSSGNLLG	NYMCNSYCM,HYNYMCNSY,SYCMGGMNR,NSYCMGGMNR,IHYNYMCNSY,SYCMGGMNRR,YNYMCNSYCM,MCNSYCMGGM	UCS
TP53	c.722C>T	p.S241F	VVVPYEPPEVGSDCTTIHYNYMCNS[p.S241F]FCMGGMNRRPILTIITLEDSSGNLLG	HYNYMCNSF,NYMCNSFCM,SFCMGGMNR,YMCNSFCMG,NSFCMGGMNR,IHYNYMCNSF,SFCMGGMNRR,YNYMCNSFCM	OV
TP53	c.723delC	p.S241fs	VVPYEPPEVGSDCTTIHYNYMCNSS[p.S241fs]AWAA*	YMCNSSAWA,NYMCNSSAW,YNYMCNSSA,YMCNSSAWAA,HYNYMCNSSA,YNYMCNSSAW	BRCA
TP53	c.725G>T	p.C242F	VVPYEPPEVGSDCTTIHYNYMCNSS[p.C242F]FMGGMNRRPILTIITLEDSSGNLLGR	SSFMGGMNR,YNYMCNSSF,NYMCNSSFM,SFMGGMNRR,YMCNSSFMG,FMGGMNRRPI,SSFMGGMNRR,HYNYMCNSSF,NSSFMGGMNR,YNYMCNSSFM,YMCNSSFMGG,MCNSSFMGGM	CLL,HNSC,LUSC
TP53	c.730G>T	p.G244C	PYEPPEVGSDCTTIHYNYMCNSSCM[p.G244C]CGMNRRPILTIITLEDSSGNLLGRNS	YMCNSSCMC,SSCMCGMNR,CGMNRRPIL,SSCMCGMNRR,NSSCMCGMNR,MCNSSCMCGM,CMCGMNRRPI	OV
TP53	c.731G>A	p.G244D	PYEPPEVGSDCTTIHYNYMCNSSCM[p.G244D]DGMNRRPILTIITLEDSSGNLLGRNS	SSCMDGMNR,DGMNRRPIL,NSSCMDGMNR,CMDGMNRRPI	CRC
TP53	c.733G>A	p.G245S	YEPPEVGSDCTTIHYNYMCNSSCMG[p.G245S]SMNRRPILTIITLEDSSGNLLGRNSF	SSCMGSMNR,GSMNRRPIL,MGSMNRRPI,CNSSCMGSM,SMNRRPILTI,SSCMGSMNRR,NSSCMGSMNR,MGSMNRRPIL,MCNSSCMGSM,CMGSMNRRPI	CRC,GBM,HNSC,OV,PRAD
TP53	c.734G>A	p.G245D	YEPPEVGSDCTTIHYNYMCNSSCMG[p.G245D]DMNRRPILTIITLEDSSGNLLGRNSF	SSCMGDMNR,NSSCMGDMNR,CMGDMNRRPI	OV
TP53	c.734G>T	p.G245V	YEPPEVGSDCTTIHYNYMCNSSCMG[p.G245V]VMNRRPILTIITLEDSSGNLLGRNSF	SSCMGVMNR,GVMNRRPIL,SCMGVMNRR,MGVMNRRPI,CNSSCMGVM,YMCNSSCMGV,VMNRRPILTI,SSCMGVMNRR,NSSCMGVMNR,MGVMNRRPIL,MCNSSCMGVM,CMGVMNRRPI	HNSC,LUSC,OV

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
TP53	c.742C>T	p.R248W	PEVGSDCTTIHYNYMCNSSCMGGMN[p.R248W]WRPILTIITLEDSSGNLLGRNSFEVR	NWRPILTII,SSCMGGMNW,MGGMNWRPI,MNWRPILTI,CMGGMNWRPI,GMNWRPILTI,SSCMGGMNWR,MNWRPILTII,NSSCMGGMNW	BLCA,BRCA,CLL,CRC,GBM,HNSC,OV,PAAD,UCEC
TP53	c.743G>A	p.R248Q	PEVGSDCTTIHYNYMCNSSCMGGMN[p.R248Q]QRPILTIITLEDSSGNLLGRNSFEVR	MNQRPILTI,NQRPILTII,CMGGMNQRPI,GMNQRPILTI,SSCMGGMNQR,NQRPILTIIT	BLCA,BRCA,CLL,GBM,HNSC,OV,PRAD,STAD,UCEC,UCS
TP53	c.743G>C	p.R248P	PEVGSDCTTIHYNYMCNSSCMGGMN[p.R248P]PRPILTIITLEDSSGNLLGRNSFEVR	SCMGGMNPR,NPRPILTII,GMNPRPILTI,CMGGMNPRPI,SSCMGGMNPR,NPRPILTIIT	LUAD
TP53	c.745A>G	p.R249G	EVGSDCTTIHYNYMCNSSCMGGMNR[p.R249G]GPILTIITLEDSSGNLLGRNSFEVRV	GPILTIITL,MNRGPILTI,GMNRGPILTI,CMGGMNRGPI,MNRGPILTII	LUAD
TP53	c.746G>T	p.R249M	EVGSDCTTIHYNYMCNSSCMGGMNR[p.R249M]MPILTIITLEDSSGNLLGRNSFEVRV	MNRMPILTI,MPILTIITL,MGGMNRMPI,SCMGGMNRM,NRMPILTII,CMGGMNRMPI,GMNRMPILTI,RMPILTIITL,MNRMPILTII,SSCMGGMNRM,MPILTIITLE	LUAD
TP53	c.747G>T	p.R249S	EVGSDCTTIHYNYMCNSSCMGGMNR[p.R249S]SPILTIITLEDSSGNLLGRNSFEVRV	MNRSPILTI,SPILTIITL,MGGMNRSPI,GMNRSPILTI,CMGGMNRSPI,RSPILTIITL,MNRSPILTII	HNSC,LIHC,LUAD
TP53	c.749C>T	p.P250L	VGSDCTTIHYNYMCNSSCMGGMNRR[p.P250L]LILTIITLEDSSGNLLGRNSFEVRVC	RLILTIITL,GMNRRLILT,MNRRLILTI,GGMNRRLIL,GMNRRLILTI,MNRRLILTII,RRLILTIITL	OV
TP53	c.763A>T	p.I255F	TTIHYNYMCNSSCMGGMNRRPILTI[p.I255F]FTLEDSSGNLLGRNSFEVRVCACPGR	RPILTIFTL,NRRPILTIF,FTLEDSSGNL,MNRRPILTIF,RRPILTIFTL	LUAD
TP53	c.775G>T	p.D259Y	YNYMCNSSCMGGMNRRPILTIITLE[p.D259Y]YSSGNLLGRNSFEVRVCACPGRDRRT	ILTIITLEY,LEYSSGNLL,PILTIITLEY,EYSSGNLLGR,LEYSSGNLLG	OV
TP53	c.785G>T	p.G262V	MCNSSCMGGMNRRPILTIITLEDSS[p.G262V]VNLLGRNSFEVRVCACPGRDRRTEEE	IITLEDSSV,DSSVNLLGR,LEDSSVNLL,VNLLGRNSF,TIITLEDSSV,TLEDSSVNLL,SVNLLGRNSF	HNSC
TP53	c.796G>A	p.G266R	SCMGGMNRRPILTIITLEDSSGNLL[p.G266R]RRNSFEVRVCACPGRDRRTEEENLRK	LLRRNSFEV,DSSGNLLRR,GNLLRRNSF,NLLRRNSFEV,LLRRNSFEVR,SGNLLRRNSF	OV
TP53	c.797G>A	p.G266E	SCMGGMNRRPILTIITLEDSSGNLL[p.G266E]ERNSFEVRVCACPGRDRRTEEENLRK	LLERNSFEV,DSSGNLLER,GNLLERNSF,NLLERNSFEV,SGNLLERNSF,LERNSFEVRV	BRCA,HNSC
TP53	c.797G>T	p.G266V	SCMGGMNRRPILTIITLEDSSGNLL[p.G266V]VRNSFEVRVCACPGRDRRTEEENLRK	LLVRNSFEV,LVRNSFEVR,GNLLVRNSF,NLLVRNSFEV,LVRNSFEVRV,SGNLLVRNSF,LEDSSGNLLV	OV
TP53	c.800G>C	p.R267P	CMGGMNRRPILTIITLEDSSGNLLG[p.R267P]PNSFEVRVCACPGRDRRTEEENLRKK	LLGPNSFEV,GNLLGPNSF,NLLGPNSFEV,SGNLLGPNSF	LUSC
TP53	c.811G>A	p.E271K	MNRRPILTIITLEDSSGNLLGRNSF[p.E271K]KVRVCACPGRDRRTEEENLRKKGEPH	LLGRNSFKV,NLLGRNSFK,LGRNSFKVR,KVRVCACPG,NSFKVRVCA,SFKVRVCAC,NLLGRNSFKV,GNLLGRNSFK,KVRVCACPGR	BLCA,LUSC
TP53	c.814G>A	p.V272M	NRRPILTIITLEDSSGNLLGRNSFE[p.V272M]MRVCACPGRDRRTEEENLRKKGEPHH	LLGRNSFEM,LGRNSFEMR,NSFEMRVCA,FEMRVCACP,NLLGRNSFEM,EMRVCACPGR,FEMRVCACPG	BRCA,OV
TP53	c.817C>T	p.R273C	RRPILTIITLEDSSGNLLGRNSFEV[p.R273C]CVCACPGRDRRTEEENLRKKGEPHHE	NSFEVCVCA,EVCVCACPGR,FEVCVCACPG	BLCA,BRCA,CRC,HNSC,OV,STAD,UCEC

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
TP53	c.818G>A	p.R273H	RRPILTIITLEDSSGNLLGRNSFEV[p.R273H]HVCACPGRDRRTEEENLRKKGEPHHE	NSFEVHVCA,LGRNSFEVH,EVHVCACPGR,HVCACPGRDR,FEVHVCACPG	BRCA,CLL,CRC,GBM,HNSC,LUAD,OV,STAD,UCEC,UCS
TP53	c.818G>T	p.R273L	RRPILTIITLEDSSGNLLGRNSFEV[p.R273L]LVCACPGRDRRTEEENLRKKGEPHHE	NSFEVLVCA,LGRNSFEVL,LLGRNSFEVL,EVLVCACPGR,FEVLVCACPG	LUAD,LUSC,OV
TP53	c.820G>T	p.V274F	RPILTIITLEDSSGNLLGRNSFEVR[p.V274F]FCACPGRDRRTEEENLRKKGEPHHEL	NSFEVRFCA,GRNSFEVRF,EVRFCACPGR,LGRNSFEVRF,FEVRFCACPG	LUAD
TP53	c.824G>A	p.C275Y	PILTIITLEDSSGNLLGRNSFEVRV[p.C275Y]YACPGRDRRTEEENLRKKGEPHHELP	RNSFEVRVY,YACPGRDRR,NSFEVRVYA,RVYACPGRDR,EVRVYACPGR,GRNSFEVRVY,FEVRVYACPG	OV
TP53	c.824G>T	p.C275F	PILTIITLEDSSGNLLGRNSFEVRV[p.C275F]FACPGRDRRTEEENLRKKGEPHHELP	FACPGRDRR,NSFEVRVFA,RNSFEVRVF,FEVRVFACP,RVFACPGRDR,EVRVFACPGR,VFACPGRDRR,GRNSFEVRVF,FEVRVFACPG	HNSC,LUAD
TP53	c.830G>T	p.C277F	LTIITLEDSSGNLLGRNSFEVRVCA[p.C277F]FPGRDRRTEEENLRKKGEPHHELPPG	CAFPGRDRR,SFEVRVCAF,EVRVCAFPGR,NSFEVRVCAF,FEVRVCAFPG	LUAD
TP53	c.832C>T	p.P278S	TIITLEDSSGNLLGRNSFEVRVCAC[p.P278S]SGRDRRTEEENLRKKGEPHHELPPGS	CACSGRDRR,FEVRVCACS,EVRVCACSGR,FEVRVCACSG	HNSC
TP53	c.841G>A	p.D281N	TLEDSSGNLLGRNSFEVRVCACPGR[p.D281N]NRRTEEENLRKKGEPHHELPPGSTKR	CACPGRNRR,RVCACPGRNR	LUAD
TP53	c.844C>T	p.R282W	LEDSSGNLLGRNSFEVRVCACPGRD[p.R282W]WRTEEENLRKKGEPHHELPPGSTKRA	CACPGRDWR,RDWRTEEENL	BRCA,CRC,GBM,HNSC,OV,STAD
TP53	c.853G>A	p.E285K	SSGNLLGRNSFEVRVCACPGRDRRT[p.E285K]KEENLRKKGEPHHELPPGSTKRALPN	RTKEENLRK,RTKEENLRKK	BLCA,CESC,HNSC,LUAD
TP53	c.856G>A	p.E286K	SGNLLGRNSFEVRVCACPGRDRRTE[p.E286K]KENLRKKGEPHHELPPGSTKRALPNN	RTEKENLRK,RTEKENLRKK	BRCA,STAD
TP53	c.945_946delTC	p.S315fs	KGEPHHELPPGSTKRALPNNTSSSP[p.S315fs]AKEETTGWRIFHPSDPWA*	KEETTGWRI,RIFHPSDPW,EETTGWRIF,RIFHPSDPWA,LPNNTSSSPA,KEETTGWRIF,WRIFHPSDPW,EETTGWRIFH,SPAKEETTGW	OV
TP53RK	c.520delC	p.L174fs	VLARMHDEDLIHGDLTTSNMLLKPP[p.L174fs]WNS*	SNMLLKPPW	STAD
TPO	c.1193G>C	p.S398T	AACAPEPGIPGETRGPCFLAGDGRA[p.S398T]TEVPSLTALHTLWLREHNRLAAALKA	FLAGDGRAT,GRATEVPSL,TEVPSLTAL,TEVPSLTALH	ACC
TPO	c.1672G>A	p.E558K	GGLDPLIRGLLARPAKLQVQDQLMN[p.E558K]KELTERLFVLSNSSTLDLASINLQRG	QVQDQLMNK,KELTERLFV,LMNKELTERL,QLMNKELTER,VQDQLMNKEL,MNKELTERLF,KELTERLFVL	LUAD
TPO	c.2476G>A	p.A826T	ADGAHPPCHASARCRNTKGGFQCLC[p.A826T]TDPYELGDDGRTCVDSGRLPRVTWIS	CLCTDPYEL,FQCLCTDPY,GFQCLCTDPY	CRC
TPPP	c.89G>A	p.R30K	AKPAKAANRTPPKSPGDPSKDRAAK[p.R30K]KLSLESEGAGEGAAASPELSALEEAF	KLSLESEGA,PSKDRAAKK,DRAAKKLSL	KIRP
TPR	c.6464C>T	p.S2155L	EDRTVPSTPTLVVPHRTDGFAEAIH[p.S2155L]LPQVAGVPRFRFGPPEDMPQTSSSHS	AEAIHLPQV,FAEAIHLPQV,AIHLPQVAGV,HLPQVAGVPR,LPQVAGVPRF,AEAIHLPQVA	CRC
TPRX1	c.598T>C	p.S200P	NPGPIPGPNPGPIPGPISGPIPGPI[p.S200P]PVPIPGPIPGPISGPISGPNPGPIPG	GPIPGPIPV,IPGPIPVPI,IPVPIPGPI	TGCT

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
TPTE	c.1268C>T	p.S423L	AQVKHLYNWNLPPRRILFIKHFIIY[p.S423L]LIPRYVRDLKIQIEMEKKVVFSTISL	FIKHFIIYL,IIYLIPRYV,FIIYLIPRY,HFIIYLIPR,IYLIPRYVR,IKHFIIYLI,FIKHFIIYLI,FIIYLIPRYV,YLIPRYVRDL,IIYLIPRYVR,LIPRYVRDLK,LFIKHFIIYL,KHFIIYLIPR,HFIIYLIPRY	CRC,UCEC
TPTE	c.1623G>A	p.M541I	DNLHKQKARRIYPSDFAVEILFGEK[p.M541I]ITSSDVVAGSD*	VEILFGEKI,GEKITSSDV,GEKITSSDVV,VEILFGEKIT	LUSC
TPTE2	c.773G>A	p.R258Q	FPSSGRQSFYRNPIEEVVRFLDKKH[p.R258Q]QNHYRVYNLCSERAYDPKHFHNRVSR	KHQNHYRVY,QNHYRVYNL,KKHQNHYRV,FLDKKHQNHY,HQNHYRVYNL,KKHQNHYRVY	CRC
TRAF3	c.26C>T	p.S9F	MESSKKMD[p.S9F]FPGALQTNPPLKLHTDRSAGTPVFVP	MESSKKMDF,KKMDFPGAL,SSKKMDFPGA,SKKMDFPGAL	CESC
TRAF7	c.32G>A	p.R11H	MSSGKSARYN[p.R11H]HFSGGPSNLPTPDVTTGTRMETTFGP	KSARYNHFS,SARYNHFSG,GKSARYNHF,KSARYNHFSG,SARYNHFSGG,SGKSARYNHF,NHFSGGPSNL	DLBCL
TRAK1	c.1879G>A	p.D627N	DPRPGVVTKGFRTLDVDLDEVYCLN[p.D627N]NFEEDDTGDHISLPRLATSTPVQHPE	DEVYCLNNF	CRC
TRAM1	c.121G>C	p.E41Q	HEFVLQNHADIVSCVAMVFLLGLMF[p.E41Q]QITAKASIIFVTLQYNVTLPATEEQA	FLLGLMFQI,LMFQITAKA,FQITAKASI,GLMFQITAK,FLLGLMFQIT,GLMFQITAKA,FQITAKASII,LGLMFQITAK,VFLLGLMFQI,MFQITAKASI,LMFQITAKAS,QITAKASIIF	BLCA
TRAM1L1	c.1033delA	p.R345fs	LQRWVEDSNIQASCMKKKRSRSSKK[p.R345fs]EQKTEWEWKLQIE*	SKKEQKTEW,TEWEWKLQI,KEQKTEWEW,RSRSSKKEQK	STAD
TRANK1	c.2536G>A	p.E846K	YNISRRLSKLRVLPWSIHELYGDEI[p.E846K]KDFTQAELALLMKCINDPNSMFLTGD	LYGDEIKDF,IKDFTQAEL,DEIKDFTQA,EIKDFTQAEL,KDFTQAELAL,DEIKDFTQAE	UCEC
TRAPPC10	c.399_400insA	p.K133fs	WQNVLKAHSSVDWLIVIVENDAKKK[p.K133fs]KQNQHPSPNLYCGQNKK*	NLYCGQNKK,NQHPSPNLY,KQNQHPSPN,KQNQHPSPNL,QNQHPSPNLY	GBM
TRAPPC11	c.1703G>A	p.R568Q	MNESPDPEPDCDILAVKTAQKLWAD[p.R568Q]QISLAGSNIFTIGVQDFVPFVQCKAK	KLWADQISL,AQKLWADQI,KLWADQISLA,QISLAGSNIF,QKLWADQISL,DQISLAGSNI	CRC
TRDN	c.2190A>C	p.*730Y	PFTPADRPGESSGQANSPGQKQQGQ[p.*730Y]YTHMYDPYKCFKILKM*	YTHMYDPYK,MYDPYKCFK,QQGQYTHMY,KQQGQYTHM,HMYDPYKCF,QKQQGQYTH,GQYTHMYDP,YKCFKILKM,DPYKCFKIL,HMYDPYKCFK,MYDPYKCFKI,KQQGQYTHMY,GQYTHMYDPY,GQKQQGQYTH,QKQQGQYTHM,THMYDPYKCF,SPGQKQQGQY	KIRC
TRIM23	c.1187G>A	p.R396Q	QQQFTEVADHIQLDASIPVTFTKDN[p.R396Q]QVHIGPKMEIRVVTLGLDGAGKTTIL	FTKDNQVHI,NQVHIGPKM,KDNQVHIGPK	CRC
TRIM23	c.866G>A	p.R289Q	IVEDGIGMAHTEHVPGTAENARSCI[p.R289Q]QAYFYDLHETLCRQEEMALSVVDAHV	RSCIQAYFY,CIQAYFYDL,NARSCIQAY,ARSCIQAYF,IQAYFYDLH,ARSCIQAYFY,ENARSCIQAY,NARSCIQAYF,AENARSCIQA	CRC
TRIM4	c.1193G>T	p.R398L	NVFTSGKHYWEVESRDSLEVAVGVC[p.R398L]LEDVMGITDRSKMSPDVGIWAIYWSA	LEVAVGVCL	LUAD
TRIM42	c.379C>A	p.Q127K	TFHKGRLRSIHTSSKTALRTGSSDT[p.Q127K]KVDEVKSIPANSHLVNHLNCPMCSRL	ALRTGSSDTK	LUAD
TRIM48	c.278C>A	p.A93D	CFECIKTIQQRNLKTNIRLKKMASL[p.A93D]DRKASLWLFLSSEEQMCGIHRETKKM	RLKKMASLD,KMASLDRKA,RLKKMASLDR,MASLDRKASL,KKMASLDRKA,ASLDRKASLW,LDRKASLWLF	LUAD
TRIM61	c.294G>C	p.K98N	SLTEIAKQLQIRSKKRKRQEEKHVC[p.K98N]NKHNQVLTFFCQKDLELLCPRCSLST	NKHNQVLTF,RQEEKHVCNK,CNKHNQVLTF,NKHNQVLTFF	CESC
TRIM7	c.994C>A	p.L332I	MKNKVWNVSLKTFVLKGMLKKFKED[p.L332I]IRGELEKEEKVELTLDPDTANPRLIL	MLKKFKEDI,KFKEDIRGEL,MLKKFKEDIR	LUSC
TRIM9	c.1009C>A	p.R337S	FEACLVAQCDALIDALNRRKAQLLA[p.R337S]SVNKEHEHKLKVVRDQISHCTVKLRQ	AQLLASVNK,SVNKEHEHK,RKAQLLASV,KAQLLASVNK,ASVNKEHEHK,RRKAQLLASV	LUAD
TRIML1	c.1197C>A	p.H399Q	DLFSLIGLKIGDDYSLWVSSPLKGQ[p.H399Q]QVREPVCKVGVFLDYESGHIAFYNGT	LKGQQVREPV	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	胜	實例性疾病
TRIO	c.1981C>T	p.R661W	QTGECDPEEIYQAAHQLEDRIQDFV[p.R661W]WRVEQRKILLDMSVSFHTHVKELWTW	RIQDFVWRV,FVWRVEQRK,DFVWRVEQR,WRVEQRKIL,DFVWRVEQRK,WRVEQRKILL	CRC
TRIOBP	c.3899A>G	p.H1300R	DLPPPRRLAQRQPGPQAQCSSGGRT[p.H1300R]RSPGRAEVERLFGQERRKSEAAGAFQ	GGRTRSPGR,RTRSPGRAE,GGRTRSPGRA,RTRSPGRAEV	ACC
TRIP11	c.1622delA	p.K541fs	DQLSKQQNEGDSIISKLKQDLNDEK[p.K541fs]REFINLKMIKWTLLKS*	KMIKWTLLK,EFINLKMIK,NLKMIKWTL,LKMIKWTLL,KREFINLKM,REFINLKMI,DEKREFINL,NLKMIKWTLL,EKREFINLKM,KMIKWTLLKS	STAD
TRIP12	c.5324T>C	p.L1775P	KLMAKAIMDFRLVDLPLGLPFYKWM[p.L1775P]PRQETSLTSHDLFDIDPVVARSVYHL	WMPRQETSL,KWMPRQETS,LPFYKWMPR,MPRQETSLT,YKWMPRQET,KWMPRQETSL,GLPFYKWMPR,MPRQETSLTS,YKWMPRQETS	MM
TRMT61A	c.731G>T	p.S244I	ALAARGFSELSTLEVLPQVYNVRTV[p.S244I]ILPPPDLGTGTDGPAGSDTSPFRSGT	VYNVRTVIL,QVYNVRTVI,PQVYNVRTVI,QVYNVRTVIL	TGCT
TRPA1	c.162G>T	p.K54N	TEDFKESLKVVFEGSAYGLQNFNKQ[p.K54N]NKLKRCDDMDTFFLHYAAAEGQIELM	NFNKQNKLKR,LQNFNKQNKL	CRC
TRPA1	c.2017delA	p.T673fs	DKSCRDYYIEYNFKYLQCPLEFTKK[p.T673fs]HLHRMLYMNRLQPSTQWYKITA*	YMNRLQPST,RLQPSTQWY,LQPSTQWYK,LHRMLYMNR,STQWYKITA,KKHLHRMLY,EFTKKHLHR,FTKKHLHRM,LEFTKKHLH,KHLHRMLYM,HRMLYMNRL,QPSTQWYKI,MLYMNRLQPS,HLHRMLYMNR,RLQPSTQWYK,LQPSTQWYKI,KKHLHRMLYM,FTKKHLHRML,TKKHLHRMLY,RMLYMNRLQP,YMNRLQPSTQ,MNRLQPSTQW,CPLEFTKKHL	STAD
TRPC5	c.1469C>T	p.S490L	PREEWEMWHPTLIAEALFAISNILS[p.S490L]LLRLISLFTANSHLGPLQISLGRMLL	FAISNILSL,AISNILSLL,ISNILSLLR,SLLRLISLF,LSLLRLISL,FAISNILSLL,ILSLLRLISL,LLRLISLFTA,AISNILSLLR,LFAISNILSL,LSLLRLISLF,ISNILSLLRL	CRC,UCEC
TRPM3	c.1285C>T	p.R429W	TRTQAQHLFIILMECMKKKELITVF[p.R429W]WMGSEGHQDIDLAILTALLKGANASA	KELITVFWM,WMGSEGHQDI,KKKELITVFW,KKELITVFWM,KELITVFWMG	UCEC
TRPM3	c.892G>T	p.G298W	QTMSNPMSKLTVLNSMHSHFILADN[p.G298W]WTTGKYGAEVKLRRQLEKHISLQKIN	FILADNWTT,LADNWTTGK,ADNWTTGKY,SHFILADNW,LADNWTTGKY,ILADNWTTGK,WTTGKYGAEV,HSHFILADNW	LUAD
TRPM6	c.2984G>A	p.R995H	IAKMTANMFYIVIIMAIVLLSFGVA[p.R995H]HKAILSPKEPPSWSLARDIVFEPYWM	LLSFGVAHK,SFGVAHKAI,AHKAILSPK,LSFGVAHKA,VLLSFGVAH,LLSFGVAHKA,VLLSFGVAHK,VAHKAILSPK,LSFGVAHKAI	CRC
TRPM7	c.2528G>A	p.R843Q	VRILDSNEGKNEMEIQMKSKKLPIT[p.R843Q]QKFYAFYHAPIVKFWFNTLAYLGFLM	ITQKFYAFY,KSKKLPITQ,KLPITQKFY,KKLPITQKF,TQKFYAFYH,QKFYAFYHA,LPITQKFYA,KLPITQKFYA,KSKKLPITQK,ITQKFYAFYH,TQKFYAFYHA,KKLPITQKFY,PITQKFYAFY,LPITQKFYAF,SKKLPITQKF,QKFYAFYHAP	CRC
TRPM7	c.5584C>T	p.R1862C	PQDEPSDLNLQPGNSTKESESTNSV[p.R1862C]CLML*	SESTNSVCL,KESESTNSVC,SESTNSVCLM	CRC
TRPM8	c.2295_2296insC	p.H765fs	VFYIAFLLLFAYVLLMDFHSVPHPP[p.H765fs]RAGPVLAGLCPLL*	VLAGLCPLL,HSVPHPPRA,HPPRAGPVL,RAGPVLAGL,DFHSVPHPPR,VPHPPRAGPV,GPVLAGLCPL	STAD
TRPS1	c.3373C>T	p.R1125W	IEKYQYPLFGLPFVHNDFQSEADWL[p.R1125W]WFWSKYKLSVPGNPHYLSHVPGLPNP	WLWFWSKYK,FQSEADWLW,SEADWLWFW,LWFWSKYKL,WLWFWSKYKL,EADWLWFWSK,DFQSEADWLW,FQSEADWLWF,WFWSKYKLSV,DWLWFWSKYK,ADWLWFWSKY,SEADWLWFWS	CRC
TRPV2	c.1865_1867delTGC	p.L627del	KFTIGMGELAFQEQLHFRGMVLLLL[p.L627del]AYVLLTYILLLNMLIALMSETVNSVATD	MVLLLLAYV,VLLLLAYVL,RGMVLLLLA,GMVLLLLAY,GMVLLLAYV,MVLLLLAYVL,VLLLLAYVLL,RGMVLLLLAY	CLL
TRPV3	c.653C>A	p.A218E	FAEENDILGRFINAEYTEEAYEGQT[p.A218E]ELNIAIERRQGDIAALLIAAGADVNA	GQTELNIAI,ELNIAIERR,EAYEGQTEL,YEGQTELNI,AYEGQTELNI,QTELNIAIER,EEAYEGQTEL,YEGQTELNIA	KIRP
TRPV5	c.1475G>A	p.R492H	YFTRGFQMLGPFTIMIQKMIFGDLM[p.R492H]HFCWLMAVVILGFASAFYIIFQTEDP	LMHFCWLMA,MHFCWLMAV,KMIFGDLMH,MIFGDLMHF,DLMHFCWLM,GDLMHFCWL,MIFGDLMHFC,LMHFCWLMAV,KMIFGDLMHF,IFGDLMHFCW,HFCWLMAVV,MHFCWLMAVV,GDLMHFCWLM	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
TRRAP	c.10543C>T	p.R3515W	THYYIKIARFMPRVEIVQKHNTAAR[p.R3515W]WLYIRGHNGKIYPYLVMNDACLTESR	TAARWLYIR,AARWLYIRG,HNTAARWLY,NTAARWLYI,QKHNTAARW,KHNTAARWL,WLYIRGHNGK,NTAARWLYIR,AARWLYIRGH,RWLYIRGHNG,KHNTAARWLY,VQKHNTAARW,QKHNTAARWL	CRC
TRRAP	c.2917G>T	p.A973S	DCLKSANTEPYYRRQAWEVIKCFLV[p.A973S]SMMSLEDNKHALYQLLAHPNFTEKTI	SMMSLEDNK,CFLVSMMSL,VIKCFLVSM,IKCFLVSMM,VSMMSLEDNK,EVIKCFLVSM,KCFLVSMMSL,SMMSLEDNKH,WEVIKCFLVS	KICH
TSC1	c.1132G>T	p.G378C	CGMTTPPTSPGNVPPDLSHPYSKVF[p.G378C]CTTAGGKGTPLGTPATSPPPAPLCHS	KVFCTTAGG,YSKVFCTTA,SKVFCTTAG,KVFCTTAGGK,HPYSKVFCTT	LUAD
TSC22D2	c.1255G>A	p.A419T	AQPSSTGAAASPATAATLPVGTGQN[p.A419T]TSSVGAQLMGASSQPSEAMAPRTGPA	NTSSVGAQL,GQNTSSVGA,NTSSVGAQLM	ACC
TSG101	c.794A>G	p.K265R	WRMKEEMDRAQAELNALKRTEEDLK[p.K265R]RGHQKLEEMVTRLDQEVAEVDKNIEL	DLKRGHQKL,RGHQKLEEM	THCA
TSG101	c.826C>A	p.R276S	AELNALKRTEEDLKKGHQKLEEMVT[p.R276S]SLDQEVAEVDKNIELLKKKDEELSSA	KLEEMVTSL,SLDQEVAEV,MVTSLDQEV,EMVTSLDQEV,TSLDQEVAEV,QKLEEMVTSL	LUAD
TSHZ1	c.1503G>C	p.K501N	EDSLEKFEPSTLYPYLREEDLDDSP[p.K501N]NGGLDILKSLENTVSTAISKAQNGAP	SPNGGLDIL	LUAD
TSHZ1	c.2642G>T	p.R881M	QAQFASSLRETTEGKYIMSDLGPQE[p.R881M]MVHISKFTGLSMTTISHWLANVKYQL	MSDLGPQEM,QEMVHISKF,MSDLGPQEMV,IMSDLGPQEM,MVHISKFTGL,PQEMVHISKF,QEMVHISKFT	CRC
TSHZ2	c.664G>A	p.A222T	LYRQSSKMCGTVFTGASRFRCRQCS[p.A222T]TAYDTLVELTVHMNETGHYQDDNRKK	RFRCRQCST,RCRQCSTAY,CSTAYDTLV,TAYDTLVEL,RQCSTAYDT,STAYDTLVEL,RFRCRQCSTA,FRCRQCSTAY,RQCSTAYDTL	GBM
TSHZ3	c.2030G>T	p.G677V	EPIKMEASSDGGFRSQENSPSPPRD[p.G677V]VCKDGSPLAEPVENGKELVKPLASSL	RDVCKDGSPL	LUAD
TSKS	c.1537G>A	p.E513K	CPSCQRLHKKILELERQALAKHVRA[p.E513K]KALSSTLRLAQDEALRAKNLLLTDKM	ALAKHVRAK,LAKHVRAKA,HVRAKALSS,RAKALSSTL,KALSSTLRL,AKHVRAKAL,ALAKHVRAKA,QALAKHVRAK,HVRAKALSST,RAKALSSTLR,KALSSTLRLA,LAKHVRAKAL,VRAKALSSTL,AKALSSTLRL	BLCA
TSPAN4	c.274C>G	p.L92V	IGFVGCLGAIKENKCLLLTFFLLLL[p.L92V]VVFLLEATIAILFFAYTDKIDRYAQQ	LTFFLLLLV,FLLLLVVFL,LLLLVVFLL,LLVVFLLEA,FFLLLLVVF,LLTFFLLLLV,LTFFLLLLVV,FLLLLVVFLL,LLLVVFLLEA,TFFLLLLVVF,FFLLLLVVFL	PRAD,TGCT
TSSK1B	c.901G>A	p.E301K	ARGSPSVAINKEGESSRGTEPLWTP[p.E301K]KPGSDKKSATKLEPEGEAQPQAQPET	GTEPLWTPK,RGTEPLWTPK	UCEC
TTBK2	c.249T>G	p.C83W	KQVLKMEVAVLKKLQGKDHVCRFIG[p.C83W]WGRNDRFNYVVMQLQGRNLADLRRSQ	WGRNDRFNY,VCRFIGWGR,FIGWGRNDR,IGWGRNDRF,HVCRFIGWGR,GWGRNDRFNY,RFIGWGRNDR,FIGWGRNDRF	KIRP
TTC21A	c.809C>A	p.S270Y	ESNIDACQILTVHELAREGNMTTVS[p.S270Y]YLKTQKATNHVRNLIKALETREPENP	NMTTVSYLK,TVSYLKTQK,EGNMTTVSY,GNMTTVSYL,GNMTTVSYLK,TTVSYLKTQK,REGNMTTVSY	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
TTF1	c.1007delA	p.K336fs	RPAVGLHGETAGIPAPAYKNKSKKK[p.K336fs]RKSPITRNLRQWPCLRASRVHTLKDHRWAVRLGLWKAVQLLKGSRNPTVQRRSLRKGSLRLSKGHECLVMIFQCPVRTLRAHSLIQ*	TLKDHRWAV,GLWKAVQLL,LVMIFQCPV,SLRKGSLRL,RLSKGHECL,RASRVHTLK,TVQRRSLRK,WAVRLGLWK,LWKAVQLLK,RSLRKGSLR,RWAVRLGLW,IFQCPVRTL,RTLRAHSLI,KNKSKKKRK,KKRKSPITR,KSPITRNLR,RNLRQWPCL,CLRASRVHT,RVHTLKDHR,HTLKDHRWA,AVRLGLWKA,GSRNPTVQR,NLRQWPCLR,QWPCLRASR,PTVQRRSLR,VMIFQCPVR,FQCPVRTLR,WPCLRASRV,NPTVQRRSL,SKKKRKSPI,LRASRVHTL,RKSPITRNL,RQWPCLRAS,HRWAVRLGL,SKGHECLVM,GHECLVMIF,VRTLRAHSL,CPVRTLRAH,KDHRWAVRL,RLSKGHECLV,CLVMIFQCPV,MIFQCPVRTL,CLRASRVHTL,LLKGSRNPTV,GLWKAVQLLK,RWAVRLGLWK,LVMIFQCPVR,KSKKKRKSPI,KKKRKSPITR,KRKSPITRNL,ITRNLRQWPC,RNLRQWPCLR,RQWPCLRASR,HTLKDHRWAV,TLKDHRWAVR,AVRLGLWKAV,GSRNPTVQRR,RSLRKGSLRL,SLRKGSLRLS,RTLRAHSLIQ,IFQCPVRTLR,LSKGHECLVM,RVHTLKDHRW,HRWAVRLGLW,LRLSKGHECL,KGHECLVMIF,FQCPVRTLRA,SPITRNLRQW	STAD
TTF1	c.1589A>G	p.Q530R	IKDRATSTIKRMYRDDLERFKEFKA[p.Q530R]RGVAIKFGKFSVKENKQLEKNVEDFL	RGVAIKFGK,RFKEFKARG,KARGVAIKF,EFKARGVAI,KEFKARGVA,RFKEFKARGV,EFKARGVAIK,KARGVAIKFG,KEFKARGVAI,FKARGVAIKF,RGVAIKFGKF	TGCT
TTF2	c.2281C>A	p.R761S	LDEAHNVKNPRVQTSIAVCKLQACA[p.R761S]SWAVTGTPIQNNLLDMYSLLKFLRCS	KLQACASWA,LQACASWAV,CKLQACASW,SWAVTGTPI,KLQACASWAV,LQACASWAVT,ASWAVTGTPI	LUAD
TTi1	c.2120G>A	p.R707H	CGYDSLQHLINQNSDYLVNGISLNL[p.R707H]HHLALHPHTPKVLEVMLRNSDANLLP	SLNLHHLAL,GISLNLHHL,LHHLALHPH,GISLNLHHLA,ISLNLHHLAL	STAD
TTLL11	c.367_368insAGGCCA	p.122_123insKA	SELAARWEAEAVAAAKAAAKAEAEA[p.122_123insKA]KATAETVAEQVRVDAGAAGEPECKAGEEQPK	AAKAEAEAK,EAKATAETV,AEAEAKATA,AKATAETVA,AEAKATAET,AAAKAEAEAK,AEAKATAETV	ACC
TTLL7	c.2252G>A	p.R751H	LIKLDSVKQRKVLDIVKTSIRTVLP[p.R751H]HIWKVPDVEEVNLYRIFNRVFNRLLW	TVLPHIWKV,SIRTVLPHI,RTVLPHIWK,TSIRTVLPH,KTSIRTVLPH,RTVLPHIWKV,TSIRTVLPHI,SIRTVLPHIW,LPHIWKVPDV	UCEC
TUBA1C	c.436C>T	p.L146F	EDGVVGLNYSCGNLGRRVNGELQLG[p.L146F]FLAIIN*	LQLGFLAII,ELQLGFLAI,VNGELQLGF,GELQLGFLA,RVNGELQLGF,GELQLGFLAI	ACC,TGCT
TUBA3C	c.526_527insC	p.Q176fs	SLLMERLSVDYGKKSKLEFAIYPAP[p.Q176fs]PGLHGRGGALQLHPDHPHDPGTF*	AIYPAPPGL,GLHGRGGAL,HGRGGALQL,LQLHPDHPH,FAIYPAPPGL,AIYPAPPGLH,LEFAIYPAPP,LHGRGGALQL	LUAD
TUBA3D	c.728G>A	p.R243Q	DIERPTYTNLNRLIGQIVSSITASL[p.R243Q]QFDGALNVDLTEFQTNLVPYPRIHFP	LQFDGALNV,SSITASLQF,ASLQFDGAL,SLQFDGALNV,ITASLQFDGA,VSSITASLQF,LQFDGALNVD	CRC
TUBBP5	c.304G>A	p.V102M	TYHGDSHLQLERINVHHHEASGGRY[p.V102M]MPRAVLVDLEPGTMDSVRSGPFGQVL	ASGGRYMPR,RYMPRAVLV,GGRYMPRAV,MPRAVLVDL,HEASGGRYM,GRYMPRAVL,YMPRAVLVDL,EASGGRYMPR,HHEASGGRYM	GBM
TUBBP5	c.356G>A	p.R119H	HEASGGRYVPRAVLVDLEPGTMDSV[p.R119H]HSGPFGQVLRPDNFIFGELRARTGVR	MDSVHSGPF,HSGPFGQVL,SVHSGPFGQV,HSGPFGQVLR,TMDSVHSGPF,VHSGPFGQVL	UCS
TUBD1	c.599C>T	p.A200V	YGTGEVIVQNYNSILTLSHLYRSSD[p.A200V]VLLLHENDAIHKICAKLMNIKQISFS	HLYRSSDVL,RSSDVLLLH,LYRSSDVLL,YRSSDVLLL,HLYRSSDVLL,VLLLHENDAI,LYRSSDVLLL,SHLYRSSDVL	BRCA
TUFT1	c.1018G>A	p.A340T	KSQQRKVRQMIEQLQNSKAVIQSKD[p.A340T]TTIQELKEKIAYLEAENLEMHDRMEH	TTIQELKEK,SKDTTIQEL,AVIQSKDTTI	CRC
TUFT1	c.303G>C	p.L101F	HSAGHSLASELVESHDGHEEIIKVY[p.L101F]FKGRSGDKMIHEKNINQLKSEVQYIQ	IIKVYFKGR,KVYFKGRSG,YFKGRSGDK,FKGRSGDKM,HEEIIKVYF,VYFKGRSGDK,EIIKVYFKGR	CESC
TWISTNB	c.918T>A	p.H306Q	KKKHQEVQDQDPVFQGSDSSGYQSD[p.H306Q]QKKKKKKRKHSEEAEFTPPLKCSPKR	SSGYQSDQK	CLL
TXNDC15	c.1028G>A	p.R343Q	LIKSVDWLLVFSLFFLISFIMYATI[p.R343Q]QTESIRWLIPGQEQEHVE*	FIMYATIQT,IQTESIRWL,QTESIRWLI,YATIQTESI,IMYATIQTE,IQTESIRWLI,IMYATIQTES,MYATIQTESI	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
TXNL1	c.700C>T	p.R234C	AERSEPTQALELTEDDIKEDGIVPL[p.R234C]CYVKFQNVNSVTIFVQSNQGEEETTR	GIVPLCYVK,IVPLCYVKF,DGIVPLCYV,KEDGIVPLCY,GIVPLCYVKF	UCEC
TYRP1	c.1054_1057delACAA	p.T352fs	PEPQDVAQCLEVGLFDTPPFYSNST[p.T352fs]VSETQWKVTVTPRESMTLLFEVFTIWLIYS*	TVSETQWKV,ESMTLLFEV,TLLFEVFTI,STVSETQWK,SMTLLFEVF,EVFTIWLIY,QWKVTVTPR,MTLLFEVFT,TPRESMTLL,SETQWKVTV,TQWKVTVTP,LLFEVFTIW,FEVFTIWLI,MTLLFEVFTI,LLFEVFTIWL,STVSETQWKV,TQWKVTVTPR,ESMTLLFEVF,TLLFEVFTIW,LFEVFTIWLI,KVTVTPRESM,EVFTIWLIYS,TPRESMTLLF,RESMTLLFEV,FEVFTIWLIY,SETQWKVTVT,TPPFYSNSTV	GBM
U2AF1	c.101C>A	p.S34Y	FGTEKDKVNCSFYFKIGACRHGDRC[p.S34Y]YRLHNKPTFSQTIALLNIYRNPQNSS	YRLHNKPTF,CYRLHNKPTF,GDRCYRLHNK,GACRHGDRCY	LAML
U2AF1	c.101C>T	p.S34F	FGTEKDKVNCSFYFKIGACRHGDRC[p.S34F]FRLHNKPTFSQTIALLNIYRNPQNSS	FRLHNKPTF,CFRLHNKPTF,ACRHGDRCFR,GDRCFRLHNK,GACRHGDRCF	CESC,LAML,LUAD,UCS
UBC	c.2051delG	p.G684fs	EDGRTLSDYNIQKESTLHLVLRLRG[p.G684fs]VSKFPLLRFQQISLHFPFNKVVAF	SLHFPFNKV,HLVLRLRGV,LLRFQQISL,VLRLRGVSK,GVSKFPLLR,ISLHFPFNK,RFQQISLHF,QQISLHFPF,RLRGVSKFP,RGVSKFPLL,FPLLRFQQI,FPFNKVVAF,LRLRGVSKF,LRGVSKFPL,VSKFPLLRF,LHFPFNKVV,RLRGVSKFPL,SLHFPFNKVV,LVLRLRGVSK,QISLHFPFNK,KFPLLRFQQI,FQQISLHFPF,HFPFNKVVAF,RGVSKFPLLR,ISLHFPFNKV,VLRLRGVSKF,GVSKFPLLRF,LRFQQISLHF,LHFPFNKVVA,FPLLRFQQIS	STAD
UBC	c.572T>C	p.I191T	TLEVEPSDTIENVKAKIQDKEGIPP[p.I191T]TSRGSSLQASSWKMAVLFLTTTSRRS	TSRGSSLQA,PPTSRGSSL,IPPTSRGSSL,IQDKEGIPPT	PRAD
UBE2J2	c.577G>T	p.G193W	KQKQKAQDELSSRPQTLPLPDVVPD[p.G193W]WETHLVQNGIQLLNGHAPGAVPNLAG	VPDWETHLV,VVPDWETHLV,DVVPDWETHL,WETHLVQNGI,LPLPDVVPDW	LUAD
UBE2M	c.392G>A	p.G131D	LEGNVCLNILREDWKPVLTINSIIY[p.G131D]DLQYLFLEPNPEDPLNKEAAEVLQNN	NSIIYDLQY,SIIYDLQYL,TINSIIYDL,IIYDLQYLF,IYDLQYLFL,IIYDLQYLFL,SIIYDLQYLF,INSIIYDLQY,LTINSIIYDL,NSIIYDLQYL	TGCT
UBE2NL	c.257G>T	p.R86I	EEYPMAAPKVRFMTKIYHPNVDKLE[p.R86I]IISLDILKDKWSPALQIRTVLLSIQA	EIISLDILK,HPNVDKLEI,LEIISLDIL,HPNVDKLEII	CRC
UBE2O	c.3354_3355insG	p.R1118fs	YENSRCYNEMALIRVVQSMTQLVRR[p.R1118fs]APRGL*	SMTQLVRRA,TQLVRRAPR,LVRRAPRGL,MTQLVRRAPR	KIRC
UBIAD1	c.289G>A	p.A97T	AYRSHGVLDPRLLVGCAVAVLAVHG[p.A97T]TGNLVNTYYDFSKGIDHKKSDDRTLV	GTGNLVNTY,AVHGTGNLV,TGNLVNTYY,GTGNLVNTYY,VLAVHGTGNL,HGTGNLVNTY,LAVHGTGNLV	CRC
UBOX5	c.1250C>T	p.S417L	LPTTSEHTAKKMKATNEPSLTHMDC[p.S417L]LTGPLSHEQKLSQSLEIALASTLGSM	HMDCLTGPL,LTGPLSHEQK,THMDCLTGPL	BLCA
UBQLN2	c.1568delC	p.A523fs	PIGPIVPFTPIGPIGPIGPTGPAAP[p.A523fs]LAPPALVAPRGLLCPALHLVKPRVLHQNLDPTSSSFSKWCRPWLEQMLHSCRIQKSDFSNNWNSSTQWGS*	GLLCPALHL,LLCPALHLV,ALHLVKPRV,ALVAPRGLL,VLHQNLDPT,MLHSCRIQK,SSSFSKWCR,SFSKWCRPW,APRGLLCPA,KPRVLHQNL,EQMLHSCRI,NLDPTSSSF,WCRPWLEQM,QKSDFSNNW,NNWNSSTQW,APLAPPALV,GLLCPALHLV,LLCPALHLVK,QMLHSCRIQK,TSSSFSKWCR,SFSKWCRPWL,KWCRPWLEQM,LAPPALVAPR,GPAAPLAPPA,APLAPPALVA,APRGLLCPAL,IQKSDFSNNW,RGLLCPALHL,HQNLDPTSSS,QNLDPTSSSF,SSFSKWCRPW,LEQMLHSCRI,HSCRIQKSDF,SNNWNSSTQW,DPTSSSFSKW	STAD
UBR1	c.4939G>T	p.G1647W	KHPVLCLFCGAILCSQNICCQEIVN[p.G1647W]WEEVGACIFHALHCGAGVCIFLKIRE	WEEVGACIF,QEIVNWEEV,WEEVGACIFH	LUAD
UBR4	c.8406delC	p.P2802fs	TAENVNNGNPSPLEALLAGAEGFPP[p.P2802fs]CWTSHLMQMTRPWLN*	LMQMTRPWL,TSHLMQMTR,CWTSHLMQM,FPPCWTSHL,HLMQMTRPW,AEGFPPCWT,HLMQMTRPWL,WTSHLMQMTR,GFPPCWTSHL,FPPCWTSHLM,SHLMQMTRPW,AEGFPPCWTS	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
UBR5	c.6360delA	p.K2120fs	EVLPTKMSYAANLKNVMNMQNRQKK[p.K2120fs]KGKNSPCCQKKLRVQNQGHLLMILLHN*	KNSPCCQKK,KLRVQNQGH,RVQNQGHLL,VQNQGHLLM,LRVQNQGHL,NQGHLLMIL,MQNRQKKKGK,KGKNSPCCQK,KLRVQNQGHL,RVQNQGHLLM,LRVQNQGHLL,VQNQGHLLMI,NQGHLLMILL	KICH
UBR5	c.7551G>T	p.R2517S	LDDTDDGDDNAPLFYQPGKRGFYTP[p.R2517S]SPGKNTEARLNCFRNIGRILGLCLLQ	GFYTPSPGK,RGFYTPSPG,RGFYTPSPGK,SPGKNTEARL	TGCT
UBXN7	c.827C>T	p.A276V	LDQVTGFLGEHGQLDGLSSSPPKKC[p.A276V]VRSESLIDASEDSQLEAAIRASLQET	KKCVRSESL	CLL
UGP2	c.784G>C	p.D262H	ASFYNSGLLDTFIGEGKEYIFVSNI[p.D262H]HNLGATVDLYILNHLMNPPNGKRCEF	NIHNLGATV,IFVSNIHNL,YIFVSNIHNL,FVSNIHNLGA,HNLGATVDLY,KEYIFVSNIH	BLCA
UGT1A1	c.10A>G	p.T4A	MAR[p.T4A]AGWTSPIPLCVSLLLTCGFAEAGKLL	ARAGWTSPI,AGWTSPIPL,MARAGWTSPI,RAGWTSPIPL	KIRP
UGT2A1	c.290delA	p.N97fs	EIYRVPFGKERIEGVIKDFVLTWLE[p.N97fs]IDHLLQPFGDSIRRWPK*	LLQPFGDSI,DFVLTWLEI,TWLEIDHLL,LEIDHLLQP,VLTWLEIDHL,HLLQPFGDSI,LEIDHLLQPF,KDFVLTWLEI,QPFGDSIRRW	CRC
UGT2B11	c.1340G>T	p.R447I	STDLLNALKTVINDPLYKENIMKLS[p.R447I]IIQHDQPVKPLDRAVFWIEFVMPHKG	KENIMKLSI,IMKLSIIQH,YKENIMKLSI,KENIMKLSII	TGCT
UGT2B28	c.866C>A	p.P289H	FQFPHPFLPNIDFVGGLHCKPAKPL[p.P289H]HKEMEEFVQSSGENGVVVFSLGSVIS	HCKPAKPLHK,KPAKPLHKEM	GBM
UGT2B7	c.642G>A	p.M214I	FPPSYVPVVMSELTDQMTFMERVKN[p.M214I]IIYVLYFDFWFEIFDMKKWDQFYSEV	RVKNIIYVL,TFMERVKNI,KNIIYVLYF,IIYVLYFDF,VKNIIYVLY,MERVKNIIY,FMERVKNII,FMERVKNIIY,RVKNIIYVLY,TFMERVKNII,NIIYVLYFDF,IIYVLYFDFW,MTFMERVKNI,MERVKNIIYV,VKNIIYVLYF	LUAD
UGT8	c.304G>A	p.E102K	FNSTTSDAFLQSKMRNIFSGRLTAI[p.E102K]KLFDILDHYTKNCDLMVGNHALIQGL	KLFDILDHY,FSGRLTAIK,SGRLTAIKL,TAIKLFDIL,GRLTAIKLF,RLTAIKLFDI,KLFDILDHYT,IFSGRLTAIK,SGRLTAIKLF,IKLFDILDHY	CRC,UCEC
UHRF1BP1	c.3990delC	p.I1330fs	EIPVVVPMQIELLNSSITLKDDIPP[p.I1330fs]SIQHLQAPSPSLWPWNMLC*	HLQAPSPSL,SLWPWNMLC,IQHLQAPSP,LQAPSPSLW,APSPSLWPW,SPSLWPWNM,TLKDDIPPSI,SPSLWPWNML,IQHLQAPSPS,QHLQAPSPSL,HLQAPSPSLW,IPPSIQHLQA	STAD
UMODL1	c.1677G>A	p.M559I	CQCRTTRDATPSRAGRACEGDLVSP[p.M559I]IGGGLSAATGVTVPGLGTGTAALGLE	LVSPIGGGL,SPIGGGLSA,CEGDLVSPI,SPIGGGLSAA	TGCT
UNC93A	c.1334_1335TC>CG	p.V445A	LTMVAYGLVECVESKNPIRPHAPGQ[p.V445A]ANQAEDEEIQTKM*	RPHAPGQAN	TGCT
UNC93B1	c.1492G>A	p.V498M	YHWWQAVAIFTVYLGSSLHMKAKLA[p.V498M]MLLVTLVAAAVSYLRMEQKLRRGVAP	KLAMLLVTL,LAMLLVTLV,AMLLVTLVA,MLLVTLVAA,HMKAKLAML,KAKLAMLLV,LHMKAKLAM,MKAKLAMLL,AKLAMLLVT,KLAMLLVTLV,AMLLVTLVAA,MLLVTLVAAA,HMKAKLAMLL,KAKLAMLLVT,SLHMKAKLAM,LHMKAKLAML,MKAKLAMLLV,AKLAMLLVTL,LAMLLVTLVA	CESC
UPK2	c.145delC	p.P49fs	DFNISSLSGLLSPALTESLLVALPP[p.P49fs]VTSQEAMPH*	SLLVALPPV,ALPPVTSQEA,ESLLVALPPV,LPPVTSQEAM	STAD
UPK3A	c.816_817insC	p.G272fs	QITQEAVPKSLGASESSYTSVNRGP[p.G272fs]ATGQG*	YTSVNRGPA	KIRC
UQCRFS1	c.16T>G	p.S6A	MLSVA[p.S6A]ARSGPFAPVLSATSRGVAGALRPLVQ	SVAARSGPF,ARSGPFAPV,SVAARSGPFA,AARSGPFAPV,LSVAARSGPF,ARSGPFAPVL	ACC
UQCRFS1	c.247A>G	p.I83V	QAVRRPLVASVGLNVPASVCYSHTD[p.I83V]VKVPDFSEYRRLEVLDSTKSSRESSE	VKVPDFSEY,SVCYSHTDVK,DVKVPDFSEY,SHTDVKVPDF	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
URGCP	c.1916_1917insG	p.G639fs	HFLREMGQFYEAESCLVEAGRLPAG[p.G639fs]PEAFCPLPRLGLGAAADRAASGANRWEHAEHARPLGHRAPEGAARPTGETVKAGGSVNRRGARHGQVHTPQHHVWAAVCHREELRSSRGLHAAHHSG*	HVWAAVCHR,RLPAGPEAF,HARPLGHRA,AARPTGETV,RSSRGLHAA,SSRGLHAAH,AVCHREELR,EAFCPLPRL,ETVKAGGSV,QVHTPQHHV,HTPQHHVWA,LPRLGLGAA,RPLGHRAPE,APEGAARPT,TPQHHVWAA,RAASGANRW,AEHARPLGH,RGARHGQVH,GQVHTPQHH,EELRSSRGL,GQVHTPQHHV,AGRLPAGPEA,AARPTGETVK,TVKAGGSVNR,RSSRGLHAAH,SSRGLHAAHH,HTPQHHVWAA,LPRLGLGAAA,RPLGHRAPEG,TPQHHVWAAV,ELRSSRGLHA,GRLPAGPEAF,WEHAEHARPL,QVHTPQHHVW,WAAVCHREEL,REELRSSRGL,LRSSRGLHAA,PEAFCPLPRL,GETVKAGGSV,CPLPRLGLGA	KICH
URI1	c.39_40insC	p.S13fs	MEAPTVETPPDPSPP[p.S13fs]FGPGPCPGSVARPGCGAAARGAGKGGH*	GAAARGAGK,VARPGCGAA,SVARPGCGA,TPPDPSPPF,VARPGCGAAA,CGAAARGAGK,SVARPGCGAA	HNSC
USF1	c.155G>A	p.R52Q	DPTSVAIASIQSAATFPDPNVKYVF[p.R52Q]QTENGGQVMYRVIQVSEGQLDGQTEG	FQTENGGQV,QTENGGQVMY,FQTENGGQVM	UCEC
USH2A	c.11156G>A	p.R3719H	NSTTVELYWSLPEKPNGLVSQYQLS[p.R3719H]HNGNLLFLGGSEEQNFTDKNLEPNSR	YQLSHNGNL,QLSHNGNLL,LSHNGNLLF,SQYQLSHNG,SHNGNLLFL,YQLSHNGNLL,QYQLSHNGNL,QLSHNGNLLF,SQYQLSHNGN,LSHNGNLLFL	GBM
USH2A	c.7107C>A	p.F2369L	KAHVRWEAPFRPNGLLTHSVLFTGI[p.F2369L]LYVDPVGNNYTLLNVTKVMYSGEETN	VLFTGILYV,SVLFTGILY,TGILYVDPV,HSVLFTGIL,HSVLFTGILY,SVLFTGILYV,FTGILYVDPV,LYVDPVGNNY	CRC
USP11	c.856G>A	p.A286T	VLDAALETGQLIIMETRKKDGTWPS[p.A286T]TQLHVMNNNMSEEDEDFKGQPGICGL	GTWPSTQLH,TWPSTQLHV,WPSTQLHVM,TWPSTQLHVM,TQLHVMNNNM	CRC
USP15	c.2344delA	p.K782fs	KKRYFDENAAEDFEKHESVEYKPPK[p.K782fs]NPL*	VEYKPPKNPL	STAD
USP16	c.1364G>A	p.R455Q	DIPSGTSKHLQKKAKKQAKKQAKNQ[p.R455Q]QRQQKIQGKVLHLNDICTIDHPEDSE	QAKNQQRQQK,QQRQQKIQGK,AKNQQRQQKI	UCEC
USP25	c.2618G>A	p.R873H	FKAIKLEYARLVKLAQEDTPPETDY[p.R873H]HLHHVVVYFIQNQAPKKIIEKTLLEQ	ETDYHLHHV,HLHHVVVYF,YHLHHVVVY,TDYHLHHVV,ETDYHLHHVV,HLHHVVVYFI,YHLHHVVVYF,DTPPETDYHL,TDYHLHHVVV	UCEC
USP25	c.3356G>A	p.R1119Q	EPPKLPSYSTHELCERFARIMLSLS[p.R1119Q]QTPADGR*	MLSLSQTPA,RIMLSLSQT,IMLSLSQTP,IMLSLSQTPA	CRC
USP26	c.2582G>A	p.R861Q	TLKSGHYICDAYDFEKQIWFTYDDM[p.R861Q]QVLGIQEAQMQEDRRCTGYIFFYMHN	FTYDDMQVL,MQVLGIQEA,TYDDMQVLGI,MQVLGIQEAQ	CRC
USP29	c.243C>A	p.F81L	NIRSVVLRHCKKRQSHLRLTLKNNV[p.F81L]LLFIDKLSYRDAKQLNMFLDIIHQNK	LLFIDKLSY,TLKNNVLLF,RLTLKNNVL,LKNNVLLFI,TLKNNVLLFI,LLFIDKLSYR,LTLKNNVLLF,KNNVLLFIDK,VLLFIDKLSY,LRLTLKNNVL,RLTLKNNVLL	CRC
USP31	c.1171G>A	p.D391N	LTEMYYDGFHRSFCDTDDLETVHES[p.D391N]NCIFAFETPEIFRPEGILSQRGIHLN	ETVHESNCI,TVHESNCIF,HESNCIFAF,TVHESNCIFA,ESNCIFAFET,VHESNCIFAF	CRC
USP33	c.107G>A	p.R36Q	LTLKVLPHFESLGKQEKIPNKMSAF[p.R36Q]QNHCPHLDSVGEITKEDLIQKSLGTC	KMSAFQNHC,SAFQNHCPH,MSAFQNHCPH,SAFQNHCPHL	UCEC
USP4	c.775C>G	p.L259V	STAPSRNFTTSPKSSASPYSSVSAS[p.L259V]VIANGDSTSTCGMHSSGVSRGGSGFS	YSSVSASVI,PYSSVSASVI,SPYSSVSASV,YSSVSASVIA	CESC
USP40	c.2552C>T	p.S851L	DSYTLKEAELKMGSSLGLCLGKAPS[p.S851L]LSQLFLFFAMGSDVQPGTEMEIVVEE	KAPSLSQLF,PSLSQLFLF,SLSQLFLFF,APSLSQLFL,GKAPSLSQL,SLSQLFLFFA,PSLSQLFLFF,KAPSLSQLFL,LGKAPSLSQL,GKAPSLSQLF,APSLSQLFLF,LSQLFLFFAM	CRC
USP42	c.2336G>C	p.R779P	SPAAESLEEPDAAAGLSSTKKAPPP[p.R779P]PDPGTPATKEGAWEAMAVAPEEPPPS	STKKAPPPP,STKKAPPPPD	ACC
USP46	c.410A>G	p.Q137R	LFDNYMQQDAHEFLNYLLNTIADIL[p.Q137R]REEKKQEKQNGKLKNGNMNEPAENNK	TIADILREEK,ILREEKKQEK,LLNTIADILR	TGCT

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
UTP14A	c.442G>A	p.V148I	EEIERIHREVAFNKTAQVLSKWDPV[p.V148I]ILKNRQAEQLVFPLEKEEPAIAPIEH	VLSKWDPVI,VLSKWDPVIL,ILKNRQAEQL,LSKWDPVILK	CRC
UTP3	c.226_228delGAG	p.E81del	SRAALAKGWNEVQSGDEEDGEEEEE[p.E81del]VLALDMDDEDDEDGGNAGEEEEEENADD	GEEEEEVLAL	PRAD
UTS2R	c.866C>A	p.A289E	VLLFWACFLPFWLWQLLAQYHQAPL[p.A289E]EPRTARIVNYLTTCLTYGNSCANPFL	LEPRTARIV,APLEPRTARI,AQYHQAPLEP,HQAPLEPRTA,EPRTARIVNY	KIRP
UXS1	c.298G>C	p.V100L	QKYPPVKFLSEKDRKRILITGGAGF[p.V100L]LGSHLTDKLMMDGHEVTVVDNFFTGR	LITGGAGFL,ILITGGAGFL,FLGSHLTDKL	OV
VARS	c.151_152CC>AG	p.P51S	EAGEGPGWGGAHPRICLQPPPTSRT[p.P51S]SFPPPRLPALEQGPGGLWVWGATAVAQ	TSRTSFPPP,RTSFPPPRL,TSRTSFPPPR,SFPPPRLPAL,TSFPPPRLPA,QPPPTSRTSF	ACC
VASH1	c.7delG	p.G3fs	MPGG[p.G3fs]RRWLGVAAAVPLQRPLRPPPPLGSGVWRPAKEPQPREMRSQKRKGKRTCETEASPSLSTGVGYLWMRPPGKGCGNTWPRSTPMERRWRNGSVGPQTCPRSPYRVCLRSSRLHLSLSAWKLCSATSESCSTITQGHSSLKLRRADL*	SLSTGVGYL,HLSLSAWKL,LSAWKLCSA,ATSESCSTI,YLWMRPPGK,ITQGHSSLK,VAAAVPLQR,GSGVWRPAK,SVGPQTCPR,QTCPRSPYR,RWLGVAAAV,GGRRWLGVA,AVPLQRPLR,RSQKRKGKR,RWRNGSVGP,RSPYRVCLR,RVCLRSSRL,CLRSSRLHL,RSSRLHLSL,SSRLHLSLS,TGVGYLWMR,NTWPRSTPM,RPLRPPPPL,CPRSPYRVC,ERRWRNGSV,SLKLRRADL,RLHLSLSAW,GRRWLGVAA,RRWLGVAAA,LGVAAAVPL,AAVPLQRPL,LQRPLRPPP,AKEPQPREM,CETEASPSL,LSTGVGYLW,RSTPMERRW,RRWRNGSVG,PQTCPRSPY,SRLHLSLSA,TQGHSSLKL,TEASPSLST,WLGVAAAVPL,SLSAWKLCSA,RLHLSLSAWK,TITQGHSSLK,GVAAAVPLQR,STGVGYLWMR,GSVGPQTCPR,GGRRWLGVAA,LGSGVWRPAK,EMRSQKRKGK,KGKRTCETEA,GYLWMRPPGK,RSTPMERRWR,RWRNGSVGPQ,RVCLRSSRLH,CLRSSRLHLS,RSSRLHLSLS,SSRLHLSLSA,TWPRSTPMER,EASPSLSTGV,QTCPRSPYRV,STITQGHSSL,MPGGRRWLGV,RPPPPLGSGV,CPRSPYRVCL,MERRWRNGSV,SPSLSTGVGY,RRWLGVAAAV,AAAVPLQRPL,LQRPLRPPPP,SLSTGVGYLW,LSTGVGYLWM,GNTWPRSTPM,GPQTCPRSPY,YRVCLRSSRL,LRSSRLHLSL,SRLHLSLSAW,LHLSLSAWKL,SATSESCSTI	STAD
VAV3	c.2053G>A	p.E685K	CVPKPVDYSCQPWYAGAMERLQAET[p.E685K]KLINRVNSTYLVRHRTKESGEYAISI	RLQAETKLI,KLINRVNST,AETKLINRV,KLINRVNSTY,AMERLQAETK,MERLQAETKL	CRC
VCAN	c.3374G>A	p.R1125H	HSVSYPPGAVTEHKVKTDEVVTLTP[p.R1125H]HIGPKVSLSPGPEQKYETEGSSTTGF	TLTPHIGPK,EVVTLTPHI,LTPHIGPKV,DEVVTLTPH,TLTPHIGPKV,VTLTPHIGPK,TPHIGPKVSL,DEVVTLTPHI	CRC
VCAN	c.3923C>G	p.S1308C	SSPPATQPTRPPTVEDKEAFGPQAL[p.S1308C]CTPQPPASTKFHPDINVYIEVRENK	ALCTPQPPA,CTPQPPASTK,KEAFGPQALC	CESC
VEZF1	c.1063_1064insACA	p.355_356insN	ETSNQKQQQQQQQQQQQQQQQQQQQH[p.355_356insN]NVTSWPGKQVETLRLWEEAVKARKKEAA	HNVTSWPGK,QQQQQHNVT,QQQQHNVTS,QQQHNVTSW,NVTSWPGKQV,QQQQQQQHNV,QQQQQQHNVT,QQQQHNVTSW,QQHNVTSWPG	STAD
VHL	c.115G>A	p.G39S	GAEEAGVEEYGPEEDGGEESGAEES[p.G39S]SPEESGPEELGAEEEMEAGRPRPVLR	SPEESGPEEL	KIRC
VHL	c.134C>T	p.P45L	VEEYGPEEDGGEESGAEESGPEESG[p.P45L]LEELGAEEEMEAGRPRPVLRSVNSRE	PEESGLEEL,LEELGAEEEM,EESGPEESGL	KIRC
VHL	c.194C>T	p.S65L	PEESGPEELGAEEEMEAGRPRPVLR[p.S65L]LVNSREPSQVIFCNRSPRVVLPVWLN	RPRPVLRLV,PVLRLVNSR,LVNSREPSQV,AGRPRPVLRL,RPRPVLRLVN	KIRC
VHL	c.221T>A	p.V74D	GAEEEMEAGRPRPVLRSVNSREPSQ[p.V74D]DIFCNRSPRVVLPVWLNFDGEPQPYP	PSQDIFCNR,DIFCNRSPR,SREPSQDIF,DIFCNRSPRV,NSREPSQDIF	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
VHL	c.232A>G	p.N78D	EMEAGRPRPVLRSVNSREPSQVIFC[p.N78D]DRSPRVVLPVWLNFDGEPQPYPTLPP	VIFCDRSPR,VIFCDRSPRV,QVIFCDRSPR	KIRC
VHL	c.236G>C	p.R79P	MEAGRPRPVLRSVNSREPSQVIFCN[p.R79P]PSPRVVLPVWLNFDGEPQPYPTLPPG	VIFCNPSPR,SQVIFCNPS,VIFCNPSPRV,QVIFCNPSPR,NPSPRVVLPV,SQVIFCNPSP,FCNPSPRVVL	KIRC
VHL	c.245G>C	p.R82P	GRPRPVLRSVNSREPSQVIFCNRSP[p.R82P]PVVLPVWLNFDGEPQPYPTLPPGTGR	RSPPVVLPV,SPPVVLPVW,VIFCNRSPPV,RSPPVVLPVW	KIRC
VHL	c.263G>T	p.W88L	LRSVNSREPSQVIFCNRSPRVVLPV[p.W88L]LLNFDGEPQPYPTLPPGTGRRIHSYR	VVLPVLLNF,SPRVVLPVL,RVVLPVLLNF,SPRVVLPVLL,RSPRVVLPVL	KIRC
VHL	c.266T>A	p.L89H	RSVNSREPSQVIFCNRSPRVVLPVW[p.L89H]HNFDGEPQPYPTLPPGTGRRIHSYRG	VVLPVWHNF,RVVLPVWHNF,HNFDGEPQPY	KIRC
VHL	c.266T>C	p.L89P	RSVNSREPSQVIFCNRSPRVVLPVW[p.L89P]PNFDGEPQPYPTLPPGTGRRIHSYRG	VVLPVWPNF,WPNFDGEPQ,RVVLPVWPNF	KIRC
VHL	c.320G>C	p.R107P	RVVLPVWLNFDGEPQPYPTLPPGTG[p.R107P]PRIHSYRGHLWLFRDAGTHDGLLVNQ	GTGPRIHSY,TLPPGTGPR,TGPRIHSYR,LPPGTGPRI,TLPPGTGPRI,GTGPRIHSYR	KIRC
VHL	c.332G>A	p.S111N	PVWLNFDGEPQPYPTLPPGTGRRIH[p.S111N]NYRGHLWLFRDAGTHDGLLVNQTELF	NYRGHLWLF,TGRRIHNYR,RIHNYRGHL,GTGRRIHNY,IHNYRGHLW,HNYRGHLWL,GTGRRIHNYR,HNYRGHLWLF,RIHNYRGHLW,NYRGHLWLFR,RRIHNYRGHL,IHNYRGHLWL	KIRC
VHL	c.333C>A	p.S111R	PVWLNFDGEPQPYPTLPPGTGRRIH[p.S111R]RYRGHLWLFRDAGTHDGLLVNQTELF	RYRGHLWLF,TGRRIHRYR,RIHRYRGHL,GTGRRIHRY,IHRYRGHLW,HRYRGHLWL,GTGRRIHRYR,HRYRGHLWLF,RIHRYRGHLW,RYRGHLWLFR,RRIHRYRGHL,IHRYRGHLWL	KIRC
VHL	c.343C>A	p.H115N	NFDGEPQPYPTLPPGTGRRIHSYRG[p.H115N]NLWLFRDAGTHDGLLVNQTELFVPSL	SYRGNLWLF,RIHSYRGNL,HSYRGNLWL,IHSYRGNLW,HSYRGNLWLF,RIHSYRGNLW,SYRGNLWLFR,RRIHSYRGNL,IHSYRGNLWL	KIRC
VHL	c.347delT	p.L116fs	DGEPQPYPTLPPGTGRRIHSYRGHL[p.L116fs]GSSEMQGHTMGFWLTKLNYLCHLSMLTDSLFLPISHCQCIL*	LTDSLFLPI,TMGFWLTKL,YLCHLSMLT,SMLTDSLFL,HLSMLTDSL,SLFLPISHC,FLPISHCQC,HTMGFWLTK,FWLTKLNYL,NYLCHLSML,RGHLGSSEM,GFWLTKLNY,EMQGHTMGF,LSMLTDSLF,LNYLCHLSM,SSEMQGHTM,SEMQGHTMG,MQGHTMGFW,TKLNYLCHL,LPISHCQCI,KLNYLCHLSM,MLTDSLFLPI,FLPISHCQCI,HTMGFWLTKL,GFWLTKLNYL,RIHSYRGHLG,LTKLNYLCHL,MGFWLTKLNY,LPISHCQCIL,SEMQGHTMGF,HLSMLTDSLF,HSYRGHLGSS,YRGHLGSSEM,GSSEMQGHTM,MQGHTMGFWL,LNYLCHLSML,CHLSMLTDSL,LSMLTDSLFL	KIRC
VHL	c.361G>T	p.D121Y	QPYPTLPPGTGRRIHSYRGHLWLFR[p.D121Y]YAGTHDGLLVNQTELFVPSLNVDGQP	RYAGTHDGL,RGHLWLFRY,WLFRYAGTH,RYAGTHDGLL,RGHLWLFRYA,YRGHLWLFRY,FRYAGTHDGL	KIRC
VHL	c.367delG	p.G123fs	PTLPPGTGRRIHSYRGHLWLFRDAG[p.G123fs]HTMGFWLTKLNYLCHLSMLTDSLFLPISHCQCIL*	LTDSLFLPI,TMGFWLTKL,YLCHLSMLT,SMLTDSLFL,WLFRDAGHT,HLSMLTDSL,SLFLPISHC,FLPISHCQC,HTMGFWLTK,FWLTKLNYL,NYLCHLSML,GFWLTKLNY,LSMLTDSLF,LFRDAGHTM,LNYLCHLSM,RDAGHTMGF,TKLNYLCHL,LPISHCQCI,WLFRDAGHTM,KLNYLCHLSM,MLTDSLFLPI,FLPISHCQCI,HTMGFWLTKL,GFWLTKLNYL,LTKLNYLCHL,MGFWLTKLNY,LPISHCQCIL,HLSMLTDSLF,FRDAGHTMGF,RDAGHTMGFW,LNYLCHLSML,CHLSMLTDSL,LSMLTDSLFL	KIRC
VHL	c.383T>A	p.L128H	PGTGRRIHSYRGHLWLFRDAGTHDG[p.L128H]HLVNQTELFVPSLNVDGQPIFANITL	HLVNQTELF,GHLVNQTEL,HLVNQTELFV,GHLVNQTELF	KIRC
VHL	c.405A>T	p.L135F	HSYRGHLWLFRDAGTHDGLLVNQTE[p.L135F]FFVPSLNVDGQPIFANITLPVYTLKE	LVNQTEFFV,EFFVPSLNV,GLLVNQTEF,LLVNQTEFF,NQTEFFVPS,LLVNQTEFFV,NQTEFFVPSL,GLLVNQTEFF,TEFFVPSLNV	KIRC
VHL	c.452T>C	p.I151T	DGLLVNQTELFVPSLNVDGQPIFAN[p.I151T]TTLPVYTLKERCLQVVRSLVKPENYR	FANTTLPVY,TTLPVYTLK,IFANTTLPV,NTTLPVYTL,QPIFANTTL,PIFANTTLPV,NTTLPVYTLK,IFANTTLPVY,GQPIFANTTL	KIRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
VHL	c.458T>C	p.L153P	LLVNQTELFVPSLNVDGQPIFANIT[p.L153P]PPVYTLKERCLQVVRSLVKPENYRRL	IFANITPPV,ITPPVYTLK,FANITPPVY,NITPPVYTL,PIFANITPPV,NITPPVYTLK,IFANITPPVY,ANITPPVYTL	KIRC
VHL	c.472C>G	p.L158V	TELFVPSLNVDGQPIFANITLPVYT[p.L158V]VKERCLQVVRSLVKPENYRRLDIVRS	NITLPVYTV,ITLPVYTVK,TVKERCLQV,YTVKERCLQV,NITLPVYTVK,TVKERCLQVV	KIRC
VHL	c.473T>C	p.L158P	TELFVPSLNVDGQPIFANITLPVYT[p.L158P]PKERCLQVVRSLVKPENYRRLDIVRS	ITLPVYTPK,TPKERCLQV,NITLPVYTPK,YTPKERCLQV,TPKERCLQVV	KIRC
VHL	c.492delG	p.Q164fs	LNVDGQPIFANITLPVYTLKERCLQ[p.Q164fs]LSGA*	TLKERCLQL,KERCLQLSGA	KIRC
VHL	c.506T>C	p.L169P	GQPIFANITLPVYTLKERCLQVVRS[p.L169P]PVKPENYRRLDIVRSLYEDLEDHPNV	CLQVVRSPV,LQVVRSPVK,RSPVKPENY,PVKPENYRR,CLQVVRSPVK,VRSPVKPENY	KIRC
VHL	c.551T>C	p.L184P	KERCLQVVRSLVKPENYRRLDIVRS[p.L184P]PYEDLEDHPNVQKDLERLTQERIAHQ	RLDIVRSPY,SPYEDLEDH,RRLDIVRSPY	KIRC
VHL	c.563T>C	p.L188P	LQVVRSLVKPENYRRLDIVRSLYED[p.L188P]PEDHPNVQKDLERLTQERIAHQRMGD	YEDPEDHPNV	KIRC
VLDLR	c.692G>A	p.R231H	IPISWVCDDDADCSDQSDESLEQCG[p.R231H]HQPVIHTKCPASEIQCGSGECIHKKW	LEQCGHQPV,EQCGHQPVI,SLEQCGHQPV,CGHQPVIHTK,LEQCGHQPVI	BRCA
VMP1	c.1105G>C	p.E369Q	AQRQKLHHKSEMGTPQGENWLSWMF[p.E369Q]QKLVVVMVCYFILSIINSMAQSYAKR	WLSWMFQKL,WMFQKLVVV,FQKLVVVMV,NWLSWMFQK,SWMFQKLVV,MFQKLVVVM,WLSWMFQKLV,WMFQKLVVVM,NWLSWMFQKL,SWMFQKLVVV,MFQKLVVVMV,ENWLSWMFQK,LSWMFQKLVV,QKLVVVMVCY	LUAD
VPRBP	c.2405G>A	p.R802Q	ARLQKADVVAQSRISFPEKELLLLI[p.R802Q]QNHLISKGLGETATVLTKEADLPMTA	LLLLIQNHL,LLLIQNHLI,LIQNHLISK,KELLLLIQN,LLLLIQNHLI,IQNHLISKGL,LLIQNHLISK	UCEC
VPRBP	c.2817delA	p.K939fs	CNGRKIRVLRQKSDHGAYSQSPAIK[p.K939fs]NSWTDIFLPHLRWTV*	WTDIFLPHL,FLPHLRWTV,AIKNSWTDI,SWTDIFLPH,IKNSWTDIF,WTDIFLPHLR,SWTDIFLPHL,IFLPHLRWTV,AIKNSWTDIF,SQSPAIKNSW,IKNSWTDIFL	STAD
VPS13A	c.8647delT	p.F2883fs	ILGLDVLGNPFGLIREFSEGVEAFF[p.F2883fs]MNLTREPSRVLKSLWKEWH*	NLTREPSRV,LTREPSRVL,EAFFMNLTR,MNLTREPSR,EPSRVLKSL,SEGVEAFFM,FMNLTREPS,VLKSLWKEW,VEAFFMNLT,FSEGVEAFFM,LTREPSRVLK,RVLKSLWKEW,PSRVLKSLWK,FMNLTREPSR,EGVEAFFMNL,REPSRVLKSL,EPSRVLKSLW	STAD
VPS13B	c.2075G>A	p.R692Q	IMGEKNSSNFMNTTNFQSLRPLPSI[p.R692Q]QILVDKINLEHSVPMYAEQLVHVVSS	RPLPSIQIL,SLRPLPSIQI,RPLPSIQILV,IQILVDKINL	UCEC
VPS13B	c.7723G>T	p.G2575W	AQADCKLLECRNVTMQSVVKPFSIF[p.G2575W]WQMAVSSDVVEKLLDCTVIVDSVFVN	FSIFWQMAV,WQMAVSSDV,KPFSIFWQM,WQMAVSSDVV,FSIFWQMAVS,VKPFSIFWQM,KPFSIFWQMA	LUAD
VPS13C	c.4075G>T	p.D1359Y	SWYHKVPVVEIKGHLDSMNVSLNQE[p.D1359Y]YLNLLFRILTENLCEGTEDLDKVKPR	SLNQEYLNL,YLNLLFRIL,EYLNLLFRI,MNVSLNQEY,NVSLNQEYL,NQEYLNLLF,SLNQEYLNLL,YLNLLFRILT,EYLNLLFRIL,SMNVSLNQEY,MNVSLNQEYL,LNQEYLNLLF,QEYLNLLFRI	CRC
VWA2	c.950G>A	p.G317D	RTTCPGPCDSQPCQNGGTCVPEGLD[p.G317D]DYQCLCPLAFGGEANCALKLSLECRV	DDYQCLCPL,DYQCLCPLAF	TGCT
VWA3A	c.2863G>A	p.V955I	LEKVLRRYVQRLQWLLSGSRRLFGT[p.V955I]ILESKVCILLDTSGSMGPYLQQVKTE	RLFGTILES,ILESKVCIL,GSRRLFGTI,SRRLFGTIL,ILESKVCILL,RLFGTILESK,GSRRLFGTIL	BRCA
VWA3B	c.1670G>T	p.R557L	QFIQEQLKYKSKFNFVKFDGQAVAW[p.R557L]LEQLAEVNEDNLEQAQSWIRDIKIGS	QAVAWLEQL,VAWLEQLAEV,GQAVAWLEQL	LUAD
VWA7	c.2375T>G	p.V792G	FSLTSNLSRAHLELNESAWGRLWLE[p.V792G]GPDSAAPDSVVMVTVTAGGREANPVP	RLWLEGPDSA	TGCT

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
VWF	c.5160A>T	p.K1720N	LLDGSSSFPASYFDEMKSFAKAFIS[p.K1720N]NANIGPRLTQVSVLQYGSITTIDVPW	FAKAFISNA,ISNANIGPR,KAFISNANI,KSFAKAFISN,SFAKAFISNA,FISNANIGPR,AKAFISNANI,ISNANIGPRL	BRCA
WAPAL	c.1564delA	p.R522fs	GFDDLSESEDDEDDDCQVERKTSKK[p.R522fs]ELKQLHHPPCSLPQKAMIIPRTVSLVLTMQRTCLVCLKV*	MIIPRTVSL,IIPRTVSLV,LTMQRTCLV,QLHHPPCSL,SLPQKAMII,MQRTCLVCL,VSLVLTMQR,KAMIIPRTV,RTVSLVLTM,IPRTVSLVL,KQLHHPPCSL,AMIIPRTVSL,MIIPRTVSLV,VLTMQRTCLV,MQRTCLVCLK,TVSLVLTMQR,VERKTSKKEL,TMQRTCLVCL,KELKQLHHPP	STAD
WASF3	c.913_914insC	p.P305fs	EHEYRPPSASARHMALNRPQQPPPP[p.P305fs]ASPSGPRGVPGLCTDGSSRLRDAPSADN*	SSRLRDAPS,RPQQPPPPA,GLCTDGSSRL,SSRLRDAPSA,RPQQPPPPAS,SPSGPRGVPG	STAD
WASH3P	c.523G>A	p.G175S	APREVVDPSGGRATLLESIRQAGGI[p.G175S]SKAKLRSMKERKLEKKQQKEQEQVRA	RQAGGISKA,ISKAKLRSM,SIRQAGGISK,RQAGGISKAK,ISKAKLRSMK	GBM,KIRC,PRAD,SKCM
WASH3P	c.559C>G	p.L187V	ATLLESIRQAGGIGKAKLRSMKERK[p.L187V]VEKKQQKEQEQVRATSQGGHLMSDLF	SMKERKVEK,RSMKERKVEK,SMKERKVEKK,KLRSMKERKV	PRAD,TGCT
WBP1	c.412_413insC	p.P138fs	LRFLSTFKPPAYEDVVHRPGTPPPP[p.P138fs]LYCGPRPPLDCFQ*	LYCGPRPPL,RPGTPPPPL,GPRPPLDCF	STAD
WBSCR17	c.682C>T	p.R228C	LEEYVHKRYPGLVKVVRNQKREGLI[p.R228C]CARIEGWKVATGQVTGFFDAHVEFTA	REGLICARI,LICARIEGWK	CRC
WDFY3	c.5525delT	p.L1842fs	FIFGVPASSGTVVSSIHNVCTEAVF[p.L1842fs]YYWECSAAC*	CTEAVFYYW,YYWECSAAC,EAVFYYWEC,FYYWECSAA,AVFYYWECSA,HNVCTEAVFY,TEAVFYYWEC	STAD
WDR17	c.832C>T	p.P278S	SESLSCITTFNLPSAAASVQCLAWV[p.P278S]SSAPGMFITGDSQVGVLRIWNVSRTT	AWVSSAPGM,WVSSAPGMF,WVSSAPGMFI,AWVSSAPGMF,LAWVSSAPGM,VQCLAWVSSA	CESC
WDR3	c.2521G>A	p.E841K	KSSELEESLLVLPFSYVPDILKLFN[p.E841K]KFIQLGSDVELICRCLFFLLRIHFGQ	KLFNKFIQL,LKLFNKFIQL	CRC
WDR34	c.178T>G	p.W60G	PGPLQDETLGVASVPSQWRAVQGIR[p.W60G]GETKSCQTASIATASASAQARNHVDA	GETKSCQTA,AVQGIRGETK	ACC
WDR5	c.642delC	p.N214fs	DGLCRIWDTASGQCLKTLIDDDNPP[p.N214fs]CLL*	TLIDDDNPPC	STAD
WDR59	c.2509C>A	p.R837S	EHLSSPWGESSPEELRFGSLTYSDP[p.R837S]SERERDQHDKNKRLLDPANTQQFDDF	LTYSDPSER	LUAD
WDR59	c.479delA	p.N160fs	IKDTRKPTVALSAVAGASQVKWNKK[p.N160fs]MLTALPPAMTAMCGYGIRGNPVQQWNI*	KMLTALPPA,MLTALPPAM,ALPPAMTAM,KWNKKMLTA,PAMTAMCGY,TAMCGYGIR,MTAMCGYGI,WNKKMLTAL,SQVKWNKKM,KKMLTALPP,KMLTALPPAM,AMTAMCGYGI,MLTALPPAMT,ALPPAMTAMC,MTAMCGYGIR,KWNKKMLTAL,LTALPPAMTA,TALPPAMTAM,SQVKWNKKML,VKWNKKMLTA,KKMLTALPPA,PPAMTAMCGY	STAD
WDR60	c.1235delA	p.Q412fs	DGDDDESSNEPESREKLEELPLAQK[p.Q412fs]RKYKKFKELLMQKMKGLASYL*	LLMQKMKGL,KMKGLASYL,KYKKFKELL,LAQKRKYKK,KFKELLMQK,QKMKGLASY,RKYKKFKEL,MQKMKGLAS,AQKRKYKKF,YKKFKELLM,FKELLMQKM,LPLAQKRKY,LLMQKMKGLA,KYKKFKELLM,AQKRKYKKFK,KFKELLMQKM,MQKMKGLASY,LAQKRKYKKF,RKYKKFKELL,QKMKGLASYL	STAD
WDR7	c.784delG	p.G262fs	RVFDAGDYSLLCSGPSENGQTWTGG[p.G262fs]TLSHQIKSSFGQKMGKVIFTNYLPVAFQLVIHSAVMWGRQLKI*	FTNYLPVAF,VIFTNYLPV,YLPVAFQLV,FQLVIHSAV,VMWGRQLKI,QIKSSFGQK,SSFGQKMGK,AVMWGRQLK,NYLPVAFQL,MGKVIFTNY,LPVAFQLVI,LSHQIKSSF,QLVIHSAVM,GQTWTGGTL,HQIKSSFGQ,IKSSFGQKM,GQKMGKVIF,GKVIFTNYL,LVIHSAVMW,SAVMWGRQL,KVIFTNYLPV,VIFTNYLPVA,YLPVAFQLVI,HQIKSSFGQK,KSSFGQKMGK,KMGKVIFTNY,VIHSAVMWGR,SAVMWGRQLK,IFTNYLPVAF,NYLPVAFQLV,MGKVIFTNYL,AVMWGRQLKI,WTGGTLSHQI,SSFGQKMGKV,TLSHQIKSSF,FQLVIHSAVM,FGQKMGKVIF,VAFQLVIHSA,HSAVMWGRQL,LPVAFQLVIH	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
WDR73	c.944_961delATGGAACACGGAGCCAAG	p.DGTRSQ315del	CLAISGFDGTVQVYDATSWDGTRSQ[p.DGTRSQ315del]VEPLFTHRGHIFLDGNGMDPAPLVTTHTWHPCRPRTLLSATND	TSWDGTRSQV	KIRC
WDR75	c.860C>A	p.P287Q	SLLSGGRESVLVEWRDATEKNKEFL[p.P287Q]QRLGATIEHISVSPAGDLFCTSHSDN	FLQRLGATI,KEFLQRLGA,EFLQRLGATI,KEFLQRLGAT,LQRLGATIEH	LUAD
WDR78	c.330T>A	p.N110K	NQSRMAVSKTVLIPPELKTVEKPNP[p.N110K]KIKTTQVFDINGTDVTPRPLYHPDPL	KTVEKPNPK,KIKTTQVFD,NPKIKTTQV,PKIKTTQVF,KIKTTQVFDI,NPKIKTTQVF	CLL
WDR88	c.298G>T	p.G100W	KHQVPEKLIWGDQDPLSKIPFKILS[p.G100W]WHEHAVSTCHFCVDDTKLLSGSYDCT	KILSWHEHA,ILSWHEHAV,KIPFKILSW,FKILSWHEH,KILSWHEHAV,SKIPFKILSW,FKILSWHEHA	LUAD
WDTC1	c.861_862insG	p.M287fs	RLRVLVATYVTFSPNGTELLVNMGG[p.M287fs]GTGLFV*	NMGGGTGLF,VNMGGGTGL,NMGGGTGLFV,VNMGGGTGLF	STAD
WHSC1L1	c.1254_1255insA	p.K418fs	YIDKQPEEALSQAKKSVASKTEVKK[p.K418fs]NPTTKICAEYSARTDQCRGGGLLTLKY*	PTTKICAEY,KICAEYSAR,RGGGLLTLK,GGGLLTLKY,CRGGGLLTL,TTKICAEYSA,RGGGLLTLKY,EYSARTDQCR,NPTTKICAEY,AEYSARTDQC	STAD
WNK4	c.1816delG	p.G606fs	CETDGYLSSSGFLDASDPALQPPGG[p.G606fs]CHPAWLSPISACPRLLPYPFHVLALEVTFPPGTAMPQMQLQALAMWEKGWDK*	RLLPYPFHV,LLPYPFHVL,AMPQMQLQA,AMWEKGWDK,SACPRLLPY,LQALAMWEK,PYPFHVLAL,HVLALEVTF,MQLQALAMW,EVTFPPGTA,SPISACPRL,CPRLLPYPF,MPQMQLQAL,VTFPPGTAM,QMQLQALAM,HPAWLSPIS,LPYPFHVLA,LEVTFPPGT,ISACPRLLPY,RLLPYPFHVL,LLPYPFHVLA,AMPQMQLQAL,QLQALAMWEK,LAMWEKGWDK,WLSPISACPR,YPFHVLALEV,EVTFPPGTAM,HPAWLSPISA,SPISACPRLL,LPYPFHVLAL,FPPGTAMPQM,MPQMQLQALA,LQPPGGCHPA,FHVLALEVTF,LEVTFPPGTA,PQMQLQALAM,QMQLQALAMW,QPPGGCHPAW,QALAMWEKGW	STAD
WNT1	c.500delG	p.W167fs	SEGSIESCTCDYRRRGPGGPDWHWG[p.W167fs]AAATTLTSAASSAGSSWTPGRRGGTCASS*	TLTSAASSA,GPDWHWGAA,WHWGAAATT,HWGAAATTL,AASSAGSSW,SAGSSWTPGR,TTLTSAASSA,GPDWHWGAAA,SAASSAGSSW,WHWGAAATTL,AAATTLTSAA	STAD
WNT11	c.1031G>A	p.C344Y	NPYTDRVVERCHCKYHWCCYVTCRR[p.C344Y]YERTVERYVCK*	CCYVTCRRY,RYERTVERY,YVTCRRYER,YERTVERYV,RRYERTVERY,CYVTCRRYER,YERTVERYVC	OV
WNT16	c.494delG	p.W165fs	GNMTECSCDTTLQNGGSASEGWHWG[p.W165fs]AAPMMSSMACGSAESS*	MMSSMACGS,SMACGSAES,MSSMACGSA,APMMSSMAC,GAAPMMSSM,SEGWHWGAA,GWHWGAAPM,WHWGAAPMM,MMSSMACGSA,SASEGWHWGA,EGWHWGAAPM,WGAAPMMSSM,GWHWGAAPMM,SMACGSAESS	STAD
WNT58	c.979A>G	p.K327E	RLCNKTSEGMDGCELMCCGRGYNQF[p.K327E]ESVQVERCHCKFHWCCFVRCKKCTEI	RGYNQFESV,QFESVQVER,NQFESVQVE,NQFESVQVER	TGCT
WT1	c.1142_1143insCGGTC	p.S381fs	HTHGVFRGIQDVRRVPGVAPTLVRS[p.S381fs]GRHLRPVRNAPSCVLTQAAIRDILSCPTYRCTAGSTLVRNHTSVTSRTVNEGFLVQTSSKDTKGDIQV*	TLVRNHTSV,CTAGSTLVR,LVRSGRHLR,RSGRHLRPV,SGRHLRPVR,LVRNHTSVT,RNHTSVTSR,HTSVTSRTV,GFLVQTSSK,RDILSCPTY,CVLTQAAIR,DILSCPTYR,RPVRNAPSC,TLVRSGRHL,VRNAPSCVL,TQAAIRDIL,YRCTAGSTL,TSRTVNEGF,LVQTSSKDTK,TYRCTAGSTL,RSGRHLRPVR,HLRPVRNAPS,STLVRNHTSV,TSRTVNEGFL,TLVRSGRHLR,RPVRNAPSCV,APSCVLTQAA,IRDILSCPTY,VTSRTVNEGF	LAML
WWP2	c.1373G>C	p.G458A	EDPRTQGMIQEPALPPGWEMKYTSE[p.G458A]AVRYFVDHNTRTTTFKDPRPGFESGT	EMKYTSEAV,KYTSEAVRY,YTSEAVRYF,TSEAVRYFV,WEMKYTSEA,YTSEAVRYFV,KYTSEAVRYF,MKYTSEAVRY,EMKYTSEAVR,WEMKYTSEAV,SEAVRYFVDH	KIRC
XAB2	c.2344G>A	p.E782K	SDLAPGQSGMDDMKLLEQRAEQLAA[p.E782K]KAERDQPLRAQSKILFVRSDASREEL	EQLAAKAER,AKAERDQPL,FQRAEQLAAK	BLCA
XDH	c.1228C>T	p.P410S	MDHTFFPGYRKTLLSPEEILLSIEI[p.P410S]SYSREGEYFSAFKQASRREDDIAKVT	ISYSREGEY,LSIEISYSR,SYSREGEYF,ILLSIEISY,IEISYSREG,ISYSREGEYF,LLSIEISYSR,EILLSIEISY,EEILLSIEIS	TGCT
XIRP2	c.7315G>A	p.D2439N	GKTGVLPPPTLPKPKLPKHIKDNKN[p.D2439N]NFSPKVELATSLSDMECKITTSKDQK	KDNKNNFSPK,KHIKDNKNNF	SKCM
XIRP2	c.9023T>A	p.V3008E	IPGWLISEDKREYAVHIAMENNLEK[p.V3008E]EKEEITHIKTQAEDMLVSYENIQTA	KEKEEITHI	CLL

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
XKR6	c.803G>A	p.R268Q	SVIHLLQMGQVWRYIRTMYLGIQSQ[p.R268Q]QRKEHQRRFYWAMMYEYADVNMLRLL	MYLGIQSQQR,QQRKEHQRRF	CRC
XPO1	c.1711G>A	p.E571K	QYPRFLRAHWKFLKTVVNKLFEFMH[p.E571K]KTHDGVQDMACDTFIKIAQKCRRHFV	KLFEFMHKT,FMHKTHDGV,KTHDGVQDM,KLFEFMHKTH,VNKLFEFMHK,KTHDGVQDMA,EFMHKTHDGV,FMHKTHDGVQ,HKTHDGVQDM	BRCA,CLL
XPOT	c.1621C>T	p.R541W	EPQHIPCVLMAFLDHRGLRHSSAKV[p.R541W]WSRTAYLFSRFVKSLNKQMNPFIEDI	KVWSRTAYL,HSSAKVWSR,VWSRTAYLF,SAKVWSRTA,WSRTAYLFS,AKVWSRTAY,LRHSSAKVW,KVWSRTAYLF,SAKVWSRTAY,WSRTAYLFSR,GLRHSSAKVW,AKVWSRTAYL	CRC
XYLB	c.260C>T	p.S87F	TSPVLMWVQALDIILEKMKASGFDF[p.S87F]FQVLALSGAGQQHGSIYWKAGAQQAL	FQVLALSGA,MKASGFDFF,SGFDFFQVL,FDFFQVLAL,KASGFDFFQV,KMKASGFDFF,FQVLALSGAG	BLCA
XYLT2	c.1578delC	p.Y526fs	RKFESTVNQEVLEILDFHLYGSYPP[p.Y526fs]ARQPSRPTGRTPTTRLMAPVGSVMSCSLLTQPSPASACTMPPLLHPQWAPHSAGLSPGACRPACTCISMTTISRATW*	HLYGSYPPA,RLMAPVGSV,SLLTQPSPA,LMAPVGSVM,CISMTTISR,RTPTTRLMA,TTRLMAPVG,ASACTMPPL,ISMTTISRA,LYGSYPPAR,PTTRLMAPV,HSAGLSPGA,RPTGRTPTT,HPQWAPHSA,SPGACRPAC,RPACTCISM,LLHPQWAPH,GSVMSCSLL,MTTISRATW,MPPLLHPQW,RLMAPVGSVM,LLTQPSPASA,GLSPGACRPA,HLYGSYPPAR,TMPPLLHPQW,TGRTPTTRLM,ASACTMPPLL,SYPPARQPSR,TCISMTTISR,TPTTRLMAPV,QPSPASACTM,HPQWAPHSAG,APHSAGLSPG,RPACTCISMT,FHLYGSYPPA,PQWAPHSAGL,SMTTISRATW,MPPLLHPQWA	STAD
YBX1	c.749C>T	p.P250L	GAGEQGRPVRQNMYRGYRPRFRRGP[p.P250L]LRQRQPREDGNEEDKENQGDETQGQQ	RFRRGPLRQ,RPRFRRGPL,RPRFRRGPLR,RFRRGPLRQR	KIRP
YBX2	c.677delC	p.P226fs	SAGTGPGSKGERAEDSGQRPRRWCP{p.P226fs]HPSSTDGGLCEAPGLPTSSSL*	RWCPHPSST,HPSSTDGGL,CEAPGLPTS,GQRPRRWCPH,RPRRWCPHPS,APGLPTSSSL,RRWCPHPSST,CEAPGLPTSS	STAD
YIF1A	c.391delC	p.R131fs	LGLLVFPYTHQNWEVQYSRDAPLPP[p.R131fs]GKTSTPLTSISPRWPSLLTCSWLGWHWAFRKGSPRRCWACVQAQRWCGW*	KTSTPLTSI,SISPRWPSL,LGWHWAFRK,WLGWHWAFR,ISPRWPSLL,SWLGWHWAF,AFRKGSPRR,KGSPRRCWA,TPLTSISPR,WAFRKGSPR,CWACVQAQR,PPGKTSTPL,SPRWPSLLT,SPRRCWACV,LLTCSWLGW,RKGSPRRCW,VQAQRWCGW,WPSLLTCSW,WACVQAQRW,SISPRWPSLL,WLGWHWAFRK,STPLTSISPR,SWLGWHWAFR,RWPSLLTCSW,SLLTCSWLGW,CSWLGWHWAF,CWACVQAQRW,TSISPRWPSL,HWAFRKGSPR,WAFRKGSPRR,APLPPGKTST,LPPGKTSTPL,SPRWPSLLTC,WPSLLTCSWL,GKTSTPLTSI,TPLTSISPRW	STAD
YLPM1	c.3533delA	p.E1178fs	RGLGRSDFGRDRGPFRPEPGDGGEK[p.E1178fs]CIHITGMSLLGLHGTMEKSEGMKSFH*	LGLHGTMEK,TMEKSEGMK,CIHITGMSL,IHITGMSLL,SLLGLHGTM,EKSEGMKSF,CIHITGMSLL,HITGMSLLGL,GMSLLGLHGT,LLGLHGTMEK,GTMEKSEGMK,MEKSEGMKSF,MSLLGLHGTM,GEKCIHITGM,KCIHITGMSL	STAD
YTHDC2	c.1900G>A	p.E634K	IMHLLYNICHSCDAGAVLIFLPGYD[p.E634K]KIVGLRDRILFDDKRFADSTHRYQVF	FLPGYDKIV,LIFLPGYDK,IFLPGYDKI,VLIFLPGYDK,LPGYDKIVGL	CRC
YTHDC2	c.553G>A	p.E185K	NREMSKTSGRLNNGIPQIPVKRGES[p.E185K]KFDSFRQSLPVFEKQEEIVKIIKENK	RGESKFDSF,IPVKRGESKF,KRGESKFDSF,SKFDSFRQSL	UCEC
ZAR1	c.126G>C	p.Q42H	CPPCSYRYPYPAATKGKGAAGGSWQ[p.Q42H]HRGRGCLPASSPCSAGAASLSFPGCG	WQHRGRGCL,WQHRGRGCLP	ACC
ZBBX	c.1787G>T	p.R596I	TKSSLLLQEIACRSKPITKQYQGLE[p.R596I]IFFIFDTNERLNLLPSHRLECNNSST	YQGLEIFFI,KQYQGLEIF,QYQGLEIFF,QGLEIFFIF,TKQYQGLEI,LEIFFIFDT,KQYQGLEIFF,QYQGLEIFFI,YQGLEIFFIF,ITKQYQGLEI,IFFIFDTNER,TKQYQGLEIF	CRC
ZBBX	c.453_455delAGA	p.E151del	KPKINGKVCGQCENKAALLVCLECG[p.E151del]DYCSGCFAKVHQKGALKLHRTTLLQAKS	LVCLECGDY,LLVCLECGDY	STAD
ZBED4	c.1154C>T	p.S385L	PSLLPPEGELSSVSSSPVKPVRESP[p.S385L]LASSSPDRLTEDLQSHLNPGDGLMED	RESPLASSS,RESPLASSSP	CESC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ZBTB20	c.2075delC	p.P692fs	CKKKFSHKTLLERHVALHSASNGTP[p.P692fs]LQAHPQVPALAPQAWWPARRGPLTSAPSAQQSLTKSSSSTTT*	APQAWWPAR,HSASNGTPL,LAPQAWWPA,TPLQAHPQV,WPARRGPLT,WWPARRGPL,LQAHPQVPA,QAHPQVPAL,VPALAPQAW,LQAHPQVPAL,ALAPQAWWPA,AWWPARRGPL,LAPQAWWPAR,APQAWWPARR,WPARRGPLTS,LHSASNGTPL,TSAPSAQQSL,AQQSLTKSSS,VPALAPQAWW	STAD
ZBTB24	c.1819C>A	p.L607I	QNMTADQAANLTLLTQQPEQLQNLI[p.L607I]ISAQQEQTEHIQSLNMIESQMGPSQT	QLQNLIISA,LQNLIISAQ,EQLQNLIISA,QPEQLQNLII	CRC
ZBTB40	c.786_787insA	p.L262fs	QLNFLLENEGVFSDALMVTQDVLKK[p.L262fs]TRNVFRN*	VLKKTRNVF,VLKKTRNVFR,VTQDVLKKTR	STAD
ZBTB7C	c.1D25_1026insG	p.G342fs	ELPPPPPPPFPNDFFKDMFPDLPGG[p.G342fs]ASGTHQGGERLRCLSQLPECHPPGRPLPTLAPGRRAQAEAQGLSAVPHLPQSHHGGREAAAAHEDPYRGEAIHVHHLRGPLHQAGQAENPHAEAHRGAALPVHPLQRQVRAQLRPQEPHAHPHGRAALPVRVLLQELHAL*	VLLQELHAL,HLRGPLHQA,RLRCLSQLP,HVHHLRGPL,QLRPQEPHA,HAHPHGRAA,HGRAALPVR,AALPVRVLL,RVLLQELHA,AAAAHEDPY,EAIHVHHLR,HPPGRPLPT,RPLPTLAPG,HAEAHRGAA,HPLQRQVRA,LQRQVRAQL,RAALPVRVL,SQLPECHPP,RAQAEAQGL,AEAQGLSAV,AQGLSAVPH,SHHGGREAA,GEAIHVHHL,AENPHAEAH,AEAHRGAAL,AHRGAALPV,GAALPVHPL,RQVRAQLRP,AQLRPQEPH,FPDLPGGAS,DPYRGEAIH,DMFPDLPGGA,TLAPGRRAQA,AQAEAQGLSA,GQAENPHAEA,AAAAHEDPYR,AALPVHPLQR,RLRCLSQLPE,HVHHLRGPLH,LQRQVRAQLR,HAHPHGRAAL,HGRAALPVRV,RAALPVRVLL,RVLLQELHAL,HLPQSHHGGR,EAHRGAALPV,HPPGRPLPTL,APGRRAQAEA,HAEAHRGAAL,LPVHPLQRQV,RPQEPHAHPH,HPHGRAALPV,LPVRVLLQEL,EAAAAHEDPY,HQGGERLRCL,GERLRCLSQL,SQLPECHPPG,RRAQAEAQGL,AQGLSAVPHL,HEDPYRGEAI,IHVHHLRGPL,HQAGQAENPH,AHRGAALPVH,RGAALPVHPL,RQVRAQLRPQ,AQLRPQEPHA,GRAALPVRVL,FPDLPGGASG,AEAQGLSAVP,DPYRGEAIHV	STAD
ZBTB7C	c.460delG	p.D154fs	ILNAARMLEIQCIVNVCLEIMEPGG[p.D154fs]TGGRRMTRRTMTTTKMMMMRRTKRRRRKRRRMTMMTRRTLLTKKTCLTPRTSAATKALPRQTISQRRPIQTPPGTSLTPSRLAVLAIWG*	TMMTRRTLL,SLTPSRLAV,CLTPRTSAA,KMMMMRRTK,MMMMRRTKR,MMMRRTKRR,MTRRTLLTK,GTGGRRMTR,TTTKMMMMR,TTKMMMMRR,SAATKALPR,RMTRRTMTT,MTRRTMTTT,TRRTMTTTK,RTMTTTKMM,MMRRTKRRR,RTKRRRRKR,RRRMTMMTR,MTMMTRRTL,RTSAATKAL,MTTTKMMMM,QTISQRRPI,RRKRRRMTM,TLLTKKTCL,IQTPPGTSL,RRTMTTTKM,TMTTTKMMM,RKRRRMTMM,TKALPRQTI,SQRRPIQTP,SRLAVLAIW,TMMTRRTLLT,CLTPRTSAAT,SLTPSRLAVL,MTRRTMTTTK,KMMMMRRTKR,MMMMRRTKRR,MMMRRTKRRR,MMTRRTLLTK,MTRRTLLTKK,MTTTKMMMMR,TTTKMMMMRR,LTPRTSAATK,TSAATKALPR,RTMTTTKMMM,MMRRTKRRRR,MRRTKRRRRK,RTKRRRRKRR,RRRKRRRMTM,KRRRMTMMTR,RRRMTMMTRR,RMTMMTRRTL,MTMMTRRTLL,RTLLTKKTCL,LTKKTCLTPR,KTCLTPRTSA,ATKALPRQTI,RQTISQRRPI,TPRTSAATKA,TPSRLAVLAI,RRKRRRMTMM,RMTRRTMTTT,TRRTMTTTKM,RRTMTTTKMM,TMTTTKMMMM,SQRRPIQTPP,IQTPPGTSLT	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ZBTB7C	c.469delG	p.E157fs	AARMLEIQCIVNVCLEIMEPGGDGG[p.E157fs]RRMTRRTMTTTKMMMMRRTKRRRRKRRRMTMMTRRTLLTKKTCLTPRTSAATKALPRQTISQRRPIQTPPGTSLTPSRLAVLAIWG*	TMMTRRTLL,SLTPSRLAV,CLTPRTSAA,KMMMMRRTK,MMMMRRTKR,MMMRRTKRR,MTRRTLLTK,TTTKMMMMR,TTKMMMMRR,SAATKALPR,RMTRRTMTT,MTRRTMTTT,TRRTMTTTK,RTMTTTKMM,MMRRTKRRR,RTKRRRRKR,RRRMTMMTR,MTMMTRRTL,RTSAATKAL,MTTTKMMMM,QTISQRRPI,RRKRRRMTM,TLLTKKTCL,IQTPPGTSL,RRTMTTTKM,TMTTTKMMM,RKRRRMTMM,TKALPRQTI,SQRRPIQTP,SRLAVLAIW,TMMTRRTLLT,CLTPRTSAAT,SLTPSRLAVL,MTRRTMTTTK,KMMMMRRTKR,MMMMRRTKRR,MMMRRTKRRR,MMTRRTLLTK,MTRRTLLTKK,MTTTKMMMMR,TTTKMMMMRR,LTPRTSAATK,TSAATKALPR,RTMTTTKMMM,MMRRTKRRRR,MRRTKRRRRK,RTKRRRRKRR,RRRKRRRMTM,KRRRMTMMTR,RRRMTMMTRR,RMTMMTRRTL,MTMMTRRTLL,RTLLTKKTCL,LTKKTCLTPR,KTCLTPRTSA,ATKALPRQTI,RQTISQRRPI,TPRTSAATKA,TPSRLAVLAI,RRKRRRMTMM,RMTRRTMTTT,TRRTMTTTKM,RRTMTTTKMM,TMTTTKMMMM,SQRRPIQTPP,IQTPPGTSLT	STAD
ZC3H12D	c.1213C>T	p.P405S	SAGGRVPGPLSLPSPESQFSPGDLP[p.P405S]SPPGLQLQPRGEHRPRDLHGDLLSPR	LPSPPGLQL,SQFSPGDLPS	ACC
ZC3H13	c.3018delA	p.K1006fs	NIETTSEDGQVFSPKKGQKKKSIEK[p.K1006fs]NVKNPKVILIFLMKKQPSKVRRKEAHGLPL*	LMKKQPSKV,KVILIFLMK,VILIFLMKK,FLMKKQPSK,KNPKVILIF,KQPSKVRRK,KVRRKEAHG,RKEAHGLPL,FLMKKQPSKV,KVILIFLMKK,SIEKNVKNPK,IFLMKKQPSK,LMKKQPSKVR,KVRRKEAHGL,RRKEAHGLPL,QPSKVRRKEA,VKNPKVILIF,NPKVILIFLM,IEKNVKNPKV	STAD
ZC3H18	c.2102_2103insC	p.T701fs	PVPEPTKPGDPREARRKERPARTPP[p.T701fs]QEADAKRQRQWQW*	AKRQRQWQW,RTPPQEADAK,RPARTPPQEA	STAD
ZC3H18	c.2473delC	p.P825fs	PKSAKPPAGGKSSQQPSTPQQAPPG[p.P825fs]SPSRAHLWPTRRSS*	RAHLWPTRR,QQAPPGSPS,PSRAHLWPTR,RAHLWPTRRS,SPSRAHLWPT	STAD
ZC3H4	c.2392G>A	p.E798K	IQQKQQEEEERARRLAESSKQDREN[p.E798K]KEGDTGNWYSSDEDEGGSSVTSILKT	SSKQDRENK,KEGDTGNWY	BLCA
ZC3H7A	c.1724G>C	p.C575S	NGKINLTVFKLLQEHLGEFIFLCEK[p.C575S]SFDHKPRMISKRNKDNSTACSHPVTK	KSFDHKPRM,FIFLCEKSF,EFIFLCEKSF,KSFDHKPRMI,GEFIFLCEKS	TGCT
ZCCHC6	c.2811A>T	p.K937N	GKHVERALLVELNKISLKEENVCEE[p.K937N]NNSPVDQSDFFYEFSKLIFTKGKSPT	NVCEENNSPV	KIRC
ZCRB1	c.228A>T	p.L76F	KGVAFILFLDKDSAQNCTRAINNKQ[p.L76F]FFGRVIKASIAIDNGRAAEFIRRRNY	KQFFGRVIK,RAINNKQFF,INNKQFFGR,NKQFFGRVI,AINNKQFFGR,FFGRVIKAS,RAINNKQFFG,KQFFGRVIKA,CTRAINNKQF	CLL
ZCWPW2	c.430G>A	p.D144N	DRFKGKYVTYDPDGNVEEYHIEFLG[p.D144N]NPHSRSWIKATFVGHYSITLKPEKCK	EFLGNPHSR,LGNPHSRSW,IEFLGNPHS,YHIEFLGNPH,FLGNPHSRSW	CRC
ZDHHC11	c.750C>G	p.H250Q	PVQVQTLIVVIIGMLVLLLDFLGLV[p.H250Q]QLGQLLIFHIYLKAKKMTTFEYLINN	GLVQLGQLL,VQLGQLLIF,LDFLGLVQL,LLDFLGLVQL,FLGLVQLGQL,QLGQLLIFHI,GLVQLGQLLI,LVQLGQLLIF	TGCT
ZDHHC4	c.899G>A	p.R300H	LFVLYLAATNQTTNEWYRGDWAWCQ[p.R300H]HCPLVAWPPSAEPQVHRNIHSHGLRS	WAWCQHCPL,CQHCPLVAW,WAWCQHCPLV	GBM
ZDHHC5	c.1947_1949delAGA	p.E651del	PTAPYLGRSMSYSSQKAQPGVSETE[p.E651del]VALQPLLTPKDEVQLKTTYSKSNGQPKS	ETEVALQPL,TEVALQPLL,AQPGVSETEV,ETEVALQPLL,SETEVALQPL,TEVALQPLLT	STAD
ZDHHC7	c.948delC	p.P316fs	LKSEKPTWERRLRWEGMKSVFGGPP[p.P316fs]HSSG*	KSVFGGPPH,MKSVFGGPPH	STAD
ZEB2	c.3280G>A	p.E1094K	SYSQHMNHRYSYCKREAEEREAAER[p.E1094K]KAREKGHLEPTELLMNRAYLQSITPQ	KAREKGHLE,KAREKGHLEP	CESC

基因	cDNA 變化	蛋白質變化	突變背景序列	肽	實例性疾病
ZEB2	c.467G>A	p.R156H	NNGTVKNANCTSDFEEYFAKRKLEE[p.R156H]HDGHAVSIEEYLQRSDTAIIYPEAPE	LEEHDGHAV,EEHDGHAVS,KLEEHDGHAV,EEHDGHAVSI	CRC
ZFAND2B	c.446T>C	p.I149T	IKHRHPLDHDCSGEGHPTSRAGLAA[p.I149T]TSRAQAVASTSTVPSPSQTMPSCTSP	TSRAGLAAT,RAGLAATSR,ATSRAQAVA,GLAATSRAQA,TSRAQAVAST,LAATSRAQAV	KIRC
ZFC3H1	c.1155delA	p.K385fs	KKLGEDEEELSELQLRLLALQSASK[p.K385fs]NGNKKNSR*	QSASKNGNK,LQSASKNGNK	STAD
ZFHX3	c.2287delG	p.E763fs	KGNLSIHMQSDKHLNNMQNLQNGGG[p.E763fs]SRSSATLPGRRRRRWLRRRRQPISVAPAGPPRRPNQKPNPPGGARCVIMRPTWPGTSAFT*	RQPISVAPA,RSSATLPGR,SSATLPGRR,SVAPAGPPR,ATLPGRRRR,RRRRRWLRR,RRRRQPISV,IMRPTWPGT,TLPGRRRRR,WLRRRRQPI,RPNQKPNPP,RPTWPGTSA,LQNGGGSRS,RRRQPISVA,RCVIMRPTW,PTWPGTSAF,QPISVAPAG,RSSATLPGRR,ISVAPAGPPR,SVAPAGPPRR,RWLRRRRQPI,GSRSSATLPG,ATLPGRRRRR,RRRRRWLRRR,RRRRQPISVA,AGPPRRPNQK,IMRPTWPGTS,LPGRRRRRWL,RPNQKPNPPG,RPTWPGTSAF,WLRRRRQPIS,LRRRRQPISV,LQNGGGSRSS,RRQPISVAPA	STAD
ZFHX3	c.2330_2332delTGG	p.V777del	NNMQNLQNGGGEQVFSHTAGAAAAA[p.V777del]AAAAAAANISSSCGAPSPTKPKTKPTWR	HTAGAAAAA	PAAD
ZFHX3	c.5677_5678delAG	p.R1893fs	LQPSQHPEKKNKLVIKEKEKESQRE[p.R1893fs]GQRRGGRGQHRSEGNTARCLEGQREERVGTRGWF*	TARCLEGQR,SEGNTARCL,EERVGTRGW,NTARCLEGQR,GQRRGGRGQH,GQHRSEGNTA,REERVGTRGW,EERVGTRGWF	STAD,UCEC
ZFHX4	c.1224_1225insG	p.L408fs	ASTSSSAEQPLGITQMPKAEVNLGG[p.L408fs]AV*	AEVNLGGAV	STAD
ZFHX4	c.2433G>T	p.L811F	MTSEKHMHNMMLLQQNMKQIQHNLH[p.L811F]FGLAPAEAELYQYYLAQNIGLTGMKL	IQHNLHFGL,NLHFGLAPA,KQIQHNLHF,MKQIQHNLHF,KQIQHNLHFG,IQHNLHFGLA,LHFGLAPAEA	LUAD
ZFHX4	c.4988C>A	p.T1663N	IAANVNSPGQGMLDSMSLAAVNSKD[p.T1663N]NHLDAKELNKKQTPDLISAQPAHHPP	NSKDNHLDAK	LUAD
ZFHX4	c.7533C>A	p.H2511Q	LPPQLLQYQCDQCTVAFPTLELWQE[p.H2511Q]QQHMHFLAAQNQFLHSPFLERPMDMP	QQHMHFLAA,ELWQEQQHM,WQEQQHMHF,QEQQHMHFL,LWQEQQHMHF,LELWQEQQHM,WQEQQHMHFL,EQQHMHFLAA,QQHMHFLAAQ,QEQQHMHFLA	LUAD
ZFP14	c.1156C>T	p.R386C	SIHTGEKPYECKECGKTFRLRQQLV[p.R386C]CHQRIHTREKPYECMECWKTFSSYSQ	RLRQQLVCH,QQLVCHQRI,RQQLVCHQRI,LVCHQRIHTR,QQLVCHQRIH	CRC
ZFP14	c.50A>T	p.Q17L	MAHGSVTFRDVAIDFS[p.Q17L]LEEWEFLDPAQRDLYRDVMWENYSNF	DFSLEEWEF,RDVAIDFSL,VAIDFSLEEW,IDFSLEEWEF,LEEWEFLDPA	LUAD
ZFP2	c.449G>T	p.R150I	TGEKPYKCNVCGKHFIERSSLTVHQ[p.R150I]IIHTGEKPYKCNECGKAFSQSMNLTV	RSSLTVHQI,SSLTVHQII,RSSLTVHQII	CRC
ZFP3	c.818G>T	p.R273I	TGEKPYECNECGKTFRVSSQLIQHQ[p.R273I]IIHTEERYHECNECGKAFKHSSGLIR	QIIHTEERY,HQIIHTEER,IQHQIIHTE,HQIIHTEERY	CRC
ZFP36L2	c.718G>A	p.D240N	IHNADERRPAPSGGASGDLRAFGTR[p.D240N]NALHLGFPREPRPKLHHSLSFSGFPS	RAFGTRNAL,GTRNALHLG,NALHLGFPR,TRNALHLGF,RAFGTRNALH,GTRNALHLGF,RNALHLGFPR,LRAFGTRNAL	LUSC
ZFP42	c.679G>A	p.V227I	RAALRKHLLIHGPRDHVCAECGKAF[p.V227I]IESSKLKRHFLVHTGEKPFRCTFEGC	AFIESSKLK,KAFIESSKL,KAFIESSKLK,CGKAFIESSK,AFIESSKLKR,GKAFIESSKL,IESSKLKRHF,AECGKAFIES	GBM
ZFP42	c.791C>T	p.T264M	HTGEKPFRCTFEGCGKRFSLDFNLR[p.T264M]MHVRIHTGEKRFVCPFQGCNRRFIQS	RMHVRIHTG,DFNLRMHVR,FSLDFNLRM,SLDFNLRMHV,RFSLDFNLRM,RMHVRIHTGE,NLRMHVRIHT	GBM
ZFP90	c.1772_1773insA	p.R591fs	IQHERTHTGEKPYECNECGRAFRKK[p.R591fs]NQPA*	AFRKKNQPA,RAFRKKNQPA	PRAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ZFPM1	c.1330_1331delGA	p.E444fs	GLAPTPSPGLDRKALAEATNGEARA[p.E444fs]ASGPEWRQQRAPGGPQEHQGGGGGGAGGGPHPGPRRAWAPGPVADAVAAQPRPGQGQGRAVQPHAGLQPGARRAGPGRGPVPSAVRVRARRGAPRLGDPGQDVRAGAQPAAAGRGRGRRRRADRALPRGPQGRYVLRVRDHLQQRQQLLRAQAPLLFRPPCARGRACRAQAQGAPRPGPRAPRPARRTRRAALVPGPRSARGGGWGRGHARGRRGRPGQRGQPEPG*	QLLRAQAPL,RLGDPGQDV,LLRAQAPLL,ALVPGPRSA,RAQAPLLFR,LLFRPPCAR,RAQAQGAPR,RAALVPGPR,RAWAPGPVA,QGRAVQPHA,GARRAGPGR,RAGPGRGPV,SAVRVRARR,AVRVRARRG,RVRARRGAP,RARRGAPRL,RAGAQPAAA,AGRGRGRRR,RGRGRRRRA,RGRRRRADR,RALPRGPQG,QGRYVLRVR,RVRDHLQQR,CARGRACRA,RGRACRAQA,RTRRAALVP,SARGGGWGR,RGHARGRRG,RGRRGRPGQ,SGPEWRQQR,HAGLQPGAR,LVPGPRSAR,HPGPRRAWA,GPRRAWAPG,APGPVADAV,RPGQGQGRA,RAVQPHAGL,VPSAVRVRA,RRRRADRAL,RPPCARGRA,APRPGPRAP,RPARRTRRA,ARRTRRAAL,RPGQRGQPE,HLQQRQQLL,ARAASGPEW,RRAWAPGPV,GQGRAVQPH,RQQLLRAQA,LRAQAPLLF,GPVADAVAA,LPRGPQGRY,QLLRAQAPLL,RVRARRGAPR,RSARGGGWGR,RYVLRVRDHL,AVRVRARRGA,RARRGAPRLG,AGRGRGRRRR,RGRRRRADRA,RRRADRALPR,RALPRGPQGR,RVRDHLQQRQ,LLRAQAPLLF,LFRPPCARGR,RGRACRAQAQ,RAPRPARRTR,RTRRAALVPG,RGHARGRRGR,RGRRGRPGQR,ALPRGPQGRY,HAGLQPGARR,HLQQRQQLLR,WAPGPVADAV,GPHPGPRRAW,RPGQGQGRAV,LPRGPQGRYV,RPPCARGRAC,RPGPRAPRPA,RPARRTRRAA,PARRTRRAAL,GPRSARGGGW,QQLLRAQAPL,RQQRAPGGPQ,RRAWAPGPVA,GQGRAVQPHA,RRAGPGRGPV,VRARRGAPRL,RDHLQQRQQL,LQQRQQLLRA,RQQLLRAQAP,AQAPLLFRPP,AQAQGAPRPG	ACC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ZFPM1	c.1335delT	p.P445fs	APTPSPGLDRKALAEATNGEARAEP[p.P445fs]WPRMEAAASPRRPPGASRWRRWRSRRRPPSWAPESLGPRPRRGRRRRAAPPRPGSRPSCPAPRRAPARCPASWAWPGPCSFRSTCSGPTRRPPPRRSWPRCPSWCTAGCSRARARAPAARRPGSSPGPPRALRASSARSPSATSTTTTCTSASTVQAAVRPRTRLPRAGPRRPPARPARPPASPPNPTRRARPRAPERARRGLGARPRPRTARAAGAARAARARVAPWTTRRTTPAARCARPATSASAATRPTPCTSGTTAPRATTRRRADRPRPRDPLGRPRPRPPLPPRLCARADAASSTCTRPAPRPPRRPATPPRPSRRGPEAEAEAAPASPLRARPAPRPTAPST*	RMEAAASPR,RVAPWTTRR,STCSGPTRR,RALRASSAR,TVQAAVRPR,ATSASAATR,CTSGTTAPR,TTAPRATTR,TSCTRPAPR,WAWPGPCSF,RSWPRCPSW,ASRWRRWRS,RWRRWRSRR,RWRSRRRPP,RSRRRPPSW,RPRRGRRRR,RGRRRRAAP,RRRRAAPPR,RSTCSGPTR,PTRRPPPRR,RARARAPAA,RARAPAARR,ALRASSARS,RASSARSPS,ASSARSPSA,AVRPRTRLP,RPRTRLPRA,RTRLPRAGP,RLPRAGPRR,RAGPRRPPA,PARPARPPA,PTRRARPRA,RARPRAPER,RARRGLGAR,GARPRPRTA,RPRPRTARA,RTARAAGAA,TARAAGAAR,AAGAARAAR,AARAARARV,AARARVAPW,RARVAPWTT,TTRRTTPAA,RTTPAARCA,AARCARPAT,ATRPTPCTS,ATTRRRADR,RPRPPLPPR,CTRPAPRPP,RPAPRPPRR,PLRARPAPR,RARPAPRPT,EARAEPWPR,GASRWRRWR,ESLGPRPRR,SWCTAGCSR,CTAGCSRAR,QAAVRPRTR,TTPAARCAR,EAAPASPLR,TTCTSASTV,CTSASTVQA,SASTVQAAV,WTTRRTTPA,EPWPRMEAA,WPRMEAAAS,SPRRPPGAS,CPAPRRAPA,APARCPASW,APAARRPGS,RPARPPASP,APERARRGL,RPRTARAAG,RAAGAARAA,APWTTRRTT,RPATSASAA,RPTPCTSGT,RPRPRPPLP,APRPPRRPA,RPATPPRPS,RPSRRGPEA,RPAPRPTAP,APRPTAPST,ARAEPWPRM,RRAPARCPA,ARCPASWAW,AAVRPRTRL,AEAAPASPL,CPASWAWPG,AEAEAAPAS,AEPWPRMEA,LPPRLCARA,STVQAAVRPR,RTARAAGAAR,RTTPAARCAR,GTTAPRATTR,TTAPRATTRR,STSCTRPAPR,SWAWPGPCSF,RMEAAASPRR,AASPRRPPGA,ASRWRRWRSR,RWRRWRSRRR,RWRSRRRPPS,RSRRRPPSWA,RGRRRRAAPP,RAAPPRPGSR,GSRPSCPAPR,SFRSTCSGPT,RSTCSGPTRR,SGPTRRPPPR,RSWPRCPSWC,CSRARARAPA,RARARAPAAR,RARAPAARRP,AARRPGSSPG,RALRASSARS,RASSARSPSA,AVRPRTRLPR,RTRLPRAGPR,RAGPRRPPAR,RARPRAPERA,RPRAPERARR,RARRGLGARP,RGLGARPRPR,GARPRPRTAR,TARAAGAARA,RAAGAARAAR,AARAARARVA,AARARVAPWT,RARVAPWTTR,TTRRTTPAAR,AARCARPATS,CARPATSASA,ATRPTPCTSG,RATTRRRADR,TTRRRADRPR,RRRADRPRPR,RPRPRDPLGR,RPRDPLGRPR,LGRPRPRPPL,RPRPPLPPRL,CTRPAPRPPR,RARPAPRPTA,SWAPESLGPR,CPAPRRAPAR,WAWPGPCSFR,RPPPRRSWPR,TAGCSRARAR,SASTVQAAVR,DAASSTSCTR,SPLRARPAPR,CTAGCSRARA,TTTCTSASTV,CTSASTVQAA,TSASTVQAAV,WTTRRTTPAA,CTSGTTAPRA,EAEAAPASPL,EAAPASPLRA,WPRMEAAASP,RPPSWAPESL,RPRRGRRRRA,RPGSRPSCPA,RPSCPAPRRA,APARCPASWA,WPRCPSWCTA,APAARRPGSS,PPRALRASSA,RPRTRLPRAG,LPRAGPRRPP,GPRRPPARPA,RPARPPASPP,RPRPRTARAA,RPRTARAAGA,APWTTRRTTP,TPAARCARPA,RPATSASAAT,RPTPCTSGTT,APRATTRRRA,RPRPRPPLPP,RPPLPPRLCA,APRPPRRPAT,RPAPRPTAPS,WRSRRRPPSW,RAPARCPASW,RRSWPRCPSW,ARAAGAARAA,RAARARVAPW,EPWPRMEAAA,AEPWPRMEAA,AEAEAAPASP,PEAEAEAAPA	ACC
ZFR2	c.319T>A	p.Y107N	TTMATYQDSYSYGQSAAARSYEDRP[p.Y107N]NFQSAALQSGRMTAADSGQPGTQEAC	RSYEDRPNF,RPNFQSAAL,ARSYEDRPNF,YEDRPNFQSA	KIRC
ZFYVE1	c.797G>A	p.R266Q	GATVNLSQRTRLLLKVLAISDLVIY[p.R266Q]QTHADRLHNDLFKFLGDASEAYLKHF	IYQTHADRL,VIYQTHADR,YQTHADRLH,AISDLVIYQT,LVIYQTHADR,VIYQTHADRL	UCEC
ZFYVE9	c.3441G>C	p.M1147I	VVQGLVVDMEVRKTSIKIPSNRYNE[p.M1147I]IMKAMNKSNEHVLAGGACFNEKADSH	SNRYNEIMK,IPSNRYNEI,RYNEIMKAM,IPSNRYNEIM,NRYNEIMKAM	CESC
ZHX3	c.747C>A	p.N249K	EVREGDHSFINGAVPVSQASASSAK[p.N249K]KPHAANGPLIGTVPVLPAGIAQFLSL	QASASSAKK,ASSAKKPHA,KPHAANGPL,SQASASSAKK,KPHAANGPLI,KKPHAANGPL	STAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ZIC1	c.335C>A	p.A112E	GSYSSAAFNSTRDFLFRNRGFGDAA[p.A112E]EAASAQHSLFAASAGGFGGPHGHTDA	EAASAQHSL,AEAASAQHS,EAASAQHSLF,RGFGDAAEAA,AEAASAQHSL	LUAD
ZIC4	c.914C>T	p.S305L	GEKPFRCEFEGCERRFANSSDRKKH[p.S305L]LHVHTSDKPYTCKVRGCDKCYTHPSS	HLHVHTSDK,KKHLHVHTS,KHLHVHTSDK,LHVHTSDKPY	CRC
ZIM3	c.1054G>A	p.D352N	RIHTGEKPYKCSICEKAFSQKSNVI[p.D352N]NHEKIHTGKRAYECDLCGNTFIQKKN	KSNVINHEK,SQKSNVINH,KSNVINHEKI,INHEKIHTGK	CRC
ZIM3	c.1150delA	p.I384fs	GKRAYECDLCGNTFIQKKNLIQHKK[p.I384fs]SILGKSPMNVTDVEKPSFRSQTFIAIRKLIAERGPIDVVNVEKPSSGN*	ILGKSPMNV,FIAIRKLIA,KLIAERGPI,SQTFIAIRK,RSQTFIAIR,TFIAIRKLI,QHKKSILGK,KSILGKSPM,SFRSQTFIA,AIRKLIAER,KPSFRSQTF,NLIQHKKSI,LIQHKKSIL,FRSQTFIAI,AERGPIDVV,SILGKSPMNV,LIAERGPIDV,IQHKKSILGK,RSQTFIAIRK,SFRSQTFIAI,IAIRKLIAER,QTFIAIRKLI,KPSFRSQTFI,NLIQHKKSIL,KKSILGKSPM,SQTFIAIRKL,RKLIAERGPI,NVTDVEKPSF	STAD
ZKSCAN1	c.1621_1622delAG	p.R541fs	KCTKCGKAFTRSSTLTLHHRIHARE[p.R541fs]SL*	HRIHARESL,HHRiHARESL	UCEC
ZKSCAN3	c.598_599AA>GC	p.K200A	VGSQPLQDRVLQVPVLAHGGCCRED[p.K200A]AVVASRLTPESQGLLKVEDVALTLTPE	REDAVVASRL	TGCT
ZKSCAN4	c.956G>A	p.R319Q	IPTHAEAGEQEGRLQRKQKNAIGSR[p.R319Q]QHYCHECGKSFAQSSGLTKHRIHTG	NAIGSRQHY,RQHYCHECG,RQHYCHECGK,KNAIGSRQHY	CRC
ZKSCAN5	c.39delC	p.D13fs	MIMTESREVIDLDP[p.D13fs]QLRLPRSRKTFS*	QLRLPRSRK,EVIDLDPQL,RLPRSRKTF,EVIDLDPQLR,DLDPQLRLPR,REVIDLDPQL,LRLPRSRKTF	STAD
ZMIZ1	c.3144delC	p.D1048fs	MPEPSLDLLPELTNPDELLSYLDPP[p.D1048fs]TCRAIVTMTSCLYLRTTEGHPVGAIPPHSASYPTYPTHFSTWEPVPSDRPAPEPRAVGRGALPRCSPLRTEG*	IVTMTSCLY,YLDPPTCRA,AIVTMTSCL,TMTSCLYLR,AVGRGALPR,SYPTYPTHF,TYPTHFSTW,VTMTSCLYL,AIPPHSASY,SYLDPPTCR,SASYPTYPT,RPAPEPRAV,EPRAVGRGA,GALPRCSPL,RAIVTMTSC,ASYPTYPTH,THFSTWEPV,HPVGAIPPH,YPTYPTHFS,EPVPSDRPA,TEGHPVGAI,YLDPPTCRAI,YLRTTEGHPV,VTMTSCLYLR,LSYLDPPTCR,AIVTMTSCLY,STWEPVPSDR,RAVGRGALPR,ASYPTYPTHF,PTYPTHFSTW,RAIVTMTSCL,RTTEGHPVGA,RGALPRCSPL,GALPRCSPLR,GAIPPHSASY,HSASYPTYPT,YPTYPTHFST,RPAPEPRAVG,EPRAVGRGAL,PPHSASYPTY,WEPVPSDRPA	PRAD
ZMIZ2	c.457_501delGTGGCTGCTGCGGCAGCCACTGCCACCGCCAGCCACAGCCACC	p.VAAAAATATATATAT153del	LGLPSHAARPSTDFTQAAAAAAAVAA[p.VAAAAATATATATAT153del]LQEKQSQELSQYGAMGAGQSFNSQFLQHGGPRGPSVPAGMNPTGIGGVMGPSGLSPLAMNPTRAAGMTPL	AAAAAVAAL,AAVAALQEK,AAAVAALQEK,AAAAAAVAAL	PAAD
ZMYM4	c.1033delA	p.K345fs	SSGMNKMLPSVPATAVRVSCSGCKK[p.K345fs]SSRRGKLLIRGKGLLSYSAPHCASLDIQFHLPAHRLLSPRKLVQVAQKTF*	LLIRGKGLL,YSAPHCASL,KSSRRGKLL,SSRRGKLLI,RGKLLIRGK,RGKGLLSYS,AHRLLSPRK,RLLSPRKLV,IRGKGLLSY,CSGCKKSSR,IQFHLPAHR,PAHRLLSPR,APHCASLDI,LPAHRLLSP,SPRKLVQVA,LVQVAQKTF,GLLSYSAPH,HCASLDIQF,ASLDIQFHL,LDIQFHLPA,FHLPAHRLL,SLDIQFHLPA,IQFHLPAHRL,LLSPRKLVQV,LLSYSAPHCA,SYSAPHCASL,GCKKSSRRGK,KSSRRGKLLI,SSRRGKLLIR,RGKGLLSYSA,PAHRLLSPRK,LIRGKGLLSY,DIQFHLPAHR,LPAHRLLSPR,KLVQVAQKTF,KKSSRRGKLL,LDIQFHLPAH	STAD
ZMYM4	c.1100C>T	p.T367I	SGCKKILQKGQTAYQRKGSTQLFCS[p.T367I]ILCLTGYTVPPARPPPPLTKKTCSSC	CSILCLTGY,QLFCSILCL,ILCLTGYTV,GSTQLFCSI,TQLFCSILCL,QLFCSILCLT,SILCLTGYTV,KGSTQLFCSI,GSTQLFCSIL,FCSILCLTGY	TGCT
ZMYM4	c.4337G>A	p.R1446Q	TYLRFFPPLQKQESEPDKLTVGKRK[p.R1446Q]QNEDDEVPVGVEMAENTDNPLRCPVR	KQNEDDEVPV	CRC
ZNF117	c.554G>T	p.R185I	TGEKPYKCKECGKAFNQTSHLIRHK[p.R185I]IIHTEEKPYKCEECGKAFNQSSTLTT	QTSHLIRHKI	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ZNF124	c.1015delA	p.T339fs	GEKPYECQKCGKAFSRASTLWKHKK[p.T339fs]LILEKSPINVKKCKGFNHYSFCQKHEQSHT*	KLILEKSPI,ILEKSPINV,KHKKLILEK,KGFNHYSFC,FNHYSFCQK,KKCKGFNHY,LWKHKKLIL,CKGFNHYSF,LILEKSPINV,ILEKSPINVK,GFNHYSFCQK,KSPINVKKCK,TLWKHKKLIL,KKLILEKSPI,VKKCKGFNHY,KCKGFNHYSF	STAD
ZNF154	c.1223C>A	p.T408N	RPYECSECGKSFTQNSGLIKHRRVH[p.T408N]NGEKPYECTECGKSFSHNSSLIKHQR	HRRVHNGEK,KHRRVHNGEK,RRVHNGEKPY	LUAD
ZNF16	c.1354C>T	p.R452W	HTGEKPYKCSDCGKAFSQSSSLIQH[p.R452W]WRIHTGEKPHVCNVCGKAFSYSSVLR	QSSSLIQHW,QSSSLIQHWR,SQSSSLIQHW	CESC
ZNF167	c.2048G>T	p.R683I	TGEKPYECNECGKVFSYSSSLMVHQ[p.R683I]ITHTGEKPYKCNDCGKAFSDSSQLIV	LMVHQITHT,SLMVHQITH,SLMVHQITHT,YSSSLMVHQI	CRC
ZNF174	c.1057C>A	p.P353T	CDDCGKSFTWNSELKRHKRVHTGER[p.P353T]TYTCGECGNCFGRQSTLKLHQRIHTG	RVHTGERTY,RVHTGERTYT,KRVHTGERTY	TGCT
ZNF180	c.1202G>T	p.R401I	TGEKPYECSECGKSFSRSSHLVSHQ[p.R401I]ITHTGEKPYRCNQCGKSFSQSYVLVV	HLVSHQITH,HLVSHQITHT,ITHTGEKPYR,RSSHLVSHQI	CRC
ZNF180	c.1706G>T	p.R569I	TGEKPYECSECGKSFNRSSHLVMHQ[p.R569I]IIHTGEKPYECNQCGKSFSQSYVLVV	SHLVMHQII,RSSHLVMHQI,SSHLVMHQII	UCEC
ZNF180	c.1874G>T	p.R625I	TGEKPYECSQCGKSFRQSSCLTQHQ[p.R625I]ITHTGEKPFECNQCGKTFSLSARLIV	ITHTGEKPF,TQHQITHTG,QITHTGEKPF	UCEC
ZNF19	c.1046G>T	p.R349I	TGEKPYSCKVCGQAFNFHTKLTRHQ[p.R349I]IIHSEEKPFDCVDCGKAFSAQEQLKR	HTKLTRHQI,HQIIHSEEK,TKLTRHQII,IIHSEEKPF,HTKLTRHQII,RHQIIHSEEK,QIIHSEEKPF	CRC
ZNF195	c.176G>A	p.R59Q	LENYRNLFSVGLTVCKPGLITCLEQ[p.R59Q]QKEPWNVKRQEAADGHPEMGFHHATQ	QQKEPWNVK,QQKEPWNVKR,LEQQKEPWNV	UCEC
ZNF205	c.1150C>T	p.R384C	TGEKPYTCPACRKSFSHHSTLIQHQ[p.R384C]CIHTGEKPYVCDRCAKRFTRRSDLVT	HQCIHTGEK,IQHQCIHTG,CIHTGEKPYV,QCIHTGEKPY	CRC
ZNF223	c.67G>T	p.G23W	MTMSKEAVTFKDVAVVFTEEEL[p.G23W]WLLDLAQRKLYRDVMLENFRNLLSVG	FTEEELWLL,EELWLLDLA,EEELWLLDL,VVFTEEELW,WLLDLAQRKL,VFTEEELWLL,ELWLLDLAQR,TEEELWLLDL,EELWLLDLAQ,EEELWLLDLA	LUAD
ZNF23	c.366delT	p.F122fs	NIKKEKSNTIDGTVKDETSPVEECF[p.F122fs]LVKVQTHISVIPSLESSPLGVQDWGNPSALIQNS*	FLVKVQTHI,KVQTHISVI,SLESSPLGV,IPSLESSPL,VKVQTHISV,THISVIPSL,VQDWGNPSA,QDWGNPSAL,VEECFLVKV,SPVEECFLV,VQDWGNPSAL,VIPSLESSPL,CFLVKVQTHI,LVKVQTHISV,QTHISVIPSL,ETSPVEECFL,TSPVEECFLV,VKVQTHISVI	STAD
ZNF236	c.4229C>T	p.T1410M	NITLQIDPSILQQTLQQGNLLAQQL[p.T1410M]MGEPGLAPQNSSLQTSDSTVPASVVI	QLMGEPGLA,AQQLMGEPG,QQLMGEPGL,LMGEPGLAP,AQQLMGEPGL	STAD
ZNF236	c.4439C>T	p.S1480L	GPLSEQDSVLTTNSSGTQDLTQVMT[p.S1480L]LQGLVSPSGGPHEITLTINNSSLSQV	TQVMTLQGL,QVMTLQGLV,TQVMTLQGLV,MTLQGLVSPS,TQDLTQVMTL	CRC
ZNF248	c.1703G>T	p.R568I	TGEKPYECNACGKTFSQRSVLTKHQ[p.R568I]IIHTRVKALSTS*	HQIIHTRVK,SVLTKHQII,IIHTRVKAL,RSVLTKHQI,LTKHQIIHTR,KHQIIHTRVK,RSVLTKHQII,HQIIHTRVKA	CRC
ZNF254	c.537G>T	p.K179N	FQCDKYLKVFYKFLNSNRPKIRHTE[p.K179N]NKSFKCKKRVKLFCMLSHKTQHKSIY	KIRHTENKS,RHTENKSFK,IRHTENKSF,HTENKSFKCK,RPKIRHTENK,KIRHTENKSF	UCEC
ZNF257	c.1175G>T	p.R392I	TKEKPYKCEECGKAFNRSSHLTKHK[p.R392I]IIHTREKAYKCDEYCKAFNWSSALTT	IIHTREKAY,IIHTREKAYK,KIIHTREKAY,RSSHLTKHKI	UCEC
ZNF259	c.521G>T	p.R174I	LITRAISGLEQDQPARRANKDATAE[p.R174I]IIDEFIVKLKELKQVASPFTLIIDDP	IIDEFIVKL,ATAEIIDEF,AEIIDEFIV,ATAEIIDEFI,IIDEFIVKLK,EIIDEFIVKL,RANKDATAEI	CRC
ZNF263	c.1529G>T	p.R510I	TGEKPYKCPECGEIFAHSSNLLRHQ[p.R510I]IIHTGERPYKCPECGKSFSRSSHLVI	SNLLRHQII	UCEC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ZNF266	c.1031G>A	p.R344Q	TAKDPFECKICGKSFRNSSCLSDHF[p.R344Q]QIHTGIKPYKCKDCGKAFTQNSDLTK	HFQIHTGIK,FQIHTGIKP,CLSDHFQIHT,QIHTGIKPYK,FQIHTGIKPY	CRC
ZNF266	c.1535G>A	p.R512Q	TGEKPYKCKQCGKSFSYSNSFQLHE[p.R512Q]QTHTGEKPYECKECGKAFSSSSSFRN	FQLHEQTHT,EQTHTGEKPY,FQLHEQTHTG	CRC
ZNF268	c.2700_2702delCTT	p.F901del	NSQLIVHQRTHSGEKPYGCNECGKT[p.F901del]SQKSILSAHQRTHTGEKPCKCTECGKAF	KTSQKSILS,KTSQKSILSA	BRCA
ZNF273	c.957T>A	p.N319K	DCGKVFSVFSVLTKHKIIHTGTKPY[p.N319K]KCEECGKGFSIFSTLTKHKIIHTGEK	IIHTGTKPYK	KIRC
ZNF2808	c.1087G>A	p.E363K	SWENHTTCQHCHRQFPTPFQLQCHI[p.E363K]KNVHTAQEPSTVCKICELSFETDQVL	QLQCHIKNV,LQCHIKNVH,CHIKNVHTA,FQLQCHIKNV	CRC
ZNF280B	c.1198G>A	p.E400K	CKICELSFETDQVLLQHMKDHHKPG[p.E400K]KMPYVCQVCHYRSSVFADVETHFRTC	HHKPGKMPY,GKMPYVCQV,HMKDHHKPGK,MKDHHKPGKM,GKMPYVCQVC	GBM
ZNF283	c.1175G>A	p.R392Q	KIHTGKKPYECKICGKAFCWGYQLT[p.R392Q]QHQIFHTGEKPYECKECGKAFNCGSS	GYQLTQHQI,YQLTQHQIF,TQHQIFHTG,GYQLTQHQIF,WGYQLTQHQI,YQLTQHQIFH	CRC
ZNF32	c.185C>T	p.S62L	EATGSSSWDIQNSFRREKLEQKSPD[p.S62L]LKTLQEDSPGVRQRVYECQECGKSFR	KLEQKSPDLK	CRC
ZNF322	c.318G>T	p.K106N	VQSSDLTSHQRIHNYEKPYKCSKCE[p.K106N]NSFWHHLVLSGHQRTHAGKKFYTCDI	ENSFWHHLV,NSFWHHLVL,KCSKCENSF,CENSFWHHL,YKCSKCENSF,CENSFWHHLV	LUAD
ZNF333	c.1661G>A	p.R554Q	TGEKLYECATCGQVLSRLSTLKSHM[p.R554Q]QTHTGEKPYVCQECGRAFSEPSSLRK	HMQTHTGEK,KSHMQTHTG,SHMQTHTGEK,MQTHTGEKPY,QTHTGEKPYV	UCEC
ZNF334	c.1278delA	p.K426fs	ECKECGKTFFCQSALTAHQRIHTGE[p.K426fs]NPMNVVNVRKPSFVNLPSMCIEEVIQERSPMNAVNVENFYVRNQPSLHIR*	AVNVENFYV,FVNLPSMCI,FYVRNQPSL,RIHTGENPM,HTGENPMNV,EVIQERSPM,NAVNVENFY,VVNVRKPSF,VRKPSFVNL,PSFVNLPSM,QERSPMNAV,MNAVNVENF,VRNQPSLHI,LPSMCIEEV,NLPSMCIEEV,VVNVRKPSFV,AVNVENFYVR,SFVNLPSMCI,NVRKPSFVNL,YVRNQPSLHI,MNAVNVENFY,HTGENPMNVV,NAVNVENFYV,KPSFVNLPSM,NFYVRNQPSL,QRIHTGENPM,GENPMNVVNV,NVVNVRKPSF,EEVIQERSPM,IQERSPMNAV,PMNAVNVENF,LPSMCIEEVI	STAD
ZNF354B	c.1205G>T	p.R402I	TGEKPFKCSECGRAFSQSASLIQHE[p.R402I]IIHTGEKPYRCNECGKGFTSISRLNR	SASLIQHEI,IQHEIIHTG,SLIQHEIIHT,QSASLIQHEI	UCEC
ZNF354B	c.1825G>A	p.D609N	GKLF5QRSSLTNHYKIHIEEDSLKA[p.D609N]NLHV*	EEDSLKANL,IEEDSLKANL	UCEC
ZNF358	c.389delC	p.T130fs	DPNSDTLSPGDPKVDPISSGLTATP[p.T130fs]RSWPPAPRCSPPPPARPGPSPARIAGEPSAAAPG*	RIAGEPSAA,SSGLTATPR,ATPRSWPPA,RPGPSPARI,GLTATPRSW,ARIAGEPSA,RIAGEPSAAA,ISSGLTATPR,PARPGPSPAR,TPRSWPPAPR,APRCSPPPPA,RPGPSPARIA,SGLTATPRSW,ARIAGEPSAA	STAD
ZNF382	c.558T>A	p.H186Q	FGDSTGWEKSLLNTKHEKIHPAVNL[p.H186Q]QKQTERVLSGKQELIQHQKVQAPEQP	NLQKQTERV,LQKQTERVL,KIHPAVNLQK	CLL
ZNF385D	c.677C>G	p.T226S	KRLLYCSLCKVAVNSASQLEAHNSG[p.T2265]SKHKTMLEARNGSGTIKAFPRAGVKG	SKHKTMLEA,GSKHKTMLEA,SQLEAHNSGS,LEAHNSGSKH	LUAD
ZNF43	c.752delA	p.N251fs	GEKPYTCEECGKVFNWSSRLTTHKK[p.N251fs]IILDTNSTNVKNVAKLLTSPQSLLPIR*	ILDTNSTNV,KLLTSPQSL,LLTSPQSLL,IILDTNSTNV,KLLTSPQSLL,ILDTNSTNVK,SSRLTTHKKI,DTNSTNVKNV,LTSPQSLLPI,RLTTHKKIIL,AKLLTSPQSL	STAD
ZNF43	c.838C>T	p.R280C	YKLYKCEECGKAFNKSSILTTHKII[p.R280C]CTGEKFYKCKECAKAFNQSSNLTEHK	IICTGEKFY,KIICTGEKF,IICTGEKFYK,CTGEKFYKCK,THKIICTGEK,KIICTGEKFY,HKIICTGEKF	UCEC
ZNF434	c.916C>T	p.R306C	QNSQIYRAMAEGLWEQGFLRTPEQC[p.R306C]CTKFKSLQLSYRKVRRGRVPEPCIFY	RTPEQCCTK,CTKFKSLQL,TPEQCCTKF,RTPEQCCTKF	CRC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ZNF439	c.785G>T	p.R262I	TGEKPYECKQCGKSFSYSATHRIHE[p.R262I]ITHIGEKPYECQECGKAFHSPRSCHR	ITHIGEKPY,HRIHEITHI,YSATHRIHEI	CRC
ZNF442	c.926G>A	p.R309Q	ERTHTGEKPYKCKRCGRAFSVSSSL[p.R309Q]QIHERTHTGEKPYECKQCGKAFHHLG	SSSLQIHER,FSVSSSLQI,VSSSLQIHER,RAFSVSSSLQ,FSVSSSLQIH	UCEC
ZNF443	c.902G>T	p.R301I	TGEKPYKCKQCSKAFPDSSSCLIHE[p.R301i]ITHTGEKPYTCKQCGKAFSVSGSLQR	CLIHEITHT,SSSCLIHEI,DSSSCLIHEI,EITHTGEKPY	CRC
ZNF445	c.2044C>A	p.L682M	ECREGFRQSPDCSQPQGAPAVEKTF[p.L682M]MCQQCGKTFTRKKTLVDHQRIHTGEK	TFMCQQCGK,KTFMCQQCG,APAVEKTFM,MCQQCGKTF,KTFMCQQCGK,FMCQQCGKTF	CRC
ZNF454	c.1127G>T	p.R376I	TGEKPFECNECGKAFRVNSSLTEHQ[p.R376I]IIHTGEKPYKCNECGKAFRDNSSFAR	SSLTEHQII,TEHQIIHTG,SLTEHQIIHT	UCEC
ZNF454	c.569G>T	p.S190I	SDQSQGFQPSKNAFECSECGKVFSK[p.S190I]ISTLNKHQKIHNEKNANQKIHIKEKR	KVFSKISTL,FSKISTLNK,ISTLNKHQK,VFSKISTLNK,KISTLNKHQK,GKVFSKISTL,SECGKVFSKI	LUAD
ZNF462	c.1948T>A	p.S650T	FCDNLPKFEGQPSSLPLENETDSHP[p.S650T]TSSNTVKKSQTSILGLSSKNNFVAKA	PTSSNTVKK,DSHPTSSNTV,LENETDSHPT	KIRC
ZNF470	c.1922G>T	p.R641I	TGEKPYECNVCGKAFSHRKSLTLHQ[p.R641I]IIHTGEKPYECKECSKAFSQVAHLTL	KSLTLHQII,RKSLTLHQI,KSLTLHQIIH,RKSLTLHQII	CRC
ZNF471	c.845G>T	p.R282I	TGEKLFECKECRKAFKQSEHLIQHQ[p.R282I]IIHTGEKPYKCKECRKAFRQPAHLAQ	SEHLIQHQI,SEHLIQHQII	CRC
ZNF48	c.704G>A	p.R235H	HQRTHTGEKPYKCGICGKGFGDSSA[p.R235H]HIKHQRTHRGEQPPRPVVPRRQPSRA	SSAHIKHQR,HIKHQRTHR,KGFGDSSAH,AHIKHQRTH,DSSAHIKHQR,KGFGDSSAHI	LUSC
ZNF48	c.739delC	p.P247fs	ICGKGFGDSSARIKHQRTHRGEQPP[p.P247fs]DQWCPDGSHLGQPRQLPRDRRPRTSHISALIAARGLCSAAAS*	RTSHISALI,HISALIAAR,RPRTSHISA,AARGLCSAA,LPRDRRPRT,SHISALIAA,LIAARGLCSA,RQLPRDRRPR,RTSHISALIA,TSHISALIAA,AARGLCSAAA,HLGQPRQLPR,SHISALIAAR,LPRDRRPRTS,RPRTSHISAL,DQWCPDGSHL,IAARGLCSAA	STAD
ZNF484	c.412C>T	p.R138C	SILEELWKDDEHTRKCGENQNKPLS[p.R138C]CVVFINKKTLANDSIFEYKDIGEIVH	NQNKPLSCV,LSCVVFINK,NKPLSCVVF,KPLSCVVFI,NQNKPLSCVV,PLSCVVFINK,LSCVVFINKK,QNKPLSCVVF	CRC
ZNF485	c.1121G>T	p.R374I	SGNKPYQCRDCGKAFTKSSTLTGHQ[p.R374I]IIHTGEKPYHCKKCGKAFRHSSGLVE	KSSTLTGHQI	UCEC
ZNF488	c.617G>A	p.R206Q	PAGESADALGELSGLLNTTDLACWG[p.R206Q]QLSTPKLLVGDLWNLQALPQNAPLCS	QLSTPKLLV,GQLSTPKLL,CWGQLSTPKL,GQLSTPKLLV	UCEC
ZNF491	c.1028G>A	p.R343Q	ERTHTGEKPDGCKQCGKAFRSAKYI[p.R343Q]QIHGRTHTGEKPYECKQCGKAFHCVS	SAKYIQIHG,RSAKYIQIH,FRSAKYIQI,IQIHGRTHT,AFRSAKYIQI,SAKYIQIHGR,IQIHGRTHTG	CRC
ZNF492	c.1175C>A	p.P392H	CEVCSKAFSRFSHLTTHKRIHTGEK[p.P392H]HYKCEECGKAFNLSSQLTTHKIIHTG	RIHTGEKHY,RIHTGEKHYK,KRIHTGEKHY	LUAD
ZNF514	c.242T>G	p.V81G	PGEEGTTNSFLKARPRDLMTFEDVA[p.V81G]GEFSQWEWGQLNPAQKDLYREVMLEN	MTFEDVAGE,MTFEDVAGEF,VAGEFSQWEW	KIRP
ZNF519	c.1291C>T	p.H431Y	CKECGKAFNRASHLTQHQRIHTGEK[p.H431Y]YFKCKECGKAFNRGSHLTRHQRIHTG	YFKCKECGK,QRIHTGEKY,RIHTGEKYF,RIHTGEKYFK,HTGEKYFKCK,KYFKCKECGK,HQRIHTGEKY,QRIHTGEKYF	KIRC
ZNF521	c.1918G>T	p.G640C	TSLKMMQAVGGAPARPTGEYICNQC[p.G640C]CAKYTSLDSFQTHLKTHLDTVLPKLT	ICNQCCAKY,GEYICNQCC,YICNQCCAKY,CAKYTSLDSF,NQCCAKYTSL,GEYICNQCCA	LUAD
ZNF521	c.809C>A	p.P270H	TQKCSQCEEGFDFPEDLQKHIAECH[p.P270H]HECSPNEDRAALQCVYCHELFVEETS	LQKHIAECHH	LUAD

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ZNF528	c.836G>A	p.R279Q	SNLSQHQRIHTGEKPYKCHECDKVF[p.R279Q]QSSSKLAQHQRIHTGEKPYKCHECDK	KVFQSSSKL,FQSSSKLAQ,KVFQSSSKLA,FQSSSKLAQH,HECDKVFQSS	CRC
ZNF534	c.1749T>A	p.N583K	TGEKPYSCNECGKVFSRNSHLARHR[p.N583K]KIHTGEKPHSCNECGKVFSRNSHLAR	RKIHTGEKPH	GBM
ZNF536	c.1987G>T	p.G663W	RVFRTYHQVVVHSRVHKRDRKGEED[p.G663W]WLHVGLDERRGSGSDQESQSVSRSTT	EEDWLHVGL,DWLHVGLDER,GEEDWLHVGL	LUAD
ZNF536	c.556G>T	p.G186C	PYCDHRAAQKGNLKIHLRTHKLGNL[p.G186C]CKGRGRVREENRLLHELEERAILRDK	RTHKLGNLC,RTHKLGNLCK,NLCKGRGRVR	LUAD
ZNF559	c.850G>A	p.E284K	PSSSHLRECVRIYGGERPYTHKEYV[p.E284K]KTFSHSTALFVHMQTQDGEKFYECKA	KTFSHSTAL,THKEYVKTF,KEYVKTFSH,VKTFSHSTA,YVKTFSHSTA,KTFSHSTALF,YTHKEYVKTF,RPYTHKEYVK,VKTFSHSTAL,KEYVKTFSHS	UCEC
ZNF563	c.622delT	p.W208fs	NLRRHMVVQGGNRPYKCKLCGKAFF[p.W208fs]GPVYYVCMKELTLERNRMNVSSVLKPFLFTVPIEDMRECTLGRNRMNVSSVLKPCLIPVPI*	AFFGPVYYV,VLKPFLFTV,KAFFGPVYY,CMKELTLER,FFGPVYYVC,VYYVCMKEL,SSVLKPFLF,CGKAFFGPV,GKAFFGPVY,FTVPIEDMR,KPFLFTVPI,NVSSVLKPF,KAFFGPVYYV,SVLKPFLFTV,FLFTVPIEDM,FFGPVYYVCM,YYVCMKELTL,VSSVLKPFLF,CGKAFFGPVY,GKAFFGPVYY,NVSSVLKPFL,MNVSSVLKPF,KELTLERNRM,LKPFLFTVPI	GBM
ZNF563	c.78G>T	p.K26N	MDAVAFEDVAVNFTQEEWALLGPSQ[p.K26N]NNLYRYVMQETIRNLDCIRMIWEEQN	PSQNNLYRY,LLGPSQNNL,SQNNLYRYV,LGPSQNNLY,QNNLYRYVM,ALLGPSQNNL,LLGPSQNNLY,SQNNLYRYVM,GPSQNNLYRY	CRC
ZNF573	c.1049G>T	p.R350I	TGKKPYECKECGKGYTTASYFLLHQ[p.R350I]IIHKGGKPYECKECKKTFTLYRNLTR	FLLHQIIHK,SYFLLHQII,HQIIHKGGK,IIHKGGKPY,ASYFLLHQI,QIIHKGGKPY,TASYFLLHQI,ASYFLLHQII	CRC
ZNF578	c.931G>A	p.G311S	PYKCNECGKSFSYKSSLTCHRRCHT[p.G311S]SEKPYKCNECGKSFSYKSSLTCHHRC	CHRRCHTSEK	CLL
ZNF583	c.1031G>T	p.R344I	TGERPFECIECGKAFSNGSFLAQHQ[p.R344I]IIHTGEKPYVCNVCGKAFSHRGYLIV	SFLAQHQII,GSFLAQHQI,FLAQHQIIH,FLAQHQIIHT,GSFLAQHQII	CRC
ZNF585A	c.1473G>T	p.E491D	YMCNKCGKAFTNRSNLITHQKTHTG[p.E491D]DKSYICSKCGKAFTQRSDLITHQRIH	HQKTHTGDK,KTHTGDKSY,KTHTGDKSYI,QKTHTGDKSY	CRC
ZNF585A	c.1912G>A	p.E638K	KSFTSKSQLLVHQPVHTGEKPYVCA[p.E638K]KCGKAFSGRSNLSKHQKTHTGEKPYI	VCAKCGKAF,KPYVCAKCGK,YVCAKCGKAF,GEKPYVCAKC	CRC
ZNF592	c.1498C>A	p.P500T	PGSQTGKKQQSTALQASTLAPANLL[p.P500T]TKAVHLANLNLVPHSVAASVTAKSSV	LLTKAVHLA,NLLTKAVHL,TKAVHLANL,NLLTKAVHLA,TLAPANLLTK,LTKAVHLANL,APANLLTKAV	TGCT
ZNF592	c.970A>C	p.K324Q	VTKEDQPGHTKDLSGPTKESSKGSP[p.K324Q]QMPKSPKSPRSPLEATRKSIKPSDSP	SSKGSPQMPK,QMPKSPKSPR,KESSKGSPQM	TGCT
ZNF594	c.860G>T	p.R287I	TGEKPYECYDCGQMFSQSSHLVPHQ[p.R287I]IIHTGEKPLKCNECEKAFRQHSHLTE	HLVPHQIIH,IIHTGEKPLK,SSHLVPHQII	UCEC
ZNF598	c.74A>G	p.E25G	MAAAGGAEGRRADMEAEAAAAPER[p.E25G]GGGSCVLCCGDLEATALGRCDHPVCY	AEAAAAPERG	ACC,KIRP
ZNF608	c.1393delG	p.A465fs	SAAAAPGSEASFTESRGLQNKNRGG[p.A465fs]PMGKGGGAASMPADEGHPQIVLLRISKPALPPPTKGKTSLQWSWT*	QIVLLRISK,KNRGGPMGK,LLRISKPAL,KPALPPPTK,GPMGKGGGA,PPTKGKTSL,GKGGGAASM,TKGKTSLQW,GKTSLQWSW,DEGHPQIVL,MPADEGHPQ,HPQIVLLRI,VLLRISKPAL,ISKPALPPPT,EGHPQIVLLR,MPADEGHPQI,GPMGKGGGAA,MGKGGGAASM,LQNKNRGGPM,KGKTSLQWSW,DEGHPQIVLL	STAD
ZNF611	c.1169G>T	p.R390I	TGEKPYKCEECDKVFSRKSTIETHK[p.R390I]IIHTGEKPYRCKVCDTAFTWHSQLAR	RKSTIETHKI	UCEC

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ZNF625	c.704G>A	p.R235Q	TGEKPYECSECGKAFHSSTCLHAHK[p.R235Q]KTHTGEKPYECKQCGKAFVSFNSVRY	STCLHAHKK,SSTCLHAHKK,AHKKTHTGEK	CRC
ZNF626	c.1418A>G	p.K473R	TGEKFYKCEECGKAFKCSSNLTTHK[p.K473R]RIHTGERPYKCEECGKAFNQSSILTT	CSSNLTTHKR	LUSC
ZNF638	c.1198G>A	p.D400N	SQADIPIRSPFGIVKASWLPKFSHA[p.D400N]NAQKMKRLPTPSMMNDYYAASPRIFP	KFSHANAQK,HANAQKMKR,FSHANAQKM,WLPKFSHANA,FSHANAQKMK,KFSHANAQKM	LIHC
ZNF644	c.61G>T	p.G21W	MRSFLQQDVNKTKSRLNVLN[p.G21W]WLANNMDDLKINTDITGAKEELLDDN	RLNVLNWLA,WLANNMDDL,VLNWLANNM,KSRLNVLNW,SRLNVLNWL,WLANNMDDLK,KSRLNVLNWL,NVLNWLANNM,TKSRLNVLNW	LUAD
ZNF645	c.460C>T	p.R154C	SLQAHIKRRHKRARKQVTSASLEKV[p.R154C]CPHIAPPQTEISDIPKRLQDRDHLSY	SLEKVCPHI,LEKVCPHIA	UCEC
ZNF649	c.593G>T	p.R198I	NIEKAHECTDCGKAFLKKSQLTEHK[p.R198I]IIHTGKKPHVCSLCGKAFYKKYRLTE	SQLTEHKII,IIHTGKKPHV,KKSQLTEHKI,SQLTEHKIIH	UCEC
ZNF652	c.981G>T	p.K327N	VSCNKSFKKLWSLHEHIKIVHGYAE[p.K327N]NKFSCEICEKKFYTMAHVRKHMVAHT	IVHGYAENK,AENKFSCEI,KIVHGYAENK,IVHGYAENKF,AENKFSCEIC	CRC
ZNF674	c.1214G>T	p.R405I	TKENIYECSKCGKSFRGKSHLSVHQ[p.R405I]IIHTGEKPYECSICGKTFSGKSHLSV	SHLSVHQII,KSHLSVHQI,KSHLSVHQII,GKSHLSVHQI	UCEC
ZNF675	c.659G>T	p.R220I	TKVNFCKCEECEKAVNQSSKLTKHK[p.R220I]IIYTCEKLYKCQECDRTFNQFSNLTE	KLTKHKIIY,IIYTCEKLY,SSKLTKHKI,IIYTCEKLYK,SSKLTKHKII,KHKIIYTCEK,KIIYTCEKLY,SKLTKHKIIY,HKIIYTCEKL	UCEC
ZNF676	c.127C>A	p.P43T	PDLIIFLEQGKEPWNMKRHEMVEEP[p.P43T]TVICSHFSQEFWPEQGIEDSFQKMIL	HEMVEEPTV,EPTVICSHF,HEMVEEPTVI,EEPTVICSHF	LUSC
ZNF677	c.1352G>T	p.R451I	PGEKPHKCNVCGRAFIQSSSLVEHQ[p.R451I]IIHTGEKPYKCNKCDKAFIKRSHLWG	SSLVEHQII,VEHQIIHTG,SLVEHQIIHT	CRC
ZNF677	c.392G>C	p.R131T	FDSLWDYDVKNYKGMPLTCNKNLTH[p.R131T]TKDQQHNKSSIHFSLKQSVSIRDSAH	HTKDQQHNK,CNKNLTHTK	CESC
ZNF680	c.1501C>T	p.R501W	TLANHKRIHAREKPYKCEECGKAFN[p.R501W]WSSHLTRHKKIHTGEKLYKPEKCDNN	FNWSSHLTR,WSSHLTRHKK,AFNWSSHLTR,FNWSSHLTRH	TGCT
ZNF687	c.2573T>G	p.F858C	DTVFTHKPLLSSHFDQHLLPQRVSV[p.F858C]CKCPSCPLLFAQKRTMLEHLKNTHQS	LLPQRVSVC,CKCPSCPLLF	KIRC
ZNF699	c.122G>T	p.R41I	QDSVVFEDVAVDFTQEEWALLDLAQ[p.R41I]INLYRDVMLENFQNLASLGYPLHTPH	LLDLAQINL,DLAQINLYR,LDLAQINLY,AQINLYRDV,QINLYRDVM,WALLDLAQI,LLDLAQINLY,ALLDLAQINL,AQINLYRDVM	CRC
ZNF7	c.1010G>T	p.R337I	TGEKPYRCEECGKAFGQSSSLIHHQ[p.R337I]IIHTGERPYGCRECGKAFSQQSQLVR	SSSLIHHQI,SSLIHHQII,SLIHHQIIHT,QSSSLIHHQI	CRC
ZNF70	c.731G>T	p.R244I	TGKRPYECRECGKDFSRSSSLRKHE[p.R244I]IIHTGERPYQCKECGKSFNQSSGLSQ	SLRKHEIIH,RSSSLRKHEI,EIIHTGERPY	CRC
ZNF700	c.1946C>G	p.S649C	NLRKHGRTHTGEKPYECKQCGKAFR[p.S649C]CASNLQMHERTHTGEKPYECKECEKA	KAFRCASNL,FRCASNLQM,CASNLQMHER,AFRCASNLQM,GKAFRCASNL	CLL
ZNF700	c.1954A>C	p.N652H	KHGRTHTGEKPYECKQCGKAFRSAS[p.N652H]HLQMHERTHTGEKPYECKECEKAFCK	ASHLQMHER,AFRSASHLQ,RSASHLQMH,FRSASHLQM,SASHLQMHER,AFRSASHLQM	CLL
ZNF700	c.1961A>G	p.Q654R	GRTHTGEKPYECKQCGKAFRSASNL[p.Q654R]RMHERTHTGEKPYECKECEKAFCKFS	ASNLRMHER,AFRSASNLR,FRSASNLRM,KAFRSASNLR,SASNLRMHER,AFRSASNLRM	CLL
ZNF705A	c.892G>A	p.D298N	GNKIIHTGEKPHACLLCGKAFSLSS[p.D298N]NLR*	AFSLSSNLR,KAFSLSSNLR	CLL

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ZNF706	c.23T>A	p.I8N	MARGQQK[p.I8N]NQSQQKNAKKQAGQKKKQGHDQKAAA	QQKNQSQQK,KNQSQQKNAK	BLCA
ZNF709	c.1403G>T	p.R468I	TGEKPYECKQCGKAFSCSSSFRMHE[p.R468I]IIHTGEKPYECKQCGKAFSFSSSFRM	RMHEIIHTG,SFRMHEIIH,SSFRMHEII,SFRMHEIIHT,CSSSFRMHEI,SSFRMHEIIH	UCEC
ZNF711	c.1231G>T	p.V411L	ICKKHFTGRSSLIVHQIVHTGEKPY[p.V411L]CGECGKAFSQSAYLIEHQRIHTGEK	YLCGECGKA,LCGECGKAF,YLCGECGKAF,GEKPYLCGEC	LUAD
ZNF711	c.2211delA	p.L737fs	SVHTKDQPLKCKRCKRGFRQQNELK[p.L737fs]NI*	RQQNELKNI	STAD
ZNF716	c.788A>T	p.H263L	EKPYRCEECGKAFSWSASLTKHKRI[p.H263L]LTGEKPYTCEERGKVFSRSTLTNYKR	LTKHKRILT,SLTKHKRIL,KHKRILTGEK	LUAD
ZNF717	c.1781A>T	p.N594I	GKSFHCKSFLTIHQRTHAGKKPYEC[p.N594I]IECEKTFINKLNLGIHKRTHTGERPY	YECIECEKTF	MM
ZNF717	c.2530T>A	p.C844S	CRKTFSQKSKLFVHHRTHTGEKPFR[p.C844S]SNECRKTFSQKSGLSIHQRTHTGEKP	RSNECRKTF,KPFRSNECRK,RSNECRKTFS,FRSNECRKTF	MM
ZNF717	c.945G>C	p.W315C	KPSISKSDLMLQCKMPTEEKPYACN[p.W315C]CCEKLFSYKSSLIIHQRIHTGEKPYG	KPYACNCCEK,YACNCCEKLF	MM
ZNF750	c.287_288delCT	p.S96fs	LDPKQTNQPDATAKPASSKSVANGL[p.S96fs]CLRLEASAQLCQGRHQGKPGAASPGNPQVPGTEASPPQGITLQEPSSGSRPRCPACSGRRSSAFCICSSRRAQTQGARQRRGARDTGFTQPHCQGRVFPHQVGLPHSWLPLESRLTFPSTRVST*	RVFPHQVGL,GLPHSWLPL,RLTFPSTRV,SVANGLCLR,SAFCICSSR,HSWLPLESR,SWLPLESRL,GSRPRCPAC,SGRRSSAFC,GARQRRGAR,AFCICSSRR,QTQGARQRR,FTQPHCQGR,RPRCPACSG,QPHCQGRVF,FPHQVGLPH,LPLESRLTF,CSGRRSSAF,KSVANGLCL,LRLEASAQL,HQGKPGAAS,RRGARDTGF,HQVGLPHSW,TEASPPQGI,LESRLTFPS,SVANGLCLRL,GLCLRLEASA,CLRLEASAQL,FTQPHCQGRV,KSVANGLCLR,SSAFCICSSR,SAFCICSSRR,WLPLESRLTF,SSGSRPRCPA,GSRPRCPACS,RPRCPACSGR,SGRRSSAFCI,SSRRAQTQGA,RAQTQGARQR,RVFPHQVGLP,EASAQLCQGR,TLQEPSSGSR,ESRLTFPSTR,EASPPQGITL,SKSVANGLCL,HQGKPGAASP,ACSGRRSSAF,RQRRGARDTG,QRRGARDTGF,TQPHCQGRVF,GRVFPHQVGL,HQVGLPHSWL,VGLPHSWLPL,HSWLPLESRL,LESRLTFPST	HNSC
ZNF765	c.761C>T	p.S254L	LLRKHQLIHLGEKQYKCDICGKVFN[p.S254L]LKRYVARHRRCHTGEKPYKCNECGKT	KVFNLKRYV,FNLKRYVAR,GKVFNLKRY,KVFNLKRYVA,CGKVFNLKRY,DICGKVFNLK,VFNLKRYVAR,NLKRYVARHR	UCEC
ZNF774	c.1268G>A	p.R423Q	TGERPYKCGECGKSFNQSSHFITHQ[p.R423Q]QIHLGDRPYRCPECGKTFNQRSHFLT	FITHQQIHL,QIHLGDRPY,SHFITHQQI,SSHFITHQQI,QQIHLGDRPY,QIHLGDRPYR,SHFITHQQIH	CRC
ZNF780A	c.1397G>A	p.R466Q	SNEKPFVCRECEMAFRYHCQLIEHS[p.R466Q]QIHTGDKPFECQDCGKAFNRGSSLVQ	HSQIHTGDK,QIHTGDKPF,CQLIEHSQI,QLIEHSQIH,QLIEHSQIHT,SQIHTGDKPF,CQLIEHSQIH	UCEC
ZNF782	c.1450G>T	p.G484W	FNYKSILIVHQRTHTGEKPFECNEC[p.G484W]WKSFSHMSGLRNHRRTHTGERPYKCD	NECWKSFSH,KPFECNECW,CWKSFSHMSG,FECNECWKSF,NECWKSFSHM,WKSFSHMSGL	LUAD
ZNF782	c.434G>T	p.C145F	KPHNRDINIFRARMMPCKCDIAGSA[p.C145F]FQGLSLMAPHCQYSKEKAHERNVCDK	SAFQGLSLM,KCDIAGSAF,IAGSAFQGL,GSAFQGLSL,FQGLSLMAP,DIAGSAFQGL,CKCDIAGSAF,AGSAFQGLSL,GSAFQGLSLM,SAFQGLSLMA,FQGLSLMAPH	TGCT
ZNF782	c.740A>C	p.K247T	KAFLEKAALVTSNSTHPKGKSYNFN[p.K247T]TFGENKYDKSTFIIPQNMNPEKSHYE	KGKSYNFNT,KSYNFNTFG,GKSYNFNTF,FNTFGENKY,NTFGENKYDK,KGKSYNFNTF	CRC
ZNF799	c.121T>G	p.W41G	IRVDAGHKPHEYQEYGEKRNTRKQF[p.W41G]GKTFSYCHSFQTHKISHTGHKPYDCK	KQFGKTFSY,RNTRKQFGK,TRKQFGKTF,KRNTRKQFGK,RKQFGKTFSY,KQFGKTFSYC,GKTFSYCHSF	BLCA
ZNF799	c.127A>G	p.T43A	VDAGHKPHEYQEYGEKRNTRKQFWK[p.T43A]AFSYCHSFQTHKISHTGHKPYDCKEC	KQFWKAFSY,KAFSYCHSF,NTRKQFWKA,TRKQFWKAF,KAFSYCHSFQ,RKQFWKAFSY,NTRKQFWKAF,WKAFSYCHSF,KQFWKAFSYC	BLCA

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ZNF799	c.1357T>C	p.C453R	KAYRISSSLRRHETTHTGEKPYKCK[p.C453R]RGKAFIDFYSFQNHKTTHAGEKPYEC	KPYKCKRGK,KCKRGKAFI,RGKAFIDFY,YKCKRGKAF,KRGKAFIDF,RGKAFIDFYS,KRGKAFIDFY,KPYKCKRGKA,CKRGKAFIDF	TGCT
ZNF804B	c.1930_1931CC>AG	p.P644S	NDIDEDLSFPSYISRFKKHKLIPCS[p.P644S]SHLEFEDERQFNCKSSPCTVGGHSDHG	KLIPCSSHL,IPCSSHLEF,HKLIPCSSH,LIPCSSHLEF,HKLIPCSSHL	TGCT
ZNF814	c.959_960GG>AA	p.G320E	KHECGECGKSFSKYVSFSNHQRVHT[p.G320E]EKRPYECGECGKSFSKYASFSNHQRVH	HQRVHTEKR,RVHTEKRPY,RVHTEKRPYE,QRVHTEKRPY	KIRP
ZNF814	c.968C>A	p.P323H	CGECGKSFSKYVSFSNHQRVHTGKR[p.P323H]HYECGECGKSFSKYASFSNHQRVHTE	RVHTGKRHY,RVHTGKRHYE,HQRVHTGKRH,QRVHTGKRHY	KIRP
ZNF814	c.970T>C	p.Y324H	GECGKSFSKYVSFSNHQRVHTGKRP[p.Y324H]HECGECGKSFSKYASFSNHQRVHTEK	RVHTGKRPH,RVHTGKRPHE	TGCT
ZNF823	c.1640G>T	p.R547I	SGEKPYECKECGKAFSWLTCLLRHE[p.R547I]IIHTGEKPYECLQCGKAFTRSRFLRG	WLTCLLRHEI	UCEC
ZNF831	c.146_147insC	p.A49fs	PGGQASPHLTLGPVLLPPEQGLAPP[p.A49fs]HCVPEGPAHPTVPHGASRGPPAPRPASDGQPRWGQRALHTQPCAAA*	ALHTQPCAA,HGASRGPPA,ASRGPPAPR,RALHTQPCA,DGQPRWGQR,QPRWGQRAL,ALHTQPCAAA,RALHTQPCAA,VPEGPAHPTV,GQPRWGQRAL,GQRALHTQPC,RPASDGQPRW	STAD
ZNF831	c.1849C>A	p.Q617K	AREAMAGKGRAGGRKCGQRRLKMFS[p.Q617K]KEKWQVYGDETFKRIYQKMKASPHGG	RLKMFSKEK,MFSKEKWQV,QRRLKMFSK,FSKEKWQVY,LKMFSKEKW,KMFSKEKWQV,GQRRLKMFSK,RRLKMFSKEK,MFSKEKWQVY,RLKMFSKEKW	LUAD
ZNF831	c.2847G>T	p.E949D	QAPRVLSALADNAFSPKYLLRLPQA[p.E949D]DTPLPLPIPWGPRHSQDSLCSSGWPE	RLPQADTPL,PQADTPLPL,LPQADTPLPL,LRLPQADTPL	CRC
ZNF831	c.4178G>A	p.R1393Q	EGDCRQTLGTLSLGTSSRIVREMDK[p.R1393Q]QTVKDISPSAGEHGDCTTHSTAATSG	REMDKQTVK,QTVKDISPSA	SKCM
ZNF836	c.1712T>A	p.I571N	RIHTGEQPYKCNVCGKVFNYSGNLS[p.I571N]NHKRIHTGEKPFQCNECGTVFRNYSC	YSGNLSNHK,FNYSGNLSNH	CLL
ZNF836	c.1822A>C	p.K608Q	QCNECGTVFRNYSCLARHLRIHTGQ[p.K608Q]QPYKCNVCGKVFNDSGNLSNHKRIHT	RIHTGQQPY,GQQPYKCNV,RIHTGQQPYK,LRIHTGQQPY	CLL
ZNF836	c.1889G>T	p.R630I	TGQKPYKCNVCGKVFNDSGNLSNHK[p.R630I]IIHTGEKPFQCNECGKVFSYYSCLAR	KIIHTGEKPF	UCEC
ZNF836	c.2561G>T	p.R854I	TGDKPYKCNECGKAFIERSKLVYHQ[p.R854I]INHTGEKPYKCIECGKAFGRFSCLNK	KLVYHQINH,HQINHTGEK,RSKLVYHQI,INHTGEKPY,KLVYHQINHT,RSKLVYHQIN,INHTGEKPYK,QINHTGEKPY	UCEC
ZNF841	c.2270G>T	p.R757I	TGEMPYKCIECGKVFNSTTTLARHR[p.R757I]IIHTGEKPYKCNECGKVFRYRSGLAR	TTTLARHRI	UCEC
ZNF845	c.1269G>A	p.M423I	LTRHRRLHTGEKPYKCNDCGKTFSQ[p.M423I]ISSLVYHRRLHTGEKPYKCEECDEAF	FSQISSLVY,KTFSQISSL,QISSLVYHR,ISSLVYHRR,TFSQISSLV,SQISSLVYH,KTFSQISSLV,SQISSLVYHR,QISSLVYHRR,TFSQISSLVY,GKTFSQISSL	CLL
ZNF845	c.2774G>A	p.R925H	AHLACHHRIHTGEKPYKCNECGKTF[p.R925H]HHNSVLVIHKTIHTGEKPYKCNECGK	KTFHHNSVL,GKTFHHNSV,FHHNSVLVI,KTFHHNSVLV,TFHHNSVLVI,CGKTFHHNSV,HHNSVLVIHK,GKTFHHNSVL,FHHNSVLVIH	PRAD
ZNF880	c.1217A>G	p.Q406R	ECKECGKVFRHKFCLTNHHRMHTGE[p.Q406R]RPYKCNECGKAFRDCSGLTAHLLIHT	HHRMHTGER,HRMHTGERPY	KIRC
ZP3	c.1085_1086insG	p.V362fs	VMSQWSRSASRNRRHVTEEADVTVG[p.V362fs]ATDLPGQEG*	EEADVTVGA,EEADVTVGAT,TEEADVTVGA	KIRC
ZPBP	c.460C>T	p.R154C	NFEESMSGIYTCFLEYKPTVEEIVK[p.R154C]CLQLKYAIYAYREPHYYYQFTARYHA	IVKCLQLKY,CLQLKYAIY,EEIVKCLQL,CLQLKYAIYA,IVKCLQLKYA,KCLQLKYAIY,VEEIVKCLQL	GBM

基因	cDNA變化	蛋白質變化	突變背景序列	肽	實例性疾病
ZSCAN18	c.674_675InsC	p.P225fs	SSILSDGVYERHMDPLLLPGELASP[p.P225fs]QPGPWSWGDPGTF*	WSWGDPGTF,LASPQPGPW,SPQPGPWSW,GELASPQPG	STAD
ZSWIM2	c.641C>A	p.S214Y	T5MLKCPLCRKEFAPLKLILEEFKN[p.S214Y]YSKLVAAAEKERLDKHLGIPCNNCKQ	KNYSKLVAA,LILEEFKNY,FKNYSKLVA,EEFKNYSKL,ILEEFKNYSK,YSKLVAAAEK,KNYSKLVAAA,KLILEEFKNY,FKNYSKLVAA,LEEFKNYSKL,EEFKNYSKLV	LUAD
ZSWIM4	c.1219G>A	p.E407K	GPSLQPTMAPAPELLQKGSTCITNT[p.E407K]KGWVGHPLDPIGCLCRALLEACRLEE	GSTCITNTK,TKGWVGHPL,KGSTCITNTK,NTKGWVGHPL	CESC
ZSWIM6	c.1829delA	p.Q610fs	LAIAIVNTLRRQQQKQLEMFRTQKK[p.Q610fs]SYPIKT*	RTQKKSYPI,TQKKSYPIK,MFRTQKKSY,RTQKKSYPIK,EMFRTQKKSY,FRTQKKSYPI	KICH
ZZEF1	c.89T>C	p.V30A	PSHSSEDEAAAAGGEGWGPHQDWAA[p.V30A]ASGTTPGPGVAAPALPPAAALLEPAR	GPHQDWAAA,WAAASGTTPG	ACC
ZZZ3	c.14G>A	p.R5Q	MAAS[p.R5Q]QSTRVTRSTVGLNGLDESFCGRTLRN	MAASQSTRV,ASQSTRVTR,SQSTRVTRST	HNSC
ZZZ3	c.485G>A	p.R162Q	IKSDKESVEQRSTVVDNDADFQGTK[p.R162Q]QACRCLILDDCEKREIKKVNVSEEGP	KQACRCLIL,GTKQACRCLI,DFQGTKQACR,TKQACRCLIL	LUSC

實例5

癌症亞型特異性免疫原性組合物之頻發突變. 癌症基因體圖譜(TCGA)含有來自腫瘤樣品之綜合大規模基因體測序資料以將導致癌症之遺傳突變編目。用於免疫原性組合物之腫瘤特異性新抗原肽可基於多個準則來選擇。第一準則係基於基因表現。測定以>10個轉錄物/百萬表現基因之患者之比例(每個腫瘤類型)。估計假定HLA類型相對每一基因之突變狀態相對基因表現(每個腫瘤類型)之隨機分配。使用國家每年發生率來定量可用每種肽治療之群體。將肽依據預期群體來分級。分析結果顯示於表9中。

表9

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
RBM14 p.AAAAAAA286del (uc009yrj.2)	VTAASTSYY	19282	胰臟癌	HLA.A01.01 HLA.A03.01 HLA.A11.01 HLA.A26.01 HLA.A26.02 HLA.A26.03 HLA.A29.02 HLA.A68.01 HLA.A80.01 HLA.B15.01 HLA.B15.03 HLA.B15.17 HLA.B58.01
HRAS p.G12D (uc001lpv.2) KRAS p.G12D (uc001rgp.1) NRAS p.G12D (uc009wgu.2)	KLVVVGADGV	16466	結腸直腸癌 胰臟癌 子宮體子宮內膜癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
NRAS p.G12V (uc009wgu.2) KRAS p.G12V (uc001rgp.1)	KLVVVGAVGV	13995	結腸直腸癌 肺腺癌 胰臟癌 子宮體子宮內膜癌	HLA.A02.01 HLA.A02.03 HLA.A02.06

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
NRAS p.G12V (uc009wgu.2) KRAS p.G12V (uc001rgp.1)	VVGAVGVGK	11278	結腸直腸癌 肺腺癌 胰臟癌 子宮體子宮內膜癌	HLA.A03.01 HLA.A11.01
KRAS p.G12C (uc001rgp.1) NRAS p.G12C (uc009wgu.2) HRAS p.G12C (uc001lpv.2)	KLVVVGACGV	7538	結腸直腸癌 肺腺癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
KRAS p.G12C (uc001rgp.1) NRAS p.G12C (uc009wgu.2) HRAS p.G12C (uc001lpv.2)	VVGACGVGK	5751	結腸直腸癌 肺腺癌	HLA.A03.01 HLA.A11.01
NRAS p.G12V (uc009wgu.2) KRAS p.G12V (uc001rgp.1)	VVVGAVGVGK	5535	結腸直腸癌 肺腺癌 胰臟癌	HLA.A11.01 HLA.A68.01
TP53 p.R248W (uc002gim.2)	GMNWRPILTI	5006	乳癌 結腸直腸癌 胰臟癌	HLA.A02.01 HLA.A02.03
PIK3CA p.E542K (uc003fjk.2)	AISTRDPLSK	4852	膀胱癌 乳癌	HLA.A03.01 HLA.A11.01

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
FRG1B p.I10T (uc010ztl.1)	KLSDSRTAL	4782	前列腺癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.B07.02 HLA.B15.03
GATA3 p.H435fs (uc001ijz.2)	KIMFATLQR	4535	乳癌	HLA.A03.01 HLA.A11.01 HLA.A30.01 HLA.A31.01 HLA.A68.01
HRAS p.G12D (uc001lpv.2) KRAS p.G12D (uc001rgp.1) NRAS p.G12D (uc009wgu.2)	VVGADGVGK	4530	結腸直腸癌 胰臟癌	HLA.A11.01
NRAS p.Q61R (uc009wgu.2) KRAS p.Q61R (uc001rgp.1) HRAS p.Q61R (uc001lpv.2)	ILDTAGREEY	4433	黑色素瘤 甲狀腺癌	HLA.A01.01

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
NRAS p.Q61K (uc009wgu.2) HRAS p.Q61K (uc001lpv.2) KRAS p.Q61K (uc001rgp.1)	ILDTAGKEEY	4203	結腸直腸癌 黑色素瘤	HLA.A01.01
GATA3 p.H435fs (uc001ijz.2)	MLTGPPARV	4113	乳癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.A68.02 HLA.A69.01
RBM47 p.495_502AAAAAAAA>A (uc003gvc.2)	AAAAVIPTV	4035	胰臟癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.A68.02 HLA.A69.01 HLA.B15.17
RBM47 p.495_502AAAAAAAA>A (uc003gvc.2)	AAAAAVIPTV	3864	胰臟癌	HLA.A02.01 HLA.A02.03 HLA.A02.06 HLA.A68.02
GATA3 p.H435fs (uc001ijz.2)	YMFLKAESK	3832	乳癌	HLA.A03.01 HLA.A11.01 HLA.A68.01

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
GATA3 p.H435fs (uc001ijz.2)	SMLTGPPARV	3718	乳癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
GATA3 p.H435fs (uc001ijz.2)	YMFLKAESKI	3718	乳癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
GATA3 p.H435fs (uc001ijz.2)	TLQRSSLWCL	3621	乳癌	HLA.A02.01 HLA.A02.03
AP3S1 p.K41fs (uc003krl.2)	LVSEMKMFV	3603	胰臟癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.A68.02 HLA.A69.01
PIK3CA p.H1047R (uc003fjk.2)	FMKQMNDAR	3582	乳癌	HLA.A31.01 HLA.A33.01 HLA.A68.01
KRAS p.Q61L (uc001rgp.1) NRAS p.Q61L (uc009wgu.2) HRAS p.Q61L (uc001lpv.2)	LLDILDTAGL	3563	結腸直腸癌 肺腺癌 黑色素瘤	HLA.A02.01 HLA.A02.03 HLA.A02.06
GATA3 p.H435fs (uc001ijz.2)	FATLQRSSL	3551	乳癌	HLA.B07.02 HLA.B08.01 HLA.B39.01

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
AP3S1 p.K41fs (uc003krl.2)	HLVSEMKMFV	3524	胰臟癌	HLA.A02.01 HLA.A02.03 HLA.A02.06 HLA.A68.02
FRG1B p.L52S (uc010ztl.1)	ALSASNSCFI	3502	前列腺癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
FRG1B p.L52S (uc010ztl.1)	FQNGKMALSA	3502	前列腺癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
RBM14 p.AAAAAAA286del (uc009yrj.2)	AVTAASTSY	3477	胰臟癌	HLA.A26.02 HLA.A29.02 HLA.B15.01 HLA.B15.03 HLA.B15.17
KRAS p.G12R (uc001rgp.1) NRAS p.G12R (uc009wgu.2)	VVGARGVGK	3176	胰臟癌	HLA.A03.01 HLA.A11.01
PIK3CA p.E545K (uc003fjk.2)	SEITKQEKDF	3090	乳癌	HLA.B44.02
FRG1B p.A53T (uc010ztl.1)	LLTSNSCFI	3016	前列腺癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
FRG1B p.A53T (uc010ztl.1)	ALLTSNSCFI	2959	前列腺癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
FRG1B p.I10T (uc010ztl.1)	RTALKSGYGK	2787	前列腺癌	HLA.A03.01 HLA.A11.01 HLA.A68.01
FRG1B p.A50P (uc010ztl.1)	FQNGKMPLL	2781	前列腺癌 黑色素瘤	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.B15.03 HLA.B39.01
PIK3CA p.H1047L (uc003fjk.2)	FMKQMNDAL	2610	乳癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.B08.01 HLA.B15.01 HLA.B15.03
KRAS p.Q61L (uc001rgp.1) NRAS p.Q61L (uc009wgu.2) HRAS p.Q61L (uc001lpv.2)	ILDTAGLEEY	2555	結腸直腸癌 肺腺癌 黑色素瘤	HLA.A01.01

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
FRG1B p.A11T (uc010ztl.1)	ITLKSGYGK	2523	前列腺癌 黑色素瘤	HLA.A03.01 HLA.A11.01 HLA.A30.01 HLA.A31.01 HLA.A68.01
ANAPC1 p.T537A (uc002thi.2)	VSAPKPLSK	2521	胰臟癌 前列腺癌	HLA.A03.01 HLA.A11.01 HLA.A30.01
GATA3 p.H435fs (uc001ijz.2)	FLKAESKIM	2496	乳癌	HLA.A02.03 HLA.B08.01 HLA.B15.01 HLA.B15.03
FRG1B p.A50P (uc010ztl.1)	FQNGKMPLLA	2486	前列腺癌 黑色素瘤	HLA.A02.01 HLA.A02.03 HLA.A02.06
PIK3CA p.H1047R (uc003fjk.2)	YFMKQMNDAR	2478	乳癌	HLA.A33.01 HLA.A68.01
GATA3 p.S408fs (uc001ijz.2)	AIQPVLWTT	2371	乳癌	HLA.A02.01 HLA.A02.02 HLA.A02.06
RBM14 p.AAAAAAA286del (uc009yrj.2)	AVTAASTSYY	2363	胰臟癌	HLA.A11.01
FRG1B p.I10T (uc010ztl.1)	KLSDSRTALK	2356	前列腺癌	HLA.A03.01 HLA.A11.01

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
FRG1B p.A11T (uc010ztl.1)	KLSDSRITL	2328	前列腺癌 黑色素瘤	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.B15.03
ANAPC1 p.T537A (uc002thi.2)	GVSAPKPLSK	2260	胰臟癌 前列腺癌	HLA.A03.01 HLA.A11.01
TP53 p.Y220C (uc002gim.2)	VVVPCEPPEV	2200	乳癌	HLA.A02.01 HLA.A02.06
TP53 p.R248W (uc002gim.2)	SSCMGGMNWR	2135	結腸直腸癌	HLA.A11.01 HLA.A68.01
KRAS p.G12R (uc001rgp.1) NRAS p.G12R (uc009wgu.2)	GARGVGKSAL	2075	胰臟癌	HLA.B07.02

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
RAC1 p.P29S (uc003spx.2)	TTNAFSGEY	2042	黑色素瘤	HLA.A01.01 HLA.A11.01 HLA.A25.01 HLA.A26.01 HLA.A26.02 HLA.A26.03 HLA.A29.02 HLA.A68.01 HLA.A80.01 HLA.B15.01 HLA.B15.03 HLA.B15.17
GATA3 p.H435fs (uc001ijz.2)	GPPARVPAV	2039	乳癌	HLA.B07.02
GATA3 p.H435fs (uc001ijz.2)	KPKRDGYMF	2039	乳癌	HLA.B07.02
GATA3 p.H435fs (uc001ijz.2)	KPKRDGYMFL	2039	乳癌	HLA.B07.02
KRAS p.G12A (uc001rgp.1) HRAS p.G12A (uc001lpv.2) NRAS p.G12A (uc009wgu.2)	KLVVVGAAGV	2034	結腸直腸癌 肺腺癌	HLA.A02.01 HLA.A02.03 HLA.A02.06

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
SPOP p.F133L (uc002ipg.2)	FVQGKDWGL	2002	前列腺癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.A68.02 HLA.A69.01
GATA3 p.H435fs (uc001ijz.2)	CSMLTGPPAR	1995	乳癌	HLA.A11.01 HLA.A33.01 HLA.A68.01
WASH3P p.G175S (uc002cdi.2) WASH2P p.G175S (uc002tkh.2)	SIRQAGGISK	1978	前列腺癌 黑色素瘤	HLA.A03.01 HLA.A11.01
ARFGAP3 p.N299fs (uc003bdd.2)	EIAEVLFHI	1959	前列腺癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.A26.02 HLA.A26.03 HLA.A68.02 HLA.A69.01
GATA3 p.S408fs (uc001ijz.2)	ALQPLQPHA	1906	乳癌	HLA.A02.01 HLA.A02.02 HLA.A02.03

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
ARFGAP3 p.N299fs (uc003bdd.2)	SAWDLEIAEV	1892	前列腺癌	HLA.A02.01 HLA.A02.06 HLA.A68.02
FRG1B p.I59V (uc010ztl.1) FRG1 p.I157V (uc003izs.2)	LLASNSCFV	1824	前列腺癌 黑色素瘤	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.A68.02 HLA.A69.01
ARFGAP3 p.N299fs (uc003bdd.2)	KMLTQTDSA	1818	前列腺癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06
PTH2 p.L22del (uc002pnn.1) CTSA p.L37del (uc002xqh.2) AGPAT2 p.17_18insL (uc004cii.1)	LLLLLLLLV	1807	前列腺癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06
TP53 p.R248Q (uc002gim.2)	SSCMGGMNQR	1795	膀胱癌	HLA.A11.01 HLA.A68.01

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
KRAS p.G12C (uc001rgp.1) NRAS p.G12C (uc009wgu.2) HRAS p.G12C (uc001lpv.2)	VVVGACGVGK	1785	結腸直腸癌 肺腺癌	HLA.A11.01
PIK3CA p.N345K (uc003fjk.2)	KILCATYVK	1776	乳癌	HLA.A03.01 HLA.A11.01 HLA.A30.01 HLA.A31.01
FRG1B p.A11T (uc010ztl.1)	KLSDSRITLK	1749	前列腺癌	HLA.A03.01 HLA.A11.01
FRG1B p.A11T (uc010ztl.1)	RITLKSGYGK	1749	前列腺癌	HLA.A03.01 HLA.A11.01
GATA3 p.H435fs (uc001ijz.2)	AVPFDLHFCR	1749	乳癌	HLA.A11.01 HLA.A68.01
PIK3CA p.E542K (uc003fjk.2)	ISTRDPLSK	1746	乳癌	HLA.A11.01
TP53 p.G245S (uc002gim.2)	SSCMGSMNR	1732	結腸直腸癌	HLA.A11.01 HLA.A31.01 HLA.A68.01
GATA3 p.H435fs (uc001ijz.2)	AESKIMFATL	1731	乳癌	HLA.B40.01 HLA.B44.02

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
AKT1 p.E17K (uc001ypk.2) AKT2 p.E17K (uc002onf.2)	WLHKRGKYIK	1717	乳癌	HLA.A03.01
PIK3CA p.N345K (uc003fjk.2)	ILCATYVKV	1715	乳癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06
FRG1B p.I59V (uc010ztl.1) FRG1 p.I157V (uc003izs.2)	ALLASNSCFV	1698	前列腺癌 黑色素瘤	HLA.A02.01 HLA.A02.03 HLA.A02.06
FRG1B p.L52S (uc010ztl.1)	SASNSCFIR	1685	前列腺癌	HLA.A11.01 HLA.A31.01 HLA.A33.01 HLA.A68.01
PIK3CA p.N345K (uc003fjk.2)	KILCATYVKV	1679	乳癌	HLA.A02.01 HLA.A02.03 HLA.A02.06

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
AP3S1 p.K41fs (uc003krl.2)	ETFHLVSEM	1635	胰臟癌	HLA.A25.01 HLA.A26.01 HLA.A26.02 HLA.A26.03 HLA.A68.01 HLA.A68.02 HLA.A69.01 HLA.B15.17
PIK3CA p.N345K (uc003fjk.2)	KVNIRDIDK	1620	乳癌	HLA.A03.01 HLA.A11.01 HLA.A30.01
KRAS p.G12A (uc001rgp.1) HRAS p.G12A (uc001lpv.2) NRAS p.G12A (uc009wgu.2)	VVGAAGVGK	1613	結腸直腸癌 肺腺癌	HLA.A03.01 HLA.A11.01
CDC27 p.D555E (uc002ile.3)	TLWHLQKEV	1577	結腸直腸癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06
GATA3 p.H435fs (uc001ijz.2)	ESKIMFATL	1573	乳癌	HLA.A68.02 HLA.B08.01
TP53 p.P75fs (uc002gim.2)	KPTRAATVSV	1536	結腸直腸癌	HLA.B07.02

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
CTNNB1 p.T41A (uc010hia.1)	ATAPSLSGK	1536	前列腺癌	HLA.A03.01 HLA.A11.01 HLA.A30.01 HLA.A31.01 HLA.A68.01
CDC27 p.D555E (uc002ile.3)	HLQKEVALSV	1530	結腸直腸癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
PIK3CA p.H1047L (uc003fjk.2)	ALHGGWTTK	1513	乳癌	HLA.A03.01 HLA.A11.01 HLA.A30.01
UBC p.R73L (uc002gyy.3)	RLRGGMQIFV	1474	前列腺癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
PEX1 p.I370fs (uc003uly.2)	KMRRPVCYK	1456	前列腺癌	HLA.A03.01 HLA.A11.01 HLA.A30.01 HLA.A31.01

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
TP53 p.C238Y (uc002gim.2)	TTIHYNYMY	1454	結腸直腸癌	HLA.A01.01 HLA.A11.01 HLA.A25.01 HLA.A26.01 HLA.A26.02 HLA.A26.03 HLA.A29.02 HLA.A68.01 HLA.A80.01 HLA.B15.17
ANAPC1 p.T537A (uc002thi.2)	APKPLSKLL	1449	胰臟癌	HLA.B07.02
FRG1B p.A53T (uc010ztl.1)	LTSNSCFIR	1447	前列腺癌	HLA.A11.01 HLA.A31.01 HLA.A33.01 HLA.A68.01

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
RNF43 p.G659fs (uc002iwf.2)	TQLARFFPI	1442	結腸直腸癌 前列腺癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.A23.01 HLA.A30.01 HLA.A31.01 HLA.A69.01 HLA.B08.01 HLA.B08.03 HLA.B15.03 HLA.B38.01 HLA.B39.01 HLA.B40.01 HLA.B40.02
AP3S1 p.K41fs (uc003krl.2)	ETFHLVSEMK	1440	胰臟癌	HLA.A11.01 HLA.A68.01
PIK3CA p.H1047R (uc003fjk.2)	ARHGGWTTK	1426	乳癌	HLA.B27.05
PIK3CA p.H1047R (uc003fjk.2)	ARHGGWTTKM	1426	乳癌	HLA.B27.05
GATA3 p.S408fs (uc001ijz.2)	QPVLWTTPPL	1421	乳癌	HLA.B07.02
FRG1B p.A50P (uc010ztl.1)	MPLLASNSCF	1374	前列腺癌	HLA.B07.02

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
WASH3P p.G175S (uc002cdi.2) WASH2P p.G175S (uc002tkh.2)	ISKAKLRSM	1337	前列腺癌 黑色素瘤	HLA.A30.01 HLA.B08.01 HLA.B15.17
HRAS p.G13R (uc001lpv.2) NRAS p.G13R (uc009wgu.2)	VVGAGRVGK	1324	結腸直腸癌	HLA.A03.01 HLA.A11.01 HLA.A30.01
ACADS p.R330H (uc001tza.3)	RLLTWHAAM	1321	前列腺癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.B08.01 HLA.B15.01 HLA.B15.03 HLA.B15.17
HRAS p.G12D (uc001lpv.2) KRAS p.G12D (uc001rgp.1) NRAS p.G12D (uc009wgu.2)	LVVVGADGV	1284	胰臟癌	HLA.A02.06 HLA.A68.02 HLA.A69.01

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
KRAS p.G12S (uc001rgp.1) HRAS p.G12S (uc001lpv.2) NRAS p.G12S (uc009wgu.2)	KLVVVGASGV	1278	結腸直腸癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
TP53 p.A159V (uc002gim.2)	RVRVMAIYK	1271	膀胱癌	HLA.A03.01 HLA.A11.01 HLA.A30.01 HLA.A31.01
HLA-A p.Q78R (uc003nol.2)	IEREGPEYW	1271	前列腺癌	HLA.B44.02 HLA.B44.03
GATA3 p.H435fs (uc001ijz.2)	LQRSSLWCL	1248	乳癌	HLA.A02.06 HLA.B15.01 HLA.B15.03
ZMIZ2 p.VAAAAATATATATAT153del (uc003tlr.2)	ALQEKQSQEL	1226	胰臟癌	HLA.A02.01 HLA.A02.03
GIGYF2 p.Q1005del (uc002vtj.3)	KLSGWGNVSK	1204	胰臟癌	HLA.A03.01 HLA.A11.01
FRG1B p.L52S (uc010ztl.1)	LSASNSCFIR	1190	前列腺癌	HLA.A11.01 HLA.A68.01

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
AKT1 p.E17K (uc001ypk.2) AKT2 p.E17K (uc002onf.2)	WLHKRGKYI	1172	乳癌	HLA.A02.03 HLA.B08.01
PEX1 p.I370fs (uc003uly.2)	KLGQIIMKK	1165	前列腺癌	HLA.A03.01 HLA.A11.01
RAC1 p.P29S (uc003spx.2)	FSGEYIPTV	1152	黑色素瘤	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.A68.02 HLA.A69.01
GATA3 p.H435fs (uc001ijz.2)	IMKPKRDGY	1151	乳癌	HLA.B15.01 HLA.B15.03
AEBP1 p.K1133del (uc003tkb.2)	EEEIATGQAF	1143	胰臟癌	HLA.B44.02
FBXW7 p.R465H (uc003ims.2)	TVHCMHLHEK	1142	結腸直腸癌	HLA.A03.01 HLA.A11.01 HLA.A68.01
TSPAN4 p.L92V (uc001lsd.1)	LTFFLLLLV	1140	前列腺癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.A68.02 HLA.A69.01 HLA.B15.17

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
TP53 p.R158L (uc002gim.2)	RVLAMAIYK	1136	肺鱗狀細胞癌	HLA.A03.01 HLA.A11.01 HLA.A30.01 HLA.A31.01 HLA.A68.01
NRAS p.G12V (uc009wgu.2) KRAS p.G12V (uc001rgp.1)	LVVVGAVGV	1130	胰臟癌	HLA.A02.03 HLA.A02.06 HLA.A68.02 HLA.A69.01
GATA3 p.S408fs (uc001ijz.2)	HMSSLSHISA	1127	乳癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
CTNNB1 p.S37F (uc010hia.1)	YLDSGIHFG	1121	子宮體子宮內膜癌	HLA.A02.01 HLA.A02.02 HLA.A02.06
CTNNB1 p.S37F (uc010hia.1)	YLDSGIHFGA	1120	子宮體子宮內膜癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
CTNNB1 p.S37C (uc010hia.1)	YLDSGIHCGA	1111	子宮體子宮內膜癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
SF3B1 p.K700E (uc002uue.2)	GLVDEQQEV	1099	乳癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
KRAS p.G12R (uc001rgp.1) NRAS p.G12R (uc009wgu.2)	VVVGARGVGK	1082	胰臟癌	HLA.A11.01
EGFR p.L858R (uc003tqk.2)	KITDFGRAK	1054	肺腺癌	HLA.A03.01 HLA.A11.01 HLA.A30.01
TP53 p.E271K (uc002gim.2)	NLLGRNSFK	1046	膀胱癌	HLA.A03.01 HLA.A11.01 HLA.A68.01
TSPAN4 p.L92V (uc001lsd.1)	FLLLLVVFL	1044	前列腺癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06
TSPAN4 p.L92V (uc001lsd.1)	LLVVFLLEA	1044	前列腺癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06
TSPAN4 p.L92V (uc001lsd.1)	LLLLVVFLL	1030	前列腺癌	HLA.A02.01 HLA.A02.02 HLA.A02.06
TSPAN4 p.L92V (uc001lsd.1)	FLLLLVVFLL	1027	前列腺癌	HLA.A02.01 HLA.A02.03 HLA.A02.06

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
TSPAN4 p.L92V (uc001lsd.1)	LLLVVFLLEA	1027	前列腺癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
TSPAN4 p.L92V (uc001lsd.1)	LLTFFLLLLV	1027	前列腺癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
ARFGAP3 p.N299fs (uc003bdd.2)	LEIAEVLFHI	1024	前列腺癌	HLA.B40.01 HLA.B44.02
FRG1B p.I10T (uc010ztl.1)	TALKSGYGK	1020	前列腺癌	HLA.A11.01 HLA.A68.01
RBM14 p.AAAAAAA286del (uc009yrj.2)	ATAAAVTAA	1020	胰臟癌	HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.A68.02 HLA.A69.01
KRAS p.G12S (uc001rgp.1) HRAS p.G12S (uc001lpv.2) NRAS p.G12S (uc009wgu.2)	VVGASGVGK	1019	結腸直腸癌	HLA.A03.01 HLA.A11.01
UBC p.L149R (uc002gyy.3)	STLHLVLRR	1014	前列腺癌	HLA.A11.01 HLA.A31.01 HLA.A33.01 HLA.A68.01

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
PIK3CA p.N345K (uc003fjk.2)	ATYVKVNIR	1007	乳癌	HLA.A11.01 HLA.A31.01 HLA.A33.01 HLA.A68.01
ERBB3 p.V104M (uc001sjh.2)	RMVRGTQVY	990	結腸直腸癌	HLA.A03.01 HLA.A29.02 HLA.A80.01 HLA.B15.01 HLA.B15.03 HLA.B15.17
GATA3 p.H435fs (uc001ijz.2)	AESKIMFAT	984	乳癌	HLA.B40.01 HLA.B40.02 HLA.B45.01
FRG1B p.L52S (uc010ztl.1)	ALSASNSCF	982	前列腺癌	HLA.B15.01 HLA.B15.03
TP53 p.E271K (uc002gim.2)	LLGRNSFKV	978	膀胱癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06
TP53 p.E271K (uc002gim.2)	NLLGRNSFKV	969	膀胱癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
FRG1B p.A11T (uc010ztl.1)	TLKSGYGKY	969	前列腺癌	HLA.A26.02 HLA.A29.02 HLA.B15.01 HLA.B15.03

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
NFE2L2 p.E79Q (uc002ulh.3)	QLDEQTGEFL	966	肺鱗狀細胞癌	HLA.A02.01 HLA.A02.06
TP53 p.K132N (uc002gim.2)	ALNNMFCQL	955	膀胱癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.B15.01 HLA.B15.03
MAP2K1 p.P124S (uc010bhq.2)	NSSYIVGFY	943	黑色素瘤	HLA.A01.01 HLA.A26.01 HLA.A26.02 HLA.A29.02 HLA.A68.01 HLA.A80.01 HLA.B15.03 HLA.B15.17

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
TSPAN9 p.S50L (uc001qlp.2)	ATFSPSFPL	937	黑色素瘤	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.A11.01 HLA.A30.01 HLA.A31.01 HLA.A68.02 HLA.A69.01 HLA.B15.03 HLA.B15.17 HLA.B58.01
SF3B1 p.K700E (uc002uue.2)	QEVRTISAL	936	乳癌	HLA.B15.03 HLA.B39.01 HLA.B40.01 HLA.B40.02 HLA.B44.02 HLA.B44.03
ZNF91 p.R333H (uc002nre.2)	FSHSSTLAK	907	前列腺癌	HLA.A03.01 HLA.A11.01 HLA.A30.01 HLA.A68.01
FNBP4 p.TT58del (uc009ylv.2)	APSAATTTA	905	前列腺癌	HLA.B07.02
FNBP4 p.TT58del (uc009ylv.2)	APSAATTTAV	905	前列腺癌	HLA.B07.02

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
RAC1 p.P29S (uc003spx.2)	YTTNAFSGEY	901	黑色素瘤	HLA.A01.01 HLA.A68.01
ACADS p.R330H (uc001tza.3)	LTWHAAMLK	896	前列腺癌	HLA.A03.01 HLA.A11.01 HLA.A30.01 HLA.A31.01 HLA.A68.01
TP53 p.C242F (uc002gim.2)	SSFMGGMNR	889	肺鱗狀細胞癌	HLA.A03.01 HLA.A11.01 HLA.A31.01 HLA.A33.01 HLA.A68.01
CNPY3 p.17_18LL>L (uc003ota.3)	LLLLPAPEL	878	前列腺癌	HLA.A02.01 HLA.A02.02 HLA.A02.06
CNPY3 p.17_18LL>L (uc003ota.3)	LLLLLLLLPA	876	前列腺癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
CNPY3 p.17_18LL>L (uc003ota.3)	LLLLLLLPA	876	前列腺癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
CNPY3 p.17_18LL>L (uc003ota.3)	LLLLLPAPEL	876	前列腺癌	HLA.A02.01 HLA.A02.03 HLA.A02.06

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
ZMIZ2 p.VAAAAATATATATAT153del (uc003tlr.2)	AAAAAVAAL	855	胰臟癌	HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.A68.02 HLA.B07.02 HLA.B15.03 HLA.B15.17
PODXL p.28_30PSP>P (uc003vqw.3)	SPSPSQNAT	852	前列腺癌	HLA.B07.02
PODXL p.28_30PSP>P (uc003vqw.3)	SPSQNATQTT	852	前列腺癌	HLA.B07.02
AP3S1 p.K41fs (uc003krl.2)	HLVSEMKMF	849	胰臟癌	HLA.A26.02 HLA.B15.01 HLA.B15.03
STK19 p.D89N (uc003nyv.2)	NPIFRFSSL	849	黑色素瘤	HLA.A26.02 HLA.B07.02 HLA.B08.01 HLA.B39.01
NUF2 p.S340L (uc001gcq.1)	NLFKRLMIV	845	結腸直腸癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.B08.01

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
FRG1B p.A53T (uc010ztl.1)	ALLTSNSCF	833	前列腺癌	HLA.B15.01 HLA.B15.03
UBC p.L149R (uc002gyy.3)	LVLRRRGGM	829	前列腺癌	HLA.B08.01
TP53 p.A159P (uc002gim.2)	RVRPMAIYK	820	肺腺癌	HLA.A03.01 HLA.A11.01 HLA.A30.01 HLA.A31.01 HLA.A68.01
FRG1B p.K13N (uc010ztl.1)	IALNSGYGK	791	前列腺癌	HLA.A03.01 HLA.A11.01 HLA.A30.01 HLA.A31.01 HLA.A68.01
GATA3 p.H435fs (uc001ijz.2)	VPFDLHFCR	791	乳癌	HLA.A33.01 HLA.A68.01
UBC p.L149R (uc002gyy.3)	STLHLVLRRR	789	前列腺癌	HLA.A11.01 HLA.A33.01 HLA.A68.01
ACADS p.R330H (uc001tza.3)	LLTWHAAML	789	前列腺癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06
GATA3 p.H435fs (uc001ijz.2)	ATLQRSSLW	782	乳癌	HLA.B15.17 HLA.B57.01 HLA.B58.01

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
MAP2K1 p.P124S (uc010bhq.2)	VLHECNSSYI	779	黑色素瘤	HLA.A02.01 HLA.A02.03 HLA.A02.06
ACADS p.R330H (uc001tza.3)	RLLTWHAAML	773	前列腺癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
RXRA p.S427F (uc004cfb.2) RXRG p.S428F (uc001gda.2)	RLPALRFIGL	771	膀胱癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
ERBB3 p.V104M (uc001sjh.2)	LPLPNLRMV	765	結腸直腸癌	HLA.B07.02
TSPAN9 p.S50L (uc001qlp.2)	LLSAANLVI	759	黑色素瘤	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.B15.01 HLA.B15.03 HLA.B15.17
CTNNB1 p.S33F (uc010hia.1)	YLDFGIHSGA	755	子宮體子宮內膜癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
CTNNB1 p.S33F (uc010hia.1)	YLDFGIHSG	754	子宮體子宮內膜癌	HLA.A02.01 HLA.A02.02 HLA.A02.06

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
PTEN p.R130G (uc001kfb.2)	GTGVMICAY	751	子宮體子宮內膜癌	HLA.A29.02 HLA.B15.01 HLA.B15.17
RXRA p.S427F (uc004cfb.2) RXRG p.S428F (uc001gda.2)	LPALRFIGL	748	膀胱癌	HLA.B07.02 HLA.B08.01
NOTCH2 p.P6fs (uc001eik.2)	MPALRRSAV	747	膀胱癌	HLA.B07.02 HLA.B08.01
JMY p.PPPPPPPPPPPP811del (uc003kfx.3)	LPPTPPPLPV	733	胰臟癌	HLA.B07.02
JMY p.PPPPPPPPPPPP811del (uc003kfx.3)	SPLPPTPPPL	733	胰臟癌	HLA.B07.02
ACADS p.R330H (uc001tza.3)	LLTWHAAMLK	729	前列腺癌	HLA.A03.01 HLA.A11.01 HLA.A68.01
GATA3 p.H435fs (uc001ijz.2)	RSSIMKPKR	703	乳癌	HLA.A30.01 HLA.A31.01
OGFOD1 p.G477fs (uc002ejb.2)	FLLLTLPKV	702	胰臟癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
HERC2P3 p.A803V (uc001ytg.2)	RVRDMKCLM	699	胰臟癌	HLA.A30.01 HLA.B07.02 HLA.B15.17
C1QB p.GPKGPMGPKGG PGAPGAP90del (uc001bgd.2)	ESGDYKATQK	697	胰臟癌	HLA.A68.01
SLC38A10 p.1071_1072II>I (uc002jzz.1)	GLNPLPDVQV	689	胰臟癌	HLA.A02.01 HLA.A02.03
UBB p.I188fs (uc002gpx.2) UBC p.I191T (uc002gyy.3)	IPPTSRGSSL	686	前列腺癌	HLA.B07.02
UBB p.I188fs (uc002gpx.2) UBC p.I191T (uc002gyy.3)	PPTSRGSSL	686	前列腺癌	HLA.B07.02
CTNNB1 p.D32N (uc010hia.1)	YLNSGIHSGA	672	子宮體子宮內膜癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
FRG1B p.K13N (uc010ztl.1)	ALNSGYGKYL	670	前列腺癌	HLA.A02.01 HLA.A02.03
NBPF14 p.R25C (uc001eqf.2)	KLCPQLAENK	667	胰臟癌	HLA.A03.01 HLA.A11.01

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
IARS2 p.R832C (uc001hmc.2)	VIVCSFAPI	662	黑色素瘤	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06 HLA.A68.02 HLA.A69.01 HLA.B15.03
PIK3CA p.H1047R (uc003fjk.2)	KQMNDARHG	661	乳癌	HLA.B15.03
CTNNB1 p.D32N (uc010hia.1)	YLNSGIHSG	658	子宮體子宮內膜癌	HLA.A02.01 HLA.A02.02 HLA.A02.03
SIK3 p.950_951QQ>Q (uc001ppy.2)	QEYQELFRHM	653	胰臟癌	HLA.B40.01 HLA.B44.02
IARS2 p.R832C (uc001hmc.2)	ILDVIVCSFA	651	黑色素瘤	HLA.A02.01 HLA.A02.03 HLA.A02.06
AP3S1 p.K41fs (uc003krl.2)	RETFHLVSEM	650	胰臟癌	HLA.B40.01
PPP2R1A p.P179R (uc002pyp.2)	RMVRRAAASK	649	子宮體子宮內膜癌	HLA.A03.01 HLA.A11.01
ZMIZ2 p.VAAAAATATATATAT153del (uc003tlr.2)	AAAAAAVAAL	641	胰臟癌	HLA.B07.02

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
HSD17B7P2 p.N175S (uc010qex.1)	SARKSNFSL	637	前列腺癌	HLA.A30.01 HLA.B07.02 HLA.B08.01 HLA.B15.17
ARL16 p.G6R (uc002kbf.2)	RVAGRRALSR	632	黑色素瘤	HLA.A03.01 HLA.A11.01 HLA.A33.01 HLA.A68.01
GATA3 p.S408fs (uc001ijz.2)	TTPPLQHGHR	623	乳癌	HLA.A33.01 HLA.A68.01
AP3S1 p.K41fs (uc003krl.2)	FHLVSEMKM	619	胰臟癌	HLA.B38.01 HLA.B39.01
PLEKHA6 p.V328fs (uc001hau.2)	SIMMSWMPPL	613	結腸直腸癌	HLA.A02.01 HLA.A02.03 HLA.A02.06 HLA.A68.02 HLA.B07.02
LZTS1 p.RTQDLEGALRTKGLEL432del (uc003wzr.2)	KLEGLELEV	609	胰臟癌	HLA.A02.01 HLA.A02.02 HLA.A02.03 HLA.A02.06
HSD17B7P2 p.N175S (uc010qex.1)	WTSSRSARK	607	前列腺癌	HLA.A03.01 HLA.A11.01 HLA.A30.01 HLA.A68.01

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
RBM14 p.AAAAAAA286del (uc009yrj.2)	GAAATAAAV	606	胰臟癌	HLA.A02.03 HLA.A68.02
TP53 p.R249M (uc002gim.2)	MPILTIITL	606	肺腺癌	HLA.A69.01 HLA.B07.02 HLA.B08.01 HLA.B15.03 HLA.B39.01 HLA.B53.01
IRF2BPL p.114_115QQ>Q (uc001xsy.2)	QLNHVDGSSK	605	前列腺癌	HLA.A03.01 HLA.A11.01
POLI p.D17del (uc002lfj.3)	EEDAEAWAM	599	前列腺癌	HLA.B40.01 HLA.B44.02 HLA.B44.03
ZNF780A p.Q600H (uc010xvh.1)	HMHLIRHQK	594	前列腺癌	HLA.A03.01 HLA.A11.01 HLA.A30.01 HLA.A31.01 HLA.A33.01 HLA.A68.01
FRG1B p.I10T (uc010ztl.1)	LSDSRTALK	589	前列腺癌	HLA.A11.01
PARG p.A584T (uc001jih.2)	EETEAQHLY	585	前列腺癌	HLA.B44.02 HLA.B44.03

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
GATA3 p.S408fs (uc001ijz.2)	SSLSHISAL	573	乳癌	HLA.A02.06 HLA.B08.01 HLA.B15.03 HLA.B15.17 HLA.B39.01
EGFR p.L858R (uc003tqk.2)	FGRAKLLGA	564	肺腺癌	HLA.B08.01
TP53 p.R249M (uc002gim.2)	RMPILTIITL	563	肺腺癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
PARG p.A584T (uc001jih.2)	TEAQHLYQSI	557	前列腺癌	HLA.B40.01 HLA.B44.02
CDC27 p.D555E (uc002ile.3)	EVALSVLSK	557	結腸直腸癌	HLA.A11.01 HLA.A68.01
GATA3 p.H435fs (uc001ijz.2)	MFLKAESKI	554	乳癌	HLA.A23.01
FRG1B p.K13N (uc010ztl.1)	RIALNSGYGK	546	前列腺癌	HLA.A03.01 HLA.A11.01
CTNNB1 p.G34R (uc010hia.1)	YLDSRIHSGA	530	子宮體子宮內膜癌	HLA.A02.01 HLA.A02.03 HLA.A02.06
FRG1B p.L52S (uc010ztl.1)	LSASNSCFI	528	前列腺癌	HLA.A68.02 HLA.B15.17 HLA.B58.01
AXIN2 p.W663fs (uc002jfi.2)	TPAPPPVPT	520	結腸直腸癌	HLA.B07.02

突變	突變體序列	所估計每年群體	相關腫瘤類型 (>500名患者/年)	呈遞HLA (預測<500 nM)
AXIN2 p.W663fs (uc002jfi.2)	VPTCSPRTL	520	結腸直腸癌	HLA.B07.02
FCGBP p.A2493V (uc002omp.3)	RPGLHRFVV	504	胰臟癌	HLA.B07.02 HLA.B08.01

實例6

對含有細胞外結構域之基因中表現之頻發突變之治療性靶向. 可用藥物或療法靶向存於大於1%之癌症患者群體中之腫瘤特異性突變，該藥物或療法識別突變導致之腫瘤特異性新表位。突變較佳在細胞外結構域內。藥物或療法係抗體、抗體片段、抗體藥物偶聯物、適配體、CAR或T細胞受體。抗體或其片段可為人類化、完全人類化或嵌合的。抗體片段可為奈米抗體、Fab、Fab'、(Fab')2、Fv、ScFv、雙價抗體、三價抗體、四價抗體、雙-scFv、微小抗體、Fab2或Fab3片段。

可靶向之頻發突變係FGFR3:p.S249C。纖維母細胞生長因子受體3 (FGFR3)係人類中由FGFR3基因編碼之蛋白質。FGFR3亦已被命名為CD333 (分化簇333)。全長蛋白質包括由3個免疫球蛋白樣結構域、單一疏水跨膜區段及細胞質酪胺酸激酶結構域組成之細胞外區域。突變發生在蛋白質之細胞外結構域中。突變存於6.92%之所分析膀胱癌(BLCA)患者中及1.12%之所分析肺鱗狀細胞癌(LUSC)患者中。

可靶向之另一頻發突變係ERBB3:p.V104M。受體酪胺酸-蛋白激酶erbB-3 (亦稱為HER3，人類表皮生長因子受體3)係人類中由ERBB3基因編碼之膜結合蛋白。ErbB3係受體酪胺酸激酶之表皮生長因子受

體(EGFR/ERBB)家族之成員。突變存於所分析之1.72%結腸直腸癌(CRC)、2.86%結腸腺癌(COAD)、2.42%胃腺癌(STAD)及2.06%子宮頸鱗狀細胞癌及子宮頸內腺癌(CESC)患者中。

可靶向之另一頻發突變係EGFR:p.L858R。表皮生長因子受體(人類中之EGFR；ErbB-1；HER1)細胞外蛋白質配體之表皮生長因子家族(EGF家族)成員之細胞表面受體。突變存在於3.24%之所分析肺腺癌(LUAD)患者中。

可靶向之另一頻發突變係MUC4:p.H4205Q。黏蛋白4 (MUC 4)係人類中由MUC4基因編碼之黏蛋白。此基因編碼在細胞表面上發現之膜主體糖蛋白，但可存在分泌同種型。突變存在於所分析之2.3%前列腺腺癌(PRAD)、2.31%膀胱尿路上皮癌(BLCA)及7.14%子宮癌肉瘤(UCS)患者中。

可靶向之另一頻發突變係PDGFRA:p.R483fs。血小板源生長因子受體α多肽係人類中由PDGFRA基因編碼之蛋白質。此基因編碼血小板源生長因子家族成員之細胞表面酪胺酸激酶受體。突變存於1.92%之所分析前列腺腺癌(PRAD)患者中。

可靶向之另一頻發突變係TMEM52 23_26LLPL>L。跨膜蛋白52係由TMEM52基因編碼。突變存於1.53%之所分析前列腺腺癌(PRAD)患者中。

可靶向之另一頻發突變係PODXL 28_30PSP>P。足糖萼蛋白樣蛋白1係人類中由PODXL基因編碼之蛋白質。突變存於所分析之1.53%前列腺腺癌(PRAD)、15.56%腎上腺皮質癌(ACC)及3.57%子宮癌肉瘤(UCS)患者中。

* * *

已由此詳細地闡述本發明之較佳實施例，應理解，由上述段落

所界定之本發明並不限於上文說明中所述之具體細節，此乃因在不背離本發明之精神或範圍之情況下對本文之多種明顯變更係可能的。

【序列表】

<110> 美商博德研究所有限公司(THE BROAD INSTITUTE INC.)
美商達納-法伯癌症協會(DANA-FARBER CANCER INSTITUTE, INC.)
美商通用醫院公司(THE GENERAL HOSPITAL CORPORATION)

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<130> TW 105115840

<150> US 62/389,377
<151> 2016-02-23

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<223> /注釋="人工序列的說明書: 合成肽"

<400> 22
Val Ser Ile Lys Ile Cys Leu Thr Leu
1 5

<210> 23
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 23
Val Ile Pro Gly Asn Ile Leu Asn Val
1 5

<210> 24
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 24
Arg Val Phe Gly Val Ser Glu Trp Leu
1 5

<210> 25
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 25
Gly Met Thr Leu Gly Ala Val Val Val
1 5

<210> 26
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 26
Met Thr Leu Gly Glu Lys Phe Arg Val
1 5

<210> 27
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<400> 27
Arg Val Gly Asn Cys Lys His Leu Lys
1 5

<210> 28
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<400> 28
Arg Val Gly Asn Cys Lys His Leu Lys
1 5

<210> 29
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<400> 29
Val Val Val Ser Glu Arg Ile Leu Arg
1 5

<210> 30
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<400> 30
Arg Val Gly Asn Cys Lys His Leu Lys
1 5

<210> 31
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<400> 31
Lys Phe Arg Val Gly Asn Cys Lys His
1 5

<210> 32
<211> 10
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<400> 32
Lys Phe Arg Val Gly Asn Cys Lys His Leu
1 5 10

<210> 33
<211> 7
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 33
Arg Val Gly Asn Cys Lys His
1 5

<210> 34
<211> 7
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 34
Thr Leu Gly Ala Val Val Val
1 5

<210> 35
<211> 8
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 35
Val Val Val Ser Glu Arg Ile Leu
1 5

<210> 36
<211> 7
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 36
Gly Met Thr Leu Gly Glu Lys
1 5

<210> 37
<211> 7
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 37
Ala Val Val Val Ser Glu Arg
1 5

<210> 38
<211> 7
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成

肽"

<400> 38
Ala Gly Met Thr Leu Gly Glu
1 5

<210> 39
<211> 7
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 39
Gly Asn Cys Lys His Leu Lys
1 5

<210> 40
<211> 7
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 40
Leu Gly Ala Val Val Val Ser
1 5

<210> 41
<211> 7
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 41
Arg Val Phe Gly Val Ser Glu
1 5

<210> 42
<211> 8
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 42
Ile Leu Arg Val Phe Gly Val Ser
1 5

<210> 43
<211> 7
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 43
Asn Cys Lys His Leu Lys Met
1 5

<210> 44
<211> 7

<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 44
Thr Leu Gly Ala Val Val Val
1 5

<210> 45
<211> 8
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 45
Val Val Val Ser Glu Arg Ile Leu
1 5

<210> 46
<211> 7
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 46
Thr Leu Gly Ala Val Val Val
1 5

<210> 47
<211> 7
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 47
Glu Ala Gly Met Thr Leu Gly
1 5

<210> 48
<211> 7
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 48
Leu Gly Ala Val Val Val Ser
1 5

<210> 49
<211> 7
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 49

Ala Val Val Val Ser Glu Arg
1 5

<210> 50
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 50
Ser Leu Leu Asn Tyr Leu Arg Glu Met
1 5

<210> 51
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 51
Glu Tyr Met Ala Asn Gly Ser Leu Leu
1 5

<210> 52
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 52
Thr Glu Tyr Met Ala Asn Gly Ser Leu
1 5

<210> 53
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 53
Met Ala Asn Gly Ser Leu Leu Asn Tyr
1 5

<210> 54
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 54
Met Ala Asn Gly Ser Leu Leu Asn Tyr
1 5

<210> 55
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 55
Thr Glu Tyr Met Ala Asn Gly Ser Leu
1 5

<210> 56
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 56
Leu Leu Asn Tyr Leu Arg Glu Met Arg
1 5

<210> 57
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 57
Glu Tyr Met Ala Asn Gly Ser Leu Leu
1 5

<210> 58
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 58
Met Ala Asn Gly Ser Leu Leu Asn Tyr
1 5

<210> 59
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 59
Thr Glu Tyr Met Ala Asn Gly Ser Leu
1 5

<210> 60
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 60
Thr Glu Tyr Met Ala Asn Gly Ser Leu
1 5

<210> 61
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 61
Met Ala Asn Gly Ser Leu Leu Asn Tyr
1 5

<210> 62
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 62
Leu Leu Asn Tyr Leu Arg Glu Met Arg
1 5

<210> 63
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 63
Met Ala Asn Gly Ser Leu Leu Asn Tyr
1 5

<210> 64
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 64
Glu Tyr Met Ala Asn Gly Ser Leu Leu
1 5

<210> 65
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 65
Thr Glu Tyr Met Ala Asn Gly Ser Leu
1 5

<210> 66
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成

肽"

<400> 66
Met Ala Asn Gly Ser Leu Leu Asn Tyr
1 5

<210> 67
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 67
Met Ala Asn Gly Ser Leu Leu Asn Tyr
1 5

<210> 68
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 68
Thr Glu Tyr Met Ala Asn Gly Ser Leu
1 5

<210> 69
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 69
Leu Leu Asn Tyr Leu Arg Glu Met Arg
1 5

<210> 70
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 70
Glu Tyr Met Ala Asn Gly Ser Leu Leu
1 5

<210> 71
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<400> 71
Met Ala Asn Gly Ser Leu Leu Asn Tyr
1 5

<210> 72
<211> 9

<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<400> 72
Thr Glu Tyr Met Ala Asn Gly Ser Leu
1 5

<210> 73
<211> 10
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<400> 73
Val Gln Leu Ile Met Gln Leu Met Pro Phe
1 5 10

<210> 74
<211> 10
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<400> 74
Ser Thr Val Gln Leu Ile Met Gln Leu Met
1 5 10

<210> 75
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<400> 75
Gln Leu Ile Met Gln Leu Met Pro Phe
1 5

<210> 76
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<400> 76
Gln Leu Ile Met Gln Leu Met Pro Phe
1 5

<210> 77
<211> 10
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<400> 77

Val Gln Leu Ile Met Gln Leu Met Pro Phe
1 5 10

<210> 78
<211> 10
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<400> 78
Met Gln Leu Met Pro Phe Gly Cys Leu Leu
1 5 10

<210> 79
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<400> 79
Met Gln Leu Met Pro Phe Gly Cys Leu
1 5

<210> 80
<211> 9
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<400> 80
Gln Leu Ile Met Gln Leu Met Pro Phe
1 5

<210> 81
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R732Q"

<400> 81
Phe Tyr Glu Ser Asp Val Met Gly Arg Gly His Ala Arg Leu Val His
1 5 10 15

Val Glu Glu Pro His Thr Glu Thr Val Gln Gln Lys Tyr Phe Pro Glu
20 25 30

Thr Trp Ile Trp Asp Leu Val Val Val Asn Ser Ala Gly Val Ala Glu
35 40 45

Val Gly Val Thr
50

<210> 82
<211> 37
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S654fs"

<400> 82
Tyr Asp Gln Cys Pro Val Ser Gly Pro Trp Asp Phe Pro Gln Pro Leu
1 5 10 15

Ile Asp Pro Met Pro Gln Gly His Ser Glu Pro Ala Phe His Tyr Leu
20 25 30

Glu Ala Leu Val Leu
35

<210> 83
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A266T"

<400> 83
Val Pro Leu Leu Ser Arg Lys Phe Met Val Thr Ser Leu Cys Asn Tyr
1 5 10 15

Leu Ala Ile Asp Leu Ser Trp Arg Asp Thr Thr Ile Leu Asn Gly Thr
20 25 30

Cys Val Pro Pro Asp Val Trp Arg Lys Tyr Glu Lys Trp Leu Ser Pro
35 40 45

Asp Asn Ile Pro
50

<210> 84
<211> 33
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T878fs"

<400> 84
Lys Thr Ile Asp Leu Val Ala Tyr Gly Asp Ile Asn Gly Phe Ser Ala
1 5 10 15

Met Ala Lys Thr Val Gly Leu Pro Thr Arg His Gly Ser Gln Asn Val
20 25 30

Ala

<210> 85
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R385I"

<400> 85
Thr Gly Glu Lys Pro Tyr Thr Cys Gly Glu Cys Gly Lys Thr Phe Arg
1 5 10 15

Gln Ser Ala Asn Leu Tyr Val His Arg Ile Ile Ile His Thr Gly Glu
20 25 30

Lys Pro Tyr Lys Cys Glu Asp Cys Gly Lys Ala Phe Gly Arg Tyr Thr
35 40 45

Ala Leu Asn Gln
50

<210> 86
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E95D"

<400> 86
Thr Phe Pro Pro Pro Gly Asp Thr Trp Glu Leu Ala Tyr Ile Pro Ser
1 5 10 15

His Ser Asp Ala Ala Lys Thr Val Thr Asp Asp Thr Val Arg Arg Ala
20 25 30

Leu Val Ile Asn Met Arg Val Arg Gly Phe Pro Ser Glu Lys Asp Phe
35 40 45

Glu Asp Tyr Ile
50

<210> 87
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R1476Q"

<400> 87
Pro Gln Ile Thr Leu Leu Asp Glu Pro Ser Thr Gly Met Asp Pro Lys
1 5 10 15

Ala Lys Gln His Met Trp Arg Ala Ile Gln Gln Thr Ala Phe Lys Asn
20 25 30

Arg Lys Arg Ala Ala Ile Leu Thr Thr His Tyr Met Glu Glu Ala Glu
35 40 45

Ala Val Cys Asp
50

<210> 88
<211> 31
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L306fs"

<400> 88
Phe Val Thr Ile Ile Ile Thr Phe Thr Gln Ile Ile Val Met Thr Gly
1 5 10 15

Phe Met Val Ile Phe Ile Leu Phe Phe Tyr Met Ala Tyr Leu Trp
20 25 30

<210> 89
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A696T"

<400> 89
Ser Thr Gln Phe Met Asp Glu Ala Asp Ile Leu Ala Asp Arg Lys Val
1 5 10 15

Phe Leu Ser Gln Gly Lys Leu Lys Cys Thr Thr Gly Ser Ser Leu Phe
20 25 30

Leu Lys Lys Lys Trp Gly Ile Gly Tyr His Leu Ser Leu Gln Leu Asn
35 40 45

Glu Ile Cys Val
50

<210> 90
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R842Q"

<400> 90
Arg Leu Val Glu Met Glu Gln Val Leu Ser Ser Leu Asn Lys Met Arg
1 5 10 15

Lys Thr Ile Gly Gly Val Ala Leu Trp Gln Gln Gln Gln Ile Cys Ala
20 25 30

Ile Ala Arg Val Arg Leu Leu Lys Leu Lys His Glu Arg Lys Ala Leu
35 40 45

Leu Ala Leu Leu
50

<210> 91
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E1158K"

<400> 91
Asn Ser Gly Ile Trp Ser Phe Cys Phe Tyr Val Val Thr Val Phe Ser
1 5 10 15

Val Ala Gly Phe Ala Phe Ser Ile Phe Lys Lys Ser Asp Ile Pro Phe
20 25 30

Ile Phe Thr Phe Leu Ile Pro Pro Ala Thr Met Ile Gly Cys Leu Phe
35 40 45

Leu Ser Ser His
50

<210> 92
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R467L"

<400> 92
Arg Leu Tyr Asp Pro Thr Glu Gly Met Val Ser Val Asp Gly Gln Asp
1 5 10 15

Ile Arg Thr Ile Asn Val Arg Phe Leu Leu Leu Glu Ile Ile Gly Val
20 25 30

Val Ser Gln Glu Pro Val Leu Phe Ala Thr Thr Ile Ala Glu Asn Ile
35 40 45

Arg Tyr Gly Arg
50

<210> 93
<211> 51
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R527fs"

<400> 93
Val Lys Glu Ala Asn Ala Tyr Asp Phe Ile Met Lys Leu Pro His Lys
1 5 10 15

Phe Asp Thr Leu Val Gly Glu Arg Gly Pro Val Glu Trp Trp Ala Glu
20 25 30

Ala Glu Asp Arg His Cys Thr Cys Pro Gly Ser Gln Pro Gln Asp Pro
35 40 45

Pro Ala Gly
50

<210> 94
<211> 33
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G318fs"

<400> 94
Leu Thr Glu Lys Ala Pro Trp Asn Ser Leu Ala Trp Thr Val Thr Ser
1 5 10 15

Tyr Val Phe Leu Lys Phe Leu Gln Gly Val Ala Leu Ala Val Gln Ala
20 25 30

Ser

<210> 95
<211> 52
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R345H"

<400> 95
Ser Arg Gln Cys Gln Glu Gln Ile Ala Arg Ala Met Gly Val Ala Asp
1 5 10 15

Glu Ala Leu Gly Asn Val Arg Thr Val His His Ala Phe Ala Met Glu
20 25 30

Gln Arg Glu Glu Glu Arg Tyr Gly Ala Glu Leu Glu Ala Cys Arg Cys
35 40 45

Arg Ala Glu Glu
50

<210> 96
<211> 52
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多肽"

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<223> /注釋="p.R570W"

<400> 96
Arg Met Leu Ile Leu Pro Leu Asn Asn Phe Pro Trp Val Ile Asn Gly
1 5 10 15

Leu Leu Glu Ala Lys Val Ser Leu Asp Trp Trp Ile Gln Leu Phe Leu
20 25 30

Asp Leu Pro Asn His Asn Pro Gln Ala Tyr Tyr Ser Pro Asp Pro Pro
35 40 45

Ala Glu Pro Ser
50

<210> 97
<211> 31
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.L883fs"

<400> 97
Val Ala Val Ile Pro Trp Ile Ala Ile Pro Leu Val Pro Leu Gly Ile
1 5 10 15

Ile Phe Ile Phe Leu Arg Arg Tyr Phe Trp Lys Arg Gln Glu Met
20 25 30

<210> 98
<211> 50
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.L1090fs"

<400> 98
His Ala Tyr Asn Lys Gly Gln Glu Phe Leu His Arg Tyr Gln Glu Leu
1 5 10 15

Leu Asp Asp Asn Gln Ala Pro Phe Phe Cys Leu Arg Val Arg Cys Gly
20 25 30

Gly Trp Leu Cys Gly Trp Thr Ser Ser Ala Ser Pro Ser Ser Pro Pro
35 40 45

Arg Gly
50

<210> 99
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.Y512C"

<400> 99
Ser Thr Leu Glu Tyr Ser Asn Glu Arg Leu Lys Gln Thr Asn Glu Met
1 5 10 15

Leu Arg Gly Ile Lys Leu Leu Lys Leu Cys Cys Ala Trp Glu Asn Ile
20 25 30

Phe Arg Thr Arg Val Glu Thr Thr Arg Arg Lys Glu Met Thr Ser Leu
35 40 45

Arg Ala Phe Ala
50

<210> 100
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.L466P"

<400> 100
Ile Ile Met Gly Val Ile Leu Leu Tyr Asn Leu Leu Gly Ser Ser Ala
1 5 10 15

Leu Val Gly Ala Ala Val Ile Val Leu Pro Pro Ala Pro Ile Gln Tyr
20 25 30

Phe Ile Ala Thr Lys Leu Ala Glu Ala Gln Lys Ser Thr Leu Asp Tyr
35 40 45

Ser Thr Glu Arg
50

<210> 101
<211> 52
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多肽"

<220>
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<223> /注釋="p.S606P"

<400> 101
Asp Val Val His Leu His His Ile Leu Gln Arg Glu Gly Gly Trp Glu
1 5 10 15

Ala Met Cys Asp Trp Lys Asp Val Leu Pro Pro Gly Gly Glu Lys Gln
20 25 30

Arg Ile Gly Met Ala Arg Met Phe Tyr His Arg Pro Lys Tyr Ala Leu
35 40 45

Leu Asp Glu Cys
50

<210> 102
<211> 52
<212> PRT
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多肽"

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<223> /注釋="p.H169Q"

<400> 102
Ala Thr Phe Val Asn Ser Ala Ile Arg Tyr Leu Glu Gly Gln Leu Ala
1 5 10 15

Leu Ser Phe Arg Ser Arg Leu Val Ala Gln Gln Ala Tyr Arg Leu Tyr
20 25 30

Phe Ser Gln Gln Thr Tyr Tyr Arg Val Ser Asn Met Asp Gly Arg Leu
35 40 45

Arg Asn Pro Asp
50

<210> 103
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.K445N"

<400> 103
Asp Tyr Glu Asp Glu Glu Ala Ala Val Val Gln Tyr Asn Asp Pro Tyr
1 5 10 15

Ala Asp Gly Asp Pro Ala Trp Ala Pro Asn Asn Asn Tyr Ile Glu Lys
20 25 30

Val Val Ala Ile Tyr Asp Tyr Thr Lys Asp Lys Asp Asp Glu Leu Ser
35 40 45

Phe Met Glu Gly
50

<210> 104
<211> 45
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.P19T"

<400> 104
Met Gly Gln Gln Val Gly Arg Val Gly Glu Ala Pro Gly Leu Gln Gln
1 5 10 15

Pro Gln Thr Thr Arg Gly Ile Arg Gly Ser Ser Ala Ala Arg Pro Ser
20 25 30

Gly Arg Arg Arg Asp Pro Ala Gly Arg Thr Thr Glu Thr
35 40 45

<210> 105
<211> 29
<212> PRT
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<220>
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肽"

<220>
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<223> /注釋="p.L249fs"

<400> 105
Thr Ile Glu Pro Pro Pro Ala Asp Pro Arg Leu Arg Glu Asp Met Ala
1 5 10 15

Leu Leu Ala Asp Cys Ala Leu Pro Pro Arg Ala Pro Arg
20 25

<210> 106
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R1731C"

<400> 106
Ala Arg Ala Glu Gly Ile Pro Arg Ile Tyr Val Ser Ala Asn Ser Gly
1 5 10 15

Ala Arg Ile Gly Leu Ala Glu Glu Ile Cys Cys His Met Phe His Val
20 25 30

Ala Trp Val Asp Pro Glu Asp Pro Tyr Lys Gly Tyr Arg Tyr Leu Tyr
35 40 45

Leu Thr Pro Gln
50

<210> 107
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.E2318Q"

<400> 107
Val Ala Val Gln Phe Ala Asp Phe His Asp Thr Pro Gly Arg Met Leu
1 5 10 15

Glu Lys Gly Val Ile Ser Asp Ile Leu Gln Gln Trp Lys Thr Ala Arg
20 25 30

Thr Phe Leu Tyr Trp Arg Leu Arg Arg Leu Leu Leu Glu Asp Gln Val
35 40 45

Lys Gln Glu Ile
50

<210> 108
<211> 41
<212> PRT
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<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.G255fs"

<400> 108
Glu His Lys Lys Leu Asp Leu His Arg Asp Phe Thr Val Ala Ser Pro
1 5 10 15

Ala Glu Phe Val Thr Arg Phe Gly Gly Ile Gly Ser Ser Arg Arg Cys
20 25 30

Leu Leu Pro Thr Thr Gly Leu Pro Pro
35 40

<210> 109
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.F48C"

<400> 109
Gln His Thr Lys Ala Asn Arg Gln Arg Glu Pro Gly Leu Gly Phe Ser
1 5 10 15

Phe Glu Phe Thr Glu Gln Gln Lys Glu Cys Cys Gln Ala Thr Ala Arg
20 25 30

Lys Phe Ala Arg Glu Glu Ile Ile Pro Val Ala Ala Glu Tyr Asp Lys
35 40 45

Thr Gly Glu Tyr
50

<210> 110
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R330H"

<400> 110
Thr Lys Leu Gln Val Ile Gln Phe Lys Leu Ala Asp Met Ala Leu Ala
1 5 10 15

Leu Glu Ser Ala Arg Leu Leu Thr Trp His His Ala Ala Met Leu Lys
20 25 30

Asp Asn Lys Lys Pro Phe Ile Lys Glu Ala Ala Met Ala Lys Leu Ala
35 40 45

Ala Ser Glu Ala
50

<210> 111
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R224L"

<400> 111
Arg Glu Glu Glu Glu Arg Glu Arg Leu Gln Lys Glu Glu Glu Lys Arg
1 5 10 15

Arg Arg Glu Glu Glu Glu Arg Leu Arg Leu Leu Glu Glu Glu Glu Arg
20 25 30

Arg Arg Ile Glu Glu Glu Arg Leu Arg Leu Glu Gln Gln Lys Gln Gln
35 40 45

Ile Met Ala Ala
50

<210> 112
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R50Q"

<400> 112
Gly Pro Gln Asn Pro Lys Lys Gln Gly Ile Phe His Ile His Glu Ala
1 5 10 15

Cys Ser Ser Ile His Val Asn His Val Gln Gln Asp Lys Leu Arg Glu
20 25 30

Ile Val Gly Ala Ser Thr Asn Trp Arg Asp His Val Lys Ala Met Glu
35 40 45

Glu Arg Lys Leu
50

<210> 113
<211> 85
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.Q123fs"

<400> 113
Asp Leu Asn Arg Lys Ser Asn Gln Val Lys Thr Cys Lys Ala Lys Ile
1 5 10 15

Glu Leu Leu Gly Ser Tyr Asp Pro Gln Asn Asn Leu Leu Leu Lys Ile
20 25 30

Pro Ile Met Gly Met Thr Leu Thr Leu Arg Arg Cys Thr Ser Ser Val
35 40 45

Ser Gly Ala Ala Glu Arg Ser Trp Arg Arg Pro Thr Glu Ala Gly Ser
50 55 60

Cys Pro Ala Ala Ala Ser Leu Thr Arg Pro His Pro Glu Val Leu His
65 70 75 80

Phe Ser Val Gly Val
85

<210> 114
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.V29G"

<400> 114
Gly Val Phe Ser Met Arg Leu Trp Thr Pro Val Gly Val Leu Thr Ser
1 5 10 15

Leu Ala Tyr Cys Leu His Gln Arg Arg Gly Gly Ala Leu Ala Glu Leu
20 25 30

Gln Glu Ala Asp Gly Gln Cys Pro Val Asp Arg Ser Leu Leu Lys Leu
35 40 45

Lys Met Val Gln
50

<210> 115
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R43W"

<400> 115
Phe Leu Phe Leu Leu Phe Phe Trp Leu Asp Arg Ser Val Leu Ala Lys
1 5 10 15

Glu Leu Lys Phe Val Thr Leu Val Phe Trp Trp His Gly Asp Arg Ser
20 25 30

Pro Ile Asp Thr Phe Pro Thr Asp Pro Ile Lys Glu Ser Ser Trp Pro
35 40 45

Gln Gly Phe Gly
50

<210> 116
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R105Q"

<400> 116
Glu Leu Gly Glu Tyr Ile Arg Lys Arg Tyr Arg Lys Phe Leu Asn Glu
1 5 10 15

Ser Tyr Lys His Glu Gln Val Tyr Ile Gln Gln Ser Thr Asp Val Asp
20 25 30

Arg Thr Leu Met Ser Ala Met Thr Asn Leu Ala Ala Leu Phe Pro Pro
35 40 45

Glu Gly Val Ser
50

<210> 117
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.E321K"

<400> 117
Leu Gln Met Ala Leu Asp Val Tyr Asn Gly Leu Leu Pro Pro Tyr Ala
1 5 10 15

Ser Cys His Leu Thr Glu Leu Tyr Phe Lys Lys Lys Gly Glu Tyr Phe
20 25 30

Val Glu Met Tyr Tyr Arg Asn Glu Thr Gln His Glu Pro Tyr Pro Leu
35 40 45

Met Leu Pro Gly
50

<210> 118
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.W279C"

<400> 118
Tyr Val Val Val Gly Ile Thr Ser Trp Gly Val Gly Cys Ala Arg Ala
1 5 10 15

Lys Arg Pro Gly Ile Tyr Thr Ala Thr Cys Cys Pro Tyr Leu Asn Trp
20 25 30

Ile Ala Ser Lys Ile Gly Ser Asn Ala Leu Arg Met Ile Gln Ser Ala
35 40 45

Thr Pro Pro Pro
50

<210> 119
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.I250M"

<400> 119
Ala Val Leu Ile Tyr Thr Ser Gly Thr Thr Gly Ile Pro Lys Gly Val
1 5 10 15

Met Leu Ser His Asp Asn Ile Thr Trp Met Met Ala Gly Ala Val Thr
20 25 30

Lys Asp Phe Lys Leu Thr Asp Lys His Glu Thr Val Val Ser Tyr Leu
35 40 45

Pro Leu Ser His
50

<210> 120
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T188S"

<400> 120
Ala Ile Phe Cys Glu Thr Arg Ala Glu Trp Met Ile Ala Ala Gln Ala
1 5 10 15

Cys Phe Met Tyr Asn Phe Gln Leu Val Ser Ser Leu Tyr Ala Thr Leu
20 25 30

Gly Gly Pro Ala Ile Val His Ala Leu Asn Glu Thr Glu Val Thr Asn
35 40 45

Ile Ile Thr Ser
50

<210> 121
<211> 72
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L402fs"

<400> 121
Pro Gly Tyr Met Gly Thr Ala Ala Ser Cys Tyr Asp Val Gln Ile Ile
1 5 10 15

Asp Asp Lys Gly Asn Val Leu Pro Pro Arg His Arg Arg Arg His Trp
20 25 30

His Gln Gly Gln Thr His Gln Ala Tyr Arg His Leu Leu Trp Leu Cys
35 40 45

Gly Gln Ser Arg Gln Asp Ser Ser Gln His Ser Arg Arg Leu Leu Ala
50 55 60

Pro Trp Arg Pro Gly Asn Gln Arg
65 70

<210> 122
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K195N"

<400> 122
Val Ala Ser Glu Cys Pro Ser Leu Arg Ile Lys Leu Leu Val Ser Glu
1 5 10 15

Lys Ser Cys Asp Gly Trp Leu Asn Phe Asn Asn Lys Leu Leu Asn Glu
20 25 30

Ala Ser Thr Thr His His Cys Val Glu Thr Gly Ser Gln Glu Ala Ser
35 40 45

Ala Ile Tyr Phe
50

<210> 123
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G275C"

<400> 123
Ile Thr Ile Gly Asn Glu Arg Phe Arg Cys Pro Glu Thr Leu Phe Gln
1 5 10 15

Pro Ser Phe Ile Gly Met Glu Ser Ala Cys Cys Ile His Glu Thr Thr
20 25 30

Tyr Asn Ser Ile Met Lys Cys Asp Ile Asp Ile Arg Lys Asp Leu Tyr
35 40 45

Ala Asn Asn Val
50

<210> 124
<211> 48
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A22P"

<400> 124
Met Glu Glu Glu Ile Ala Ala Leu Val Ile Asp Asn Gly Ser Gly Met
1 5 10 15

Cys Lys Ala Gly Phe Pro Pro Gly Asp Asp Ala Pro Arg Ala Val Phe
20 25 30

Pro Ser Ile Val Gly Arg Pro Arg His Gln Gly Val Met Val Gly Met
35 40 45

<210> 125
<211> 71
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L88fs"

<400> 125
Gly Pro Thr Tyr Tyr Ile Asp Thr Asn Ala Leu Arg Val Pro Arg Glu
1 5 10 15

Asn Met Glu Ala Ile Ser Pro Leu Lys Met Gly Trp Leu Lys Thr Gly
20 25 30

Ile Val Ser Lys Leu Phe Trp Ile Ile Pro Thr Lys Cys Met Ser Asn
35 40 45

Gln Lys Pro Val Ser Ile Leu Phe Ser Cys Gln Arg His Arg Gly Ile
50 55 60

Leu Glu Gln Arg Glu Arg Asn
65 70

<210> 126
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R354H"

<400> 126
Thr Gly Phe Lys Glu Glu Met Ala Ala Asn Val Leu Leu Cys Gly Gly
1 5 10 15

Cys Thr Met Leu Asp Gly Phe Pro Glu His His Phe Gln Arg Glu Leu
20 25 30

Ser Leu Leu Cys Pro Gly Asp Ser Pro Ala Val Ala Ala Ala Pro Glu
35 40 45

Arg Lys Thr Ser
50

<210> 127
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E211K"

<400> 127
Ile Tyr Ser Tyr Gly Lys Thr Ser Gly Leu Val Val Glu Ser Gly His
1 5 10 15

Gly Val Ser His Val Val Pro Ile Ser Lys Lys Gly Asp Val Leu Pro
20 25 30

Gly Leu Thr Ser Arg Ala Asp Tyr Ala Gly Gly Asp Leu Thr Asn Tyr
35 40 45

Leu Met Gln Leu
50

<210> 128
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R331H"

<400> 128
Glu Val Pro Gly Leu Ser Pro Val Gly Leu Ser Thr Met Ala Lys Gln
1 5 10 15

Ser Leu Arg Lys Leu Ser Leu Glu Met His His Ala Asp Leu Ala Gln
20 25 30

Asn Val Leu Leu Cys Gly Gly Ser Ser Leu Phe Thr Gly Phe Glu Gly
35 40 45

Arg Phe Arg Ala
50

<210> 129
<211> 28
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.D893Y"

<400> 129
Ala Tyr Ser Gly Pro Gly Ser Val Pro Gly Ala Leu Asp Tyr Ala Ala
1 5 10 15

Phe Ser Ser Ala Leu Tyr Gly Glu Ser Tyr Tyr Leu
20 25

<210> 130
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R206H"

<400> 130
Ala Asp Leu Leu Asp His Ser Cys Thr Ser Gly Ser Gly Ser Gly Leu
1 5 10 15

Pro Phe Leu Val Gln Arg Thr Val Ala His His Gln Ile Thr Leu Leu
20 25 30

Glu Cys Val Gly Lys Gly Arg Tyr Gly Glu Val Trp Arg Gly Ser Trp
35 40 45

Gln Gly Glu Asn
50

<210> 131
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S290L"

<400> 131
Phe Ile Ala Ser Asp Met Thr Ser Arg His Ser Ser Thr Gln Leu Trp
1 5 10 15

Leu Ile Thr His Tyr His Glu Met Gly Leu Leu Leu Tyr Asp Tyr Leu
20 25 30

Gln Leu Thr Thr Leu Asp Thr Val Ser Cys Leu Arg Ile Val Leu Ser
35 40 45

Ile Ala Ser Gly
50

<210> 132
<211> 37
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S11L"

<400> 132
Met Ala Ser Asn Asn His Trp Phe Gln Ser Leu Leu Gln Val Pro Ser
1 5 10 15

Phe Ala Gln Met Leu Lys Lys Asn Leu Pro Val Gln Pro Ala Thr Lys
20 25 30

Thr Ile Thr Thr Pro
35

<210> 133
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G44E"

<400> 133
Leu Ala Ala Ser Leu Gln Ile Ser Pro Gln Pro Arg Pro Trp Arg Pro
1 5 10 15

Leu Pro Ala Gln Ala Gln Ser Ala Trp Glu Glu Pro Ala Pro Ala Pro
20 25 30

Ala Thr Tyr Arg Ala Glu Gly Gly Trp Pro Gln Val Ser Val Leu Arg
35 40 45

Asp Ser Gly Pro
50

<210> 134
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K380M"

<400> 134
Glu Lys Asp Gln Ile Asp Ile Thr Thr Asn Pro Val Gln Met Leu His
1 5 10 15

Glu Phe Ser Lys Tyr Arg Gln Arg Ile Met Met Gln His Ala Asp Ala
20 25 30

Val His Leu Ile Ser Arg Val Thr Phe His Tyr Lys Arg Ser Ser Leu
35 40 45

Ser Tyr Phe Gly
50

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<400> 135
Gln Glu Gln Phe Glu Thr Glu Leu Lys Tyr Lys Met Thr Ile Asn Gly
1 5 10 15

Lys Ile Ala Val Leu Tyr Leu Lys Lys Lys Gln Glu Pro Pro Cys Thr
20 25 30

Arg Leu His Gly Asn Ile Leu
35

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<400> 136
Ile Asp Asn Ser Thr Gln Lys Gln Ser Ser Tyr Val Gly Trp Trp Ile
1 5 10 15

His Phe Arg Ile Val Glu Ile Val Val Ile Ile Ile Asp Asn Tyr Leu
20 25 30

Tyr Ile Arg Tyr Glu Arg Asn Asp Ser Lys Leu Leu Glu Asp Leu Tyr
35 40 45

Val Ile Val Asn
50

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<400> 137
Leu Lys Pro Lys Gln Glu Lys Met Pro Leu Ser Lys Ala Lys Thr Glu
1 5 10 15

Gln Glu Glu Ser Lys Thr Lys Thr Val His His Glu Glu Ser Lys Thr
20 25 30

Lys Thr Gly Gln Glu Glu Ser Glu Ala Lys Thr Gly Gln Glu Glu Ser
35 40 45

Lys Ala Lys Thr
50

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<400> 138
Lys His Val Leu His Leu Trp Pro Lys Arg Leu Leu Leu Pro Arg His
1 5 10 15

Leu Arg Val Phe Ser Phe Thr Glu His Leu Leu Glu Leu Leu Glu Asp
20 25 30

His Pro Tyr Ile Pro Lys Asp Cys Asn Tyr Met Gly Ser Val Lys Glu
35 40 45

Ser Leu Asp Ser Lys
50

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<400> 139
Ser Ser Asp Trp Ala His Leu Tyr Leu Gln Arg Lys Tyr Asn Asp Ala
1 5 10 15

Leu Ala Trp Ser Phe Gly Lys Val Cys Tyr Tyr Leu Glu Tyr Ala Gly
20 25 30

Ser Val Ser Thr Leu Leu Asp Thr Asn Ile Leu Ala Pro Ala Thr Trp
35 40 45

Ser Ala His Glu
50

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<400> 140
Asp Arg Asn Asn Lys Tyr Val Phe Cys Gly Trp Arg Asn Leu Ile Cys
1 5 10 15

Gly Arg Leu Val Cys Thr Tyr Pro Thr Gln Gln Lys Pro Phe His Gln
20 25 30

Glu Asn Gly Asp Val Ile Tyr Ala Phe Val Arg Asp Ser Val Cys Ile
35 40 45

Thr Val Asp Tyr
50

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<223> /注釋="p.R256Q"

<400> 141
Asn Gln Thr Ala Val Arg Glu Glu Met Ile Leu Leu Ala Asn Tyr Leu
1 5 10 15

Asp Ser Met Tyr Ile Met Leu Asn Ile Gln Gln Ile Val Leu Val Gly
20 25 30

Leu Glu Ile Trp Thr Asn Gly Asn Leu Ile Asn Ile Val Gly Gly Ala
35 40 45

Gly Asp Val Leu
50

<210> 142
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多肽"

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<400> 142
Leu Asn Pro Val His His Asp Val Ala Val Leu Leu Thr Arg Lys Asp
1 5 10 15

Ile Cys Ala Gly Phe Asn Arg Pro Cys Lys Lys Thr Leu Gly Leu Ser
20 25 30

His Leu Ser Gly Met Cys Gln Pro His Arg Ser Cys Asn Ile Asn Glu
35 40 45

Asp Ser Gly Leu
50

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<400> 143
Arg Pro Arg Met Leu Thr Thr Pro Thr Gly Pro Glu Ser Met Ser Thr
1 5 10 15

Ser Thr Pro Ala Ile Ser Ser Pro Ser Ala Ala Thr Thr Ala Ser Lys
20 25 30

Glu Gly Asp Leu Gly Gly Lys Gln Trp Gln Asp Ser Ser Thr Gln Pro
35 40 45

Glu Leu Ser Ser
50

<210> 144
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多肽"

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<400> 144
Gln Gln Glu Trp Ala Glu Pro Asp Gly Asp Leu His Asn Glu Ala Phe
1 5 10 15

Gly Leu Gly Asp Leu Pro Asn Leu Leu Cys Cys Leu Val Gly Asp Gln
20 25 30

Leu Gly Asp Thr Glu Arg Lys Arg Arg His Ala Lys Pro Gly Ser Tyr
35 40 45

Ser Ile Glu Val
50

<210> 145
<211> 52
<212> PRT
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多肽"

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<400> 145
Leu Arg Arg Tyr Tyr Leu Asn Gly His Trp Thr Val Asp Trp Pro Gly
1 5 10 15

Arg Tyr Lys Phe Ser Gly Thr Thr Phe Asn Asn Tyr Arg Arg Ser Tyr
20 25 30

Asn Glu Pro Glu Asn Leu Ile Ala Thr Gly Pro Thr Asn Glu Thr Leu
35 40 45

Ile Val Glu Leu
50

<210> 146
<211> 52
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多肽"

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<223> /注釋="p.N572T"

<400> 146
Ser Pro Trp Gly Ala Trp Ser Met Cys Ser Arg Thr Cys Gly Thr Gly
1 5 10 15

Ala Arg Phe Arg Gln Arg Lys Cys Asp Thr Thr Pro Pro Pro Gly Pro
20 25 30

Gly Gly Thr His Cys Pro Gly Ala Ser Val Glu His Ala Val Cys Glu
35 40 45

Asn Leu Pro Cys
50

<210> 147
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多肽"

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<400> 147
Trp Glu Pro Cys Ser Gln Thr Cys Gly Arg Thr Gly Met Gln Val Arg
1 5 10 15

Ser Val Arg Cys Ile Gln Pro Leu His Asn Asn Asn Thr Thr Arg Ser
20 25 30

Val His Ala Lys His Cys Asn Asp Ala Arg Pro Glu Ser Arg Arg Ala
35 40 45

Cys Ser Arg Glu
50

<210> 148
<211> 52
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多肽"

<220>
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<400> 148
Lys Leu His Lys Gly Cys Phe Thr Gln His Val Pro Pro Ala Asp Gly
1 5 10 15

Thr Asp Cys Gly Pro Gly Met His Cys Leu Leu His Gly Leu Cys Val
20 25 30

Asn Lys Glu Thr Glu Thr Arg Pro Val Asn Gly Glu Trp Gly Pro Trp
35 40 45

Glu Pro Tyr Ser
50

<210> 149
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多肽"

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<400> 149
Gly Lys Thr Thr Arg Gln Val Leu Cys Met Asn Tyr His Gln Pro Ile
1 5 10 15

Asp Glu Asn Tyr Cys Asp Pro Glu Val Ser Ser Pro Leu Met Glu Gln
20 25 30

Glu Cys Ser Leu Ala Ala Cys Pro Pro Ala His Ser His Phe Pro Ser
35 40 45

Ser Pro Val Gln
50

<210> 150
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多肽"

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<400> 150
Thr Ile Asn Gly Asp Pro Glu Ser Val Ala Ser Leu His Trp Asp Gly
1 5 10 15

Gly Ala Leu Leu Gly Val Leu Gln Tyr Trp Trp Gly Ala Glu Leu His
20 25 30

Leu Gln Pro Leu Glu Gly Gly Thr Pro Asn Ser Ala Gly Gly Pro Gly
35 40 45

Ala His Ile Leu
50

<210> 151
<211> 52
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多肽"

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<400> 151
Gln Gly Gln Met Val Cys Leu Thr Lys Lys Leu Pro Ala Val Glu Gly
1 5 10 15

Thr Pro Cys Gly Lys Gly Arg Ile Cys Met Met Gln Gly Lys Cys Val
20 25 30

Asp Lys Thr Lys Lys Lys Tyr Tyr Ser Thr Ser Ser His Gly Asn Trp
35 40 45

Gly Ser Trp Gly
50

<210> 152
<211> 52
<212> PRT
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<400> 152
Thr Pro Cys Gly Pro Gly His Leu Cys Ser Glu Gly Ser Cys Leu Pro
1 5 10 15

Glu Glu Glu Val Glu Arg Pro Lys Pro Met Met Ala Asp Gly Gly Trp
20 25 30

Ala Pro Trp Gly Pro Trp Gly Glu Cys Ser Arg Thr Cys Gly Gly Gly
35 40 45

Val Gln Phe Ser
50

<210> 153
<211> 52
<212> PRT
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<220>
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<400> 153
Phe Lys Ser Cys Asn Thr Glu Pro Cys Leu Lys Gln Lys Arg Asp Phe
1 5 10 15

Arg Asp Glu Gln Cys Ala His Phe Asp Trp Trp Lys His Phe Asn Ile
20 25 30

Asn Gly Leu Leu Pro Asn Val Arg Trp Val Pro Lys Tyr Ser Gly Ile
35 40 45

Leu Met Lys Asp
50

<210> 154
<211> 83
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<220>
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<400> 154
Thr Ser Cys Ser Arg Ser Cys Gly Pro Gly Thr Gln His Arg Gln Leu
1 5 10 15

Gln Cys Arg Gln Glu Phe Gly Gly Gly Trp Leu Leu Gly Ala Pro Gly
20 25 30

Ala Leu Trp Thr Ser Pro Pro Ala Gln His His Pro Val Leu Pro Ala
35 40 45

Ala Pro Leu Trp Pro Leu Gly Ser Trp Leu Ser Leu Glu Pro Val Leu
50 55 60

Arg Ala Val Arg Pro Gly Pro Glu Lys Pro Ala Gly Ser Leu Cys Trp
65 70 75 80

Glu Gln Trp

<210> 155
<211> 52
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<400> 155
Leu Ala Val Phe Phe Ala Leu Gly Leu Glu Val Glu Asp His Val Ala
1 5 10 15

Phe Leu Ile Thr Val Pro Thr Ala Leu Val Val Ile Phe Phe Ala Ile
20 25 30

Phe Ile Leu Val Cys Ile Glu Ser Val Phe Lys Lys Leu Leu Arg Leu
35 40 45

Phe Ser Leu Val
50

<210> 156
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<400> 156
His Val Ala Glu His Phe Leu Ala Arg Ser Leu Lys Asn Glu Glu Leu
1 5 10 15

Tyr His Gln Ser Tyr Asp Cys Val Cys Ile Ile Met Phe Ala Ser Ile
20 25 30

Pro Asp Phe Lys Glu Phe Tyr Thr Glu Ser Asp Val Asn Lys Glu Gly
35 40 45

Leu Glu Cys Leu
50

<210> 157
<211> 52
<212> PRT
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<400> 157
Ser Phe Asn Asp Phe Lys Leu Arg Val Gly Ile Asn His Gly Pro Val
1 5 10 15

Ile Ala Gly Val Ile Gly Ala Gln Lys Thr Thr Gln Tyr Asp Ile Trp
20 25 30

Gly Asn Thr Val Asn Val Ala Ser Arg Met Asp Ser Thr Gly Val Leu
35 40 45

Asp Lys Ile Gln
50

<210> 158
<211> 52
<212> PRT
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<400> 158
Ser Ile Glu Thr Phe Leu Ile Leu Arg Cys Thr Gln Lys Arg Lys Glu
1 5 10 15

Glu Lys Ala Met Ile Ala Lys Met Asn His His Gln Arg Thr Asn Ser
20 25 30

Ile Gly His Asn Pro Pro His Trp Gly Ala Glu Arg Pro Phe Tyr Asn
35 40 45

His Leu Gly Gly
50

<210> 159
<211> 52
<212> PRT
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<220>
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<400> 159
His Gly Pro Pro Ala Pro Pro Asn Pro Phe Ser His Leu Thr Glu Gly
1 5 10 15

Glu Leu Glu Glu Tyr Lys Arg Thr Ile Lys Lys Arg Lys Gln Gln Gly
20 25 30

Leu Glu Asp Ala Glu Gln Glu Leu Leu Ser Asp Asp Ala Ser Ser Val
35 40 45

Ser Gln Ile Gln
50

<210> 160
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<212> PRT
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<400> 160
Pro Cys Asn Ser Phe Ala Ile Lys Glu Ile Arg Asp Tyr Tyr Ile Pro
1 5 10 15

Asn Asp Lys Lys Ile Leu Phe Arg Tyr Leu Leu Val Lys Val Leu Thr
20 25 30

Pro Gln Pro Ala Thr Ile Gln Val Arg Thr Ser Lys Pro Asp Ala Phe
35 40 45

Ile Lys Leu Gln
50

<210> 161
<211> 52
<212> PRT
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<400> 161
Ser Arg Phe Thr Cys Arg Arg Lys Pro Ile His His Phe Leu Gly Ile
1 5 10 15

Ser Thr Phe Ser Gln Tyr Thr Val Val Val Val Glu Asn Ala Val Ala
20 25 30

Lys Ile Asp Ala Ala Ser Pro Leu Glu Lys Val Cys Leu Ile Gly Cys
35 40 45

Gly Phe Ser Thr
50

<210> 162
<211> 32
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多肽"

<220>
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<400> 162
Asn Ser Pro Ser Pro Ala Ala Gly Gln Pro Val Thr Val Ala Gln Gly
1 5 10 15

Ala Pro Gly Ser Leu Thr His Ser Pro Leu Leu Leu Ala Asn Pro Thr
20 25 30

<210> 163
<211> 52
<212> PRT
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多肽"

<220>
<221> 來源
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<400> 163
Val Lys Thr Asn Ala Ser Gln Val Pro Ala Glu Pro Lys Glu Arg Pro
1 5 10 15

Leu Leu Ser Leu Ile Arg Glu Lys Ala His His Pro Arg Pro Thr Gln
20 25 30

Lys Ile Pro Glu Thr Lys Ala Leu Lys His Lys Leu Ser Thr Thr Ser
35 40 45

Glu Thr Val Ser
50

<210> 164
<211> 52
<212> PRT
<213> 人工序列

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多肽"

<220>
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<400> 164
Ile Asn Lys Asn Glu Lys Met Leu Arg Ser Pro Ile Ser Pro Leu Ser
1 5 10 15

Asp Ala Ser Lys His Lys Tyr Thr Ser Lys Lys Asp Leu Thr Ser Ser
20 25 30

Ser Arg Pro Asn Gly Asn Ser Leu Phe Thr Ser Ala Ser Ser Ser Lys
35 40 45

Lys Pro Lys Ala
50

<210> 165
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 165
Thr Phe Met Asn Lys Phe Ile Tyr Glu Ile Ala Arg Arg His Pro Phe
1 5 10 15

Leu Tyr Ala Pro Thr Ile Leu Leu Trp Gly Gly Ala Arg Tyr Asp Lys
20 25 30

Ile Ile Pro Ser Cys Cys Lys Ala Glu Asn Ala Val Glu Cys Phe Gln
35 40 45

Thr Lys Ala Ala
50

<210> 166
<211> 46
<212> PRT
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多肽"

<220>
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<223> /注釋="p.G127fs"

<400> 166
Gly Gly Arg Phe Lys Lys Glu Ile Val Val Asp Gly Gln Ser Tyr Leu
1 5 10 15

Leu Leu Ile Arg Asp Glu Gly Gly Pro Arg Arg Arg Ser Leu Pro Cys
20 25 30

Gly Trp Thr Leu Leu Tyr Leu Ser Ser Ala Trp Arg Met Lys
35 40 45

<210> 167
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R766W"

<400> 167
Val Trp Glu Gly Ala Leu Gly Gly Tyr Ser Lys Pro Gly Pro Asp Ala
1 5 10 15

Cys Arg Glu Glu Lys Glu Arg Trp Ile Trp Trp Ala Lys Tyr Glu Gln
20 25 30

Lys Leu Phe Leu Ala Pro Leu Pro Ser Ser Asp Val Pro Leu Gly Gln
35 40 45

Gln Leu Leu Arg
50

<210> 168
<211> 77
<212> PRT
<213> 人工序列

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<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.D69fs"

<400> 168
Met Ala Ala Ala Val Gln Pro Ala Glu Val Thr Val Glu Val Gly Glu
1 5 10 15

Asp Leu His Met His His Val Arg Asp Gly Arg Cys Leu Lys Leu Trp
20 25 30

Ser Leu Thr Phe Leu Pro Ile Gln Ser Gln Ala Gln Tyr Ser Arg Gly
35 40 45

Thr Leu Lys Gln Lys Leu Trp Ser Leu Thr Leu Leu Pro Ile Gln Arg
50 55 60

Gln Ala Gln Tyr Ser Arg Gly Thr Leu Lys Gln Met Leu
65 70 75

<210> 169
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.S127I"

<400> 169
Asn Pro Ser Ala Asn Pro Glu Ala Ser Thr Ile Phe Gln Arg Asn Ser
1 5 10 15

Gln Thr Asp Val Val Glu Ile Arg Arg Ile Ile Asn Cys Thr Asn His
20 25 30

Val Ser Ala Val Arg Phe Ser Gln Gln Tyr Ser Leu Cys Ser Thr Ile
35 40 45

Phe Leu Asp Asp
50

<210> 170
<211> 53
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E71fs"

<400> 170
Ala Ala Ala Val Gln Pro Ala Glu Val Thr Val Glu Val Gly Glu Asp
1 5 10 15

Leu His Met His His Val Arg Asp Arg Arg Cys Leu Lys Leu Trp Ser
20 25 30

Leu Thr Leu Leu Pro Ile Gln Arg Gln Ala Gln Tyr Ser Arg Gly Thr
35 40 45

Leu Lys Gln Met Leu
50

<210> 171
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
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<400> 171
Ser Thr Ser Gln Glu Asp Pro Gln Phe Ser Val Pro Pro Thr Ala Asn
1 5 10 15

Thr Pro Thr Pro Val Cys Lys Leu Ser Val Val Arg Trp Ser Asn Leu
20 25 30

Phe Thr Ser Glu Lys Gly Ser Asp Pro Asp Lys Glu Arg Lys Ala Pro
35 40 45

Glu Asn His Ala
50

<210> 172
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<223> /注釋="p.I420fs"

<400> 172
Lys Leu Asn Ser Val Trp Ile Met Pro Gln Gln Ser Ala Gly Leu Glu
1 5 10 15

Glu Ser Ala Pro Asp Thr Ile Pro Pro Gln Arg Glu Trp Arg Cys Leu
20 25 30

Leu Cys Gly Pro Ala Trp Thr Cys Phe Gln Lys Gly Leu Leu His Val
35 40 45

Arg Lys Gln Leu
50

<210> 173
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.V313M"

<400> 173
Thr Gly Thr Pro Glu Ile Ala Gly Leu Thr Pro Ser Gln Ala Leu Glu
1 5 10 15

Ile Ile Arg Gly Cys Gln Gly Leu Asn Met Met Met Gly Cys Asp Leu
20 25 30

Val Glu Val Ser Pro Pro Tyr Asp Leu Ser Gly Asn Thr Ala Leu Leu
35 40 45

Ala Ala Asn Leu
50

<210> 174
<211> 52
<212> PRT
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<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.A212T"

<400> 174
Ile Ser Met Gln Val Ala Arg Ala Lys Gly Leu Pro Arg Leu Lys His
1 5 10 15

His Leu Leu Pro Arg Thr Lys Gly Phe Thr Thr Ile Thr Val Arg Ser
20 25 30

Leu Arg Asn Val Val Ser Ala Val Tyr Asp Cys Thr Leu Asn Phe Arg
35 40 45

Asn Asn Glu Asn
50

<210> 175
<211> 54
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<400> 175
Gly Ala Thr Ser Gly Ala Ile Ala Ala Gly Ala Thr Ala Arg Ala Thr
1 5 10 15

Thr Ala Ser Arg Leu Pro Ser Ser Ala Ala Ala Pro Arg Ala Pro His
20 25 30

Pro Ser His Thr Ser Gln Pro Val Ala Lys Thr Thr Ala Ala Pro Thr
35 40 45

Thr Arg Arg Pro Pro Thr
50

<210> 176
<211> 39
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多肽"

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<400> 176
Phe Ser Gln Thr Phe Arg Ile Ala Pro Ser Met Cys Ile Thr Lys Pro
1 5 10 15

Glu Val Asp Phe Ala Val Glu Val Phe Cys Cys Ser Ala Leu Thr Gln
20 25 30

His Met Glu Arg Arg Ala Lys
35

<210> 177
<211> 30
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多肽"

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<400> 177
Asp Asp Glu Ile Ser Ser Met Glu Gln Ser Thr Glu Asp Ser Met Gln
1 5 10 15

Asp Asp Thr Lys Pro Lys Pro Lys Lys Asn Lys Lys Glu Asp
20 25 30

<210> 178
<211> 52
<212> PRT
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<400> 178
Lys Ala Pro Lys Ile Ser Met Pro Glu Val Asp Leu Asn Leu Lys Gly
1 5 10 15

Pro Lys Met Lys Gly Asp Val Asp Val Phe Phe Leu Pro Lys Val Glu
20 25 30

Gly Asp Leu Lys Gly Pro Glu Val Asp Ile Lys Gly Pro Lys Val Asp
35 40 45

Ile Asp Val Pro
50

<210> 179
<211> 34
<212> PRT
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多肽"

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<400> 179
Met Glu Lys Glu Glu Glu Glu Thr Thr Arg Glu Leu Leu Leu Pro Asn
1 5 10 15

Trp Gln Gly Ser Gly Ser His Gly Leu Thr Ile Ala Gln Arg Asp Asp
20 25 30

Gly Val

<210> 180
<211> 52
<212> PRT
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多肽"

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<400> 180
Ile Ser Met Pro Asp Val Asp Leu His Leu Lys Gly Pro Lys Val Lys
1 5 10 15

Gly Asp Val Asp Val Ser Val Pro Lys Ile Ile Glu Gly Glu Met Lys
20 25 30

Val Pro Asp Val Glu Ile Lys Gly Pro Lys Met Asp Ile Asp Ala Pro
35 40 45

Asp Val Glu Val
50

<210> 181
<211> 52
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<400> 181
Pro Asp Val Ser Leu Glu Gly Pro Glu Gly Lys Leu Lys Gly Pro Lys
1 5 10 15

Leu Lys Met Pro Glu Met His Phe Lys Gly Gly Pro Lys Ile Ser Met
20 25 30

Pro Asp Val Asp Leu His Leu Lys Gly Pro Lys Val Lys Gly Asp Val
35 40 45

Asp Val Ser Leu
50

<210> 182
<211> 52
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多肽"

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<400> 182
Leu Lys Gly Pro Glu Val Asp Leu Lys Gly Pro Lys Val Asp Ile Asp
1 5 10 15

Val Pro Asp Val Asn Val Gln Gly Pro His His Trp His Leu Lys Met
20 25 30

Pro Lys Met Lys Met Pro Lys Phe Ser Met Pro Gly Phe Lys Ala Glu
35 40 45

Gly Pro Glu Val
50

<210> 183
<211> 52
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<400> 183
Ala Pro Lys Val Glu Ala Asp Val Ser Leu Pro Ser Met Gln Gly Asp
1 5 10 15

Leu Lys Thr Thr Asp Leu Ser Ile Gln Ser Ser Pro Ser Ala Asp Leu
20 25 30

Glu Val His Ala Gly Gln Val Asp Val Lys Leu Leu Glu Gly His Val
35 40 45

Pro Glu Gly Ala
50

<210> 184
<211> 52
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多肽"

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<400> 184
Pro Asp Val Lys Met Ser Leu Ser Ser Met Glu Val Asp Val Gln Ala
1 5 10 15

Pro Arg Ala Lys Leu Asp Gly Ala Gln Met Met Glu Gly Asp Leu Ser
20 25 30

Leu Ala Asp Lys Ala Val Thr Ala Lys Asp Ser Lys Phe Lys Met Pro
35 40 45

Lys Phe Lys Met
50

<210> 185
<211> 52
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多肽"

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<400> 185
Leu Ala Asn Lys Asp Leu Thr Thr Lys Asp Ser Lys Phe Lys Met Pro
1 5 10 15

Lys Phe Lys Met Pro Ser Phe Gly Val Phe Phe Ala Pro Gly Lys Ser
20 25 30

Ile Glu Ala Ser Val Asp Val Ser Pro Pro Lys Val Glu Ala Asp Met
35 40 45

Ser Leu Pro Ser
50

<210> 186
<211> 52
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多肽"

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<400> 186
Leu Arg Ile Phe Thr Ala Arg Leu Tyr Phe Cys Glu Asp Arg Lys Ala
1 5 10 15

Glu Pro Glu Gly Leu Arg Arg Leu His Gly Gly Ala Gly Val Gln Ile
20 25 30

Ala Ile Met Thr Phe Lys Asp Tyr Phe Tyr Cys Trp Asn Thr Phe Val
35 40 45

Glu Asn His Glu
50

<210> 187
<211> 52
<212> PRT
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多肽"

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<400> 187
Arg Lys Ala Glu Pro Glu Gly Leu Arg Arg Leu His Arg Ala Gly Val
1 5 10 15

Gln Ile Ala Ile Met Thr Phe Lys Asp Phe Phe Phe Tyr Cys Trp Asn
20 25 30

Thr Phe Val Glu Asn His Glu Arg Thr Phe Lys Ala Trp Glu Gly Leu
35 40 45

His Glu Asn Ser
50

<210> 188
<211> 52
<212> PRT
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多肽"

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<400> 188
Val Asp Ile Glu Leu Gln Lys His Val Glu Lys Leu Thr Lys Gly Ala
1 5 10 15

Ala Ile Phe Phe Glu Phe Lys His Tyr Met Met Pro Lys Lys Arg Phe
20 25 30

Thr Ser Thr Lys Cys Phe Ala Phe Met Glu Met Asp Glu Ile Lys Pro
35 40 45

Gly Pro Ile Val
50

<210> 189
<211> 52
<212> PRT

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多肽"

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<400> 189
Ala Val Ser Thr Gln Gln Gln Glu Glu Asp Arg Ser Ser Ser Cys Arg
1 5 10 15

Glu Ala Val Leu Gln Trp Arg Leu Gln Arg Arg Thr Ile Lys Glu Gln
20 25 30

Ala Leu Leu Asn Ala His Val Thr Gln Val Thr Glu Ser Leu Lys Gln
35 40 45

Val Gln Leu Glu
50

<210> 190
<211> 52
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多肽"

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<400> 190
Ser Ala Leu Ser Glu Glu Val Ser His Phe Glu Lys Arg Lys Leu Phe
1 5 10 15

Ile Leu Leu Ser Thr Val Met Thr Trp Val Val Arg Ser Lys Ala Leu
20 25 30

Asp Pro Glu Asp Ser Glu Val Pro Phe Thr Glu Glu Asp Tyr Arg Arg
35 40 45

Arg Lys Ser His
50

<210> 191
<211> 52
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多肽"

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<400> 191
Lys Leu Leu Glu Tyr His Arg Asn Ile Val Arg Val Ile Pro Ser Tyr
1 5 10 15

Pro Lys Ile Leu Lys Val Ile Ser Ala Ala Ala Gln Pro Cys Val Asp
20 25 30

Val Phe Tyr Gln Ala Leu Thr Tyr Val Gln Ser Asn His Arg Thr Asn
35 40 45

Ala Pro Phe Thr
50

<210> 192
<211> 52
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多肽"

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<223> /注釋="p.E1282K"

<400> 192
Ile Leu Ser Lys Thr Glu Gly Thr Gln Glu Ala Asp Gln Tyr Ala Asp
1 5 10 15

Glu Lys Thr Lys Asp Val Pro Phe Phe Lys Lys Gly Leu Glu Gly Ser
20 25 30

Ile Asp Thr Gly Ile Thr Val Ser Arg Glu Lys Val Thr Glu Val Ala
35 40 45

Leu Lys Gly Glu
50

<210> 193
<211> 58
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多肽"

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<400> 193
Gln Ala Pro Ala Ser Thr Ser Ala Ser Thr Arg Leu Phe Gly Leu Thr
1 5 10 15

Lys Pro Lys Glu Lys Lys Glu Lys Lys Arg Arg Thr Lys Pro Ala Ala
20 25 30

Leu Ser Pro Val Met Val Pro Arg Gln Lys Tyr Gln Gln Arg Val Lys
35 40 45

Arg Ser Ser Ala Asp Pro Leu Pro Leu Cys
50 55

<210> 194
<211> 52
<212> PRT
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多肽"

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<400> 194
Arg Arg Ile Leu Tyr Gln Asn Leu Asn Glu Pro Thr Thr Trp Ser Leu
1 5 10 15

Thr Ser Asp Arg Thr Arg Asn Trp Val Ile Ile Gln Gln Lys Ile Glu
20 25 30

Gly Glu Thr Lys Glu Ser Asn Tyr Ala Lys Leu Ile Glu Met Asn Gly
35 40 45

Gly Gly Thr Gly
50

<210> 195
<211> 31
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<400> 195
Tyr Leu Leu Leu Leu Leu Gly Gly Phe Gln Glu Cys Glu Asp Ala Thr
1 5 10 15

Leu Ala Leu Leu Ala Arg Met Gly Gly Ser Gln Leu Ser Arg Ile
20 25 30

<210> 196
<211> 63
<212> PRT
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<400> 196
Asp Met Lys Ala Lys Ile Arg Val Asp Thr Ile Ala Lys Arg Arg Ala
1 5 10 15

Glu Leu Ile Leu Glu Arg Asp Lys Lys Gly Gly Arg Met Leu Leu Glu
20 25 30

Met Met Lys Arg Leu Val Arg Lys Asn Leu Lys Lys Thr Met Met Ile
35 40 45

Leu Lys Thr Ser Leu Lys Met Ser Phe Gln Lys Met Arg Lys Arg
50 55 60

<210> 197
<211> 52
<212> PRT
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<220>
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<400> 197
Ala Glu Met Thr Ala Pro Ser Pro Ser Cys Ala Phe Cys Arg Arg Leu
1 5 10 15

Leu Glu Trp Lys Gln Asn Val Glu Lys Arg Arg Gly His Gly Arg Ile
20 25 30

Asn Cys Gly Arg Phe Ser Ile Val Leu His Glu Lys Ala Pro His Ser
35 40 45

Asp Ser Thr Pro
50

<210> 198
<211> 43
<212> PRT
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<400> 198
Met Ser Asp Val Ala Ile Val Lys Glu Gly Trp Leu His Lys Arg Gly
1 5 10 15

Lys Lys Tyr Ile Lys Thr Trp Arg Pro Arg Tyr Phe Leu Leu Lys Asn
20 25 30

Asp Gly Thr Phe Ile Gly Tyr Lys Glu Arg Pro
35 40

<210> 199
<211> 52
<212> PRT
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<400> 199
Glu Tyr Leu His Ser Arg Asp Val Val Tyr Arg Asp Ile Lys Leu Glu
1 5 10 15

Asn Leu Met Leu Asp Lys Asp Gly His Met Met Lys Ile Thr Asp Phe
20 25 30

Gly Leu Cys Lys Glu Gly Ile Ser Asp Gly Ala Thr Met Lys Thr Phe
35 40 45

Cys Gly Thr Pro
50

<210> 200
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<212> PRT
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<400> 200
Pro Arg Val Cys Gly Ala Val Met Asp Thr Leu Lys Gln His Gly Ala
1 5 10 15

Gly Ala Gly Gly Thr Arg Asn Ile Ser Arg Arg Thr Ser Lys Phe His
20 25 30

Val Asp Leu Glu Arg Glu Leu Ala Asp Leu His Gly Lys Asp Ala Ala
35 40 45

Leu Leu Phe Ser
50

<210> 201
<211> 52
<212> PRT
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多肽"

<220>
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<400> 201
Cys Cys His Gly Asp Leu Leu Glu Cys Ala Asp Asp Arg Ala Asp Leu
1 5 10 15

Ala Lys Tyr Ile Cys Glu Asn Gln Asp Leu Leu Ile Ser Ser Lys Leu
20 25 30

Lys Glu Cys Cys Glu Lys Pro Leu Leu Glu Lys Ser His Cys Ile Ala
35 40 45

Glu Val Glu Asn
50

<210> 202
<211> 52
<212> PRT
<213> 人工序列

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多肽"

<220>
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<400> 202
Pro Ala Thr Gly Glu Gln Val Cys Glu Val Gln Glu Ala Asp Lys Ala
1 5 10 15

Asp Ile Asp Lys Ala Val Gln Ala Ala Cys Cys Leu Ala Phe Ser Leu
20 25 30

Gly Ser Val Trp Arg Arg Met Asp Ala Ser Glu Arg Gly Arg Leu Leu
35 40 45

Asp Lys Leu Ala
50

<210> 203
<211> 52
<212> PRT
<213> 人工序列

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多肽"

<220>
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<400> 203
Lys Ala Leu Tyr Val Ser Asp Lys Leu Gln Ala Gly Thr Val Phe Val
1 5 10 15

Asn Thr Tyr Asn Lys Thr Asp Val Ala Thr Thr Pro Phe Gly Gly Phe
20 25 30

Lys Gln Ser Gly Phe Gly Lys Asp Leu Gly Glu Ala Ala Leu Asn Glu
35 40 45

Tyr Leu Arg Val
50

<210> 204
<211> 146
<212> PRT
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多肽"

<220>
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<400> 204
Thr Glu Ile Gly Arg Val Ile Gln Val Ala Ala Gly Ser Ser Asn Leu
1 5 10 15

Lys Arg Val Thr Leu Glu Leu Gly Gly Arg Ala Pro Thr Ser Ser Cys
20 25 30

Gln Met Pro Ile Trp Ile Gly Pro Trp Asn Arg Pro Thr Ser Pro Cys
35 40 45

Ser Ser Thr Arg Ala Ser Ala Ala Val Pro Ala Pro Gly Pro Ser Cys
50 55 60

Arg Arg Thr Ser Met Met Ser Leu Trp Ser Gly Ala Leu Pro Gly Pro
65 70 75 80

Ser Leu Gly Trp Ser Gly Thr Pro Leu Ile Ala Arg Pro Ser Arg Gly
85 90 95

Arg Arg Trp Met Lys Leu Ser Leu Arg Arg Ser Ser Ala Thr Ser Thr
100 105 110

Arg Gly Ser Lys Arg Gly Arg Ser Cys Cys Val Val Gly Ala Leu Leu
115 120 125

Leu Thr Val Val Thr Ser Ser Ser Pro Leu Cys Leu Glu Met Cys Arg
130 135 140

Met Ala
145

<210> 205
<211> 30
<212> PRT
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多肽"

<220>
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<223> /注釋="p.P562fs"

<400> 205
Glu Thr Phe Ser His Arg Arg Ser Cys Leu Val Arg Pro Leu Met Asn
1 5 10 15

Asp Glu Gly Leu Lys Val Arg Tyr Pro Arg Ala Arg Pro Arg
20 25 30

<210> 206
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 206
Asn Val Glu His Tyr Gln Glu Leu Lys Lys Met Val Gln Gln Ser Asp
1 5 10 15

Leu Gly Gln Tyr Val Thr Phe Leu Arg Tyr Tyr Phe Ser Asp Lys Gln
20 25 30

Lys Ile Ser Leu Leu His Ser Cys Thr Cys Val Leu Tyr Thr Pro Ser
35 40 45

Asn Glu His Phe
50

<210> 207
<211> 52
<212> PRT
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多肽"

<220>
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<400> 207
Trp His Trp Val Lys Gln Cys Leu Lys Leu Tyr Ser Gln Lys Pro Asn
1 5 10 15

Val Cys Asn Leu Asp Lys His Met Ser Glu Glu Glu Glu Thr Gln Asp
20 25 30

Leu Trp Glu Gln Ser Lys Glu Phe Leu Arg Tyr Lys Glu Ala Thr Lys
35 40 45

Arg Arg Pro Arg
50

<210> 208
<211> 26
<212> PRT
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肽"

<220>
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<223> /注釋="p.L356fs"

<400> 208
Glu Cys Ser Asp Val Met Thr Asp Tyr Ser Asn Ala Val Trp Gln Arg
1 5 10 15

Asn Leu Leu Gly Thr Glu His Val Phe Tyr
20 25

<210> 209
<211> 39
<212> PRT
<213> 人工序列

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<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.K523fs"

<400> 209
Leu Leu Ser Gly Glu Ser Glu Asn Ser Gly Met Ser Gln Cys Trp Glu
1 5 10 15

Thr Ala Ala Asp Lys Arg Val Gly Gly Arg Thr Tyr Gly Ala Arg Gly
20 25 30

Val Gln Gly Asn Leu Pro Gly
35

<210> 210
<211> 52
<212> PRT
<213> 人工序列

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多肽"

<220>
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<223> /注釋="p.D53N"

<400> 210
Asp Ala Val Leu Arg Cys Ile Ile Ser Gly Gln Pro Lys Pro Glu Val
1 5 10 15

Thr Trp Tyr Lys Asn Gly Gln Ala Ile Asn Asn Gly Ser Gly Ile Ile
20 25 30

Ser Asn Tyr Glu Phe Phe Glu Asn Gln Tyr Ile His Val Leu His Leu
35 40 45

Ser Cys Cys Thr
50

<210> 211
<211> 52
<212> PRT
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多肽"

<220>
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<400> 211
Val Leu Leu Leu Leu Gly Leu Arg Leu Gln Leu Ser Leu Gly Ile Ile
1 5 10 15

Pro Val Glu Glu Glu Asn Pro Asp Phe Ser Ser Asn Arg Gln Ala Ala
20 25 30

Glu Ala Leu Gly Ala Ala Lys Lys Leu Gln Pro Ala Gln Thr Ala Ala
35 40 45

Lys Asn Leu Ile
50

<210> 212
<211> 52
<212> PRT
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多肽"

<220>
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<400> 212
Pro Pro Pro Gln Pro Gln Pro Gln Gln Gln Gln Pro Gln Pro Gln Pro
1 5 10 15

Pro Ala Gln Pro His Leu Tyr Leu Gln Gln Gln Gly Ala Cys Lys Thr
20 25 30

Pro Pro Asp Gly Ser Leu Lys Leu Gln Glu Gly Ser Ser Gly His Ser
35 40 45

Ala Ala Leu Gln
50

<210> 213
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.S225Y"

<400> 213
Gln Gly Pro Ser Leu Pro Gly Leu Asp Phe Ala Asp Pro Gln Gly Ser
1 5 10 15

Thr Ile Phe Gln Ile Ala Arg Leu Ile Tyr Tyr His Gly Pro Met Pro
20 25 30

Gln Asn Lys Gln Ser Pro Leu Tyr Pro Gly Met Leu Tyr Val Pro Phe
35 40 45

Gly Ala Asn Gln
50

<210> 214
<211> 29
<212> PRT
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肽"

<220>
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<223> /注釋="p.S3G"

<400> 214
Met Ala Gly Gly Gly His Ser Leu Leu Leu Glu Asn Ala Gln Gln Val
1 5 10 15

Val Leu Val Cys Ala Arg Gly Glu Arg Phe Leu Ala Arg
20 25

<210> 215
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.R292W"

<400> 215
Pro Ser Pro Leu Pro Ser Pro Thr Ala Ser Pro Asn His Thr Leu Ala
1 5 10 15

Pro Ala Ser Pro Ala Pro Ala Arg Pro Trp Trp Ser Pro Ser Gln Thr
20 25 30

Arg Lys Gly Pro Pro Val Pro Pro Leu Pro Lys Val Thr Pro Thr Lys
35 40 45

Glu Leu Gln Gln
50

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多肽"

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<400> 216
Pro Gly Leu Pro Ala Pro Ser Leu Thr Met Ser Asn Thr Met Pro Arg
1 5 10 15

Pro Ser Thr Pro Leu Asp Gly Val Ser Ala Ala Pro Lys Pro Leu Ser
20 25 30

Lys Leu Leu Gly Ser Leu Asp Glu Val Val Leu Leu Ser Pro Val Pro
35 40 45

Glu Leu Arg Asp
50

<210> 217
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<400> 217
Thr Glu Ser Gly Leu Thr Pro Ile His Val Ala Ala Phe Met Gly His
1 5 10 15

Leu Asn Ile Val Leu Leu Leu Leu Gln Ser Ser Gly Ala Ser Pro Asp
20 25 30

Val Thr Asn Ile Arg Gly Glu Thr Ala Leu His Met Ala Ala Arg Ala
35 40 45

Gly Gln Val Glu
50

<210> 218
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多肽"

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<400> 218
Asp Asp Glu Ala Phe Glu Ala Arg Val Lys Glu Glu Glu Gln Lys Ile
1 5 10 15

Phe Gly Leu Met Val Asp Arg Gln Ser Leu Leu Gly Thr Thr Pro Asp
20 25 30

Thr Thr Pro Ala Arg Thr Pro Thr Glu Glu Gly Thr Pro Thr Ser Glu
35 40 45

Gln Asn Pro Phe
50

<210> 219
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多肽"

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<400> 219
Leu Ala Thr Gln Leu Tyr Arg Glu Leu Ile Cys Val Pro Tyr Met Ala
1 5 10 15

Lys Phe Val Val Phe Ala Lys Met Asn Glu Glu Pro Val Glu Ser Ser
20 25 30

Leu Arg Cys Phe Cys Met Thr Asp Asp Lys Val Asp Lys Thr Leu Glu
35 40 45

Gln Gln Glu Asn
50

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<400> 220
Met Gln Glu Glu Leu Ala Trp Glu Thr Asp Gly Leu Leu Pro Leu Glu
1 5 10 15

Arg Gln Leu His Glu Ala Ala His His Gln Asn Asn Val Gly Arg Met
20 25 30

Gln Glu Leu Ile Gly Arg Arg Val Asn Thr Arg Ala Arg Asn His Val
35 40 45

Gly Arg
50

<210> 221
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多肽"

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<223> /注釋="p.M280I"

<400> 221
Tyr Arg Leu Tyr Arg Arg Met Lys Thr Gly Phe Glu His Ala Arg Ala
1 5 10 15

Pro Glu Met Pro Thr Asn Val Cys Leu Ile Ile Val Thr Ser Ser Thr
20 25 30

Ser Leu Thr Val Ser Phe Gln Glu Pro Leu Ser Val Asn Ala Ala Val
35 40 45

Val Thr Arg Tyr
50

<210> 222
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多肽"

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<223> /注釋="p.C644fs"

<400> 222
Thr Ala Ala Pro Ile Ser Gly Phe Arg Arg Gly Val Cys Val Cys Val
1 5 10 15

Cys Val Cys Val Cys Val Cys Val Cys Val Cys Val Cys Val Cys Arg
20 25 30

Glu His Pro Gly Arg Ser Pro Pro Gly
35 40

<210> 223
<211> 57
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多肽"

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<400> 223
Thr Ala Ala Pro Ile Ser Gly Phe Arg Arg Gly Val Cys Val Cys Val
1 5 10 15

Cys Val Cys Val Cys Val Cys Val Cys Val Cys Val Cys Val Cys Val
20 25 30

Gly Ser Thr Gln Ala Asp Leu Pro Gln Ala Glu Arg Gly Leu Cys Tyr
35 40 45

Arg Trp Tyr Cys Trp Arg Gly Ser Lys
50 55

<210> 224
<211> 52
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<223> /注釋="p.N302I"

<400> 224
Lys Glu Leu Asp Ala Arg Ile Phe Leu Asn Glu Ile Pro Pro Phe Val
1 5 10 15

Glu Asp Gly Glu Pro Trp Phe Ile Ile Ile Ile Glu Thr Pro Leu Leu
20 25 30

Val Lys Ile Gln Lys Gln Thr Tyr Lys Phe Arg Asn Lys Pro Ala His
35 40 45

Thr Ser Trp Asn
50

<210> 225
<211> 52
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<223> /注釋="p.K369R"

<400> 225
Lys Asp Glu Tyr Glu Phe Asp Glu Asp Asp Glu Gln Asp Arg Val Pro
1 5 10 15

Pro Val Asp Asp Lys His Leu Leu Lys Arg Arg Asp Tyr Arg Lys Glu
20 25 30

Thr Lys Ser Asn Ser Phe Ile Ser Ile Pro Lys Met Glu Val Lys Ser
35 40 45

Tyr Thr Lys Asn
50

<210> 226
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<220>
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<223> /注釋="p.Y2015S"

<400> 226
Ser Pro Lys Arg Phe Cys Pro Ala Asp Pro Leu His Ser Ala Ala Pro
1 5 10 15

Gly Pro Phe Ser Ala Ser Glu Ala Pro Ser Ser Pro Ala Pro Pro Ala
20 25 30

Ser Pro Ala Pro Tyr Ala Leu Pro Val Ala Glu Pro Gly Leu Glu Asp
35 40 45

Val Lys Asp Gly
50

<210> 227
<211> 52
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多肽"

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<400> 227
His Lys Glu Lys Ser Lys His Gln Lys Asp Phe His Leu Glu Phe Gly
1 5 10 15

Glu Lys Ser Asn Ala Lys Ile Lys Asp Lys Lys Asp His Ser Pro Thr
20 25 30

Phe Glu Asn Ser Asp Cys Thr Leu Lys Lys Met Asp Lys Glu Gly Lys
35 40 45

Thr Leu Lys Lys
50

<210> 228
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 228
Trp Lys Glu Asn Phe Phe Lys Ser Asp Glu Thr Glu Asp Leu Phe Leu
1 5 10 15

Asn Met Glu His Glu Ser Leu Thr Leu Gln Gln Lys Lys Ser Lys Leu
20 25 30

Glu Lys Asn Ile Lys Asp Asp Lys Ser Thr Lys Glu Lys His Val Ser
35 40 45

Lys Glu Arg Asn
50

<210> 229
<211> 52
<212> PRT

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<220>
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多肽"

<220>
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<400> 229
Ser Glu Phe Ile Leu Ala Ser Lys Gly Leu Thr His Leu Asn Glu Leu
1 5 10 15

Leu Met Ala Cys Lys Ser His Lys Glu Asn Asn Thr Ser Val His Thr
20 25 30

Asp Trp Leu Leu Asp Leu Tyr Ala Gly Asn Ile Lys Thr Leu Gln Lys
35 40 45

Leu Pro His Ile
50

<210> 230
<211> 52
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多肽"

<220>
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<400> 230
Thr Ser Asp Lys Asp Asp Ser Val Ser Asn Thr Ala Thr Glu Ile Lys
1 5 10 15

Asp Glu Gln Lys Ser Gly Thr Val Leu Arg Arg Ala Val Glu Gln Cys
20 25 30

Leu Asn Arg Ser Leu Tyr Arg Pro Asp Ala Val Ala Gln Pro Val Thr
35 40 45

Glu Asn Glu Phe
50

<210> 231
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多肽"

<220>
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<400> 231
Val Ala Gln Pro Val Thr Glu Asn Glu Phe Ser Leu Glu Ser Glu Ile
1 5 10 15

Ile Ser Lys Leu Tyr Ile Pro Lys Arg Arg Arg Ile Ile Ser Pro Arg
20 25 30

Ser Ile Lys Asp Val Leu Pro Pro Val Glu Glu Ala Val Asp Arg Cys
35 40 45

Leu Tyr Leu Leu
50

<210> 232
<211> 52
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多肽"

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<400> 232
Ser Glu Lys Pro Pro Gly Leu Lys Ala Thr Ser Asp Glu Lys Asp Ser
1 5 10 15

Val Leu Asn Ile Ala Arg Gly Lys Lys Tyr Tyr Gly Glu Lys Thr Arg
20 25 30

Thr Val Ser Ser Gln Lys Pro Pro Thr Leu Lys Ala Thr Ser Asp Glu
35 40 45

Glu Asp Ser Val
50

<210> 233
<211> 52
<212> PRT
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多肽"

<220>
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<400> 233
Lys Ser Arg Thr Val Ser Ser Pro Lys Gln Pro Ala Leu Lys Ala Ile
1 5 10 15

Cys Asp Lys Glu Asp Ser Val Pro Asn Thr Thr Ala Thr Glu Lys Lys
20 25 30

Asp Glu Gln Ile Ser Gly Thr Val Ser Cys Gln Lys Gln Pro Ala Leu
35 40 45

Lys Ala Thr Ser
50

<210> 234
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多肽"

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<400> 234
Leu Glu Lys Asp Thr Ile Lys Asn Gln Asn Leu Glu Lys Lys Tyr Leu
1 5 10 15

Lys Asp Phe Glu Ile Val Lys Arg Lys Arg Arg Glu Asp Leu Gln Lys
20 25 30

Ala

<210> 235
<211> 52
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多肽"

<220>
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<400> 235
Trp Thr Ala Leu Arg Ser Ala Ala Trp Gly Gly His Thr Glu Val Val
1 5 10 15

Ser Ala Leu Leu Tyr Ala Gly Val Lys Met Met Asp Cys Ala Asp Ala
20 25 30

Asp Ser Arg Thr Ala Leu Arg Ala Ala Ala Trp Gly Gly His Glu Asp
35 40 45

Ile Val Leu Asn
50

<210> 236
<211> 52
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多肽"

<220>
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<400> 236
Thr Gln His Gln Met Arg Val Leu Asp Lys Leu Met Val Glu Arg Leu
1 5 10 15

Ser Ala Glu Arg Thr Glu Cys Leu Asn Cys Cys Leu Gln Gln His Ser
20 25 30

Asp Thr Glu Lys His Glu Gly Glu Lys Arg Gln Ile Ser Leu Val Asp
35 40 45

Glu Leu Lys Thr
50

<210> 237
<211> 52
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多肽"

<220>
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<223> /注釋="p.R334C"

<400> 237
Pro Leu His Asp Gly Glu Tyr Asp Ser Pro Glu Asp Asp Met Asn Asp
1 5 10 15

Arg Lys Leu Leu Tyr Gln Glu Trp Ala Cys Cys Tyr Gly Val Phe Tyr
20 25 30

Lys Phe Gln Pro Ile Asp Leu Ile Arg Lys Tyr Phe Gly Glu Lys Ile
35 40 45

Gly Leu Tyr Phe
50

<210> 238
<211> 52
<212> PRT
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多肽"

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<223> /注釋="p.A41S"

<400> 238
Gly Met Asn Ile Ser Lys Ser Glu Ile Thr Lys Glu Thr Ser Leu Lys
1 5 10 15

Pro Ser Arg Arg Ser Leu Pro Cys Leu Ser Ser Gln Ser Tyr Ala Tyr
20 25 30

Ser Lys Ser Leu Ser Gln Ser Thr Ser Leu Phe Gln Ser Thr Glu Ser
35 40 45

Glu Ser Gln Ala
50

<210> 239
<211> 52
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多肽"

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<400> 239
Ile Ala Tyr Leu Ile Pro Asp Val Pro Lys Gly Leu His Asp Arg Ile
1 5 10 15

Arg Arg Glu Lys Tyr Leu Val Gln Glu Ile Ile Met Tyr Glu Ala Glu
20 25 30

Leu Glu His Leu Gln Gln Gln Arg Arg Lys Ser Gly Gln Pro Val His
35 40 45

His Glu Trp Pro
50

<210> 240
<211> 52
<212> PRT
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<220>
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<400> 240
Arg Ser Lys Gln His Leu Arg Leu Val Phe Asp Glu Tyr Leu Lys Thr
1 5 10 15

Thr Gly Lys Pro Ile Glu Ala Ser Ile Gln Gln Gly Glu Leu Ser Gly
20 25 30

Asp Phe Glu Lys Leu Met Leu Ala Val Val Lys Cys Ile Arg Ser Thr
35 40 45

Pro Glu Tyr Phe
50

<210> 241
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<400> 241
Gln Ser Gln Leu Phe Ala Asp Leu Ser Arg Glu Glu Leu Thr Ala Val
1 5 10 15

Met Arg Phe Leu Thr Gln Arg Leu Gly Ala Arg Ala Gly Gly Cys Ser
20 25 30

Pro Gly Pro Ala Leu Gly Gln Leu Cys Leu Leu Ser Gly Val Ala Ala
35 40 45

Ala Ser Gln Gly Cys Ser Pro Gly Ser Leu Gly Gln Gly Glu Pro Pro
50 55 60

Thr Cys Pro Gly Gly Thr Gly His Arg Leu Leu Trp Gln Ala Thr Pro
65 70 75 80

Ala Gln Arg Glu

<210> 242
<211> 52
<212> PRT

<213> 人工序列

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<220>
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<400> 242
Gly Arg His Trp Asn Glu Gln Met Leu Asp Ile Ala Cys Arg Leu Ile
1 5 10 15

Leu Asn Glu Val Ser Leu Leu Gly Ser Val Val Pro Gly Gly Lys Val
20 25 30

Glu Phe Lys Arg Thr Leu Ile Ile Ser Phe Leu Phe Lys Phe Tyr Leu
35 40 45

Glu Val Ser Gln
50

<210> 243
<211> 52
<212> PRT
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多肽"

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<400> 243
Asn Asp Ile Ala Ala Gly Ile Pro Ser Ile Thr Ala Tyr Ser Lys Asn
1 5 10 15

Gly Leu Lys Ile Glu Phe Thr Phe Glu Leu Leu Ser Asn Thr Asn Pro
20 25 30

Ser Val Thr Val Ile Thr Ile Gln Ala Ser Asn Ser Thr Glu Leu Asp
35 40 45

Met Thr Asp Phe
50

<210> 244
<211> 52
<212> PRT
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多肽"

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<400> 244
Pro Gln Leu Val His Ile Leu Arg Thr Leu Val Thr Met Gly Tyr Ser
1 5 10 15

Thr Glu His Ser Ile Ser Gly Val Ser Asn Asn Pro Phe Leu Gln Val
20 25 30

Gln Ile Leu Arg Leu Leu Arg Ile Leu Gly Arg Asn His Glu Glu Ser
35 40 45

Ser Glu Thr Met
50

<210> 245
<211> 33
<212> PRT
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多肽"

<220>
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<400> 245
Leu Ser Lys Phe Tyr Gln Pro Tyr Ser Glu Asp Thr Gln Gln Gln Ile
1 5 10 15

Ile Arg Glu Thr Phe His Leu Val Ser Glu Met Lys Met Phe Val Ile
20 25 30

Ser

<210> 246
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.R276W"

<400> 246
Val Val Met Gly Ala Thr Lys Leu Phe Leu Ile Leu Ala Lys Met Phe
1 5 10 15

Pro His Val Gln Thr Asp Val Leu Val Trp Trp Val Lys Gly Pro Leu
20 25 30

Leu Ala Ala Cys Ser Ser Glu Ser Arg Glu Leu Cys Phe Val Ala Leu
35 40 45

Cys His Val Arg
50

<210> 247
<211> 52
<212> PRT
<213> 人工序列

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多肽"

<220>
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<400> 247
Leu Ile Ala Gln Ser Ile Gly Gln Ala Phe Ser Val Ala Tyr Gln Glu
1 5 10 15

Phe Leu Arg Ala Asn Gly Ile Asn Pro Lys Lys Asp Leu Ser Gln Lys
20 25 30

Glu Tyr Ser Asp Leu Leu Asn Thr Gln Asp Met Tyr Asn Asp Asp Leu
35 40 45

Ile His Phe Ser
50

<210> 248
<211> 52
<212> PRT
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多肽"

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<400> 248
Gln Ile Met Ser Ile Asn Gly Thr Ser Leu Val Gly Leu Pro Leu Ser
1 5 10 15

Thr Cys Gln Ser Ile Ile Lys Gly Leu Asn Asn Asn Gln Ser Arg Val
20 25 30

Lys Leu Asn Ile Val Arg Cys Pro Pro Val Thr Thr Val Leu Ile Arg
35 40 45

Arg Pro Asp Leu
50

<210> 249
<211> 39
<212> PRT
<213> 人工序列

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多肽"

<220>
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<223> /注釋="p.T243fs"

<400> 249
Glu Asp Gly Gln Val Ala Thr Val Ser Ser Ser Pro Glu Thr Lys Lys
1 5 10 15

Asp His Pro Lys Thr Gly Ala Lys Thr Arg Leu Cys Thr Ala Pro Asp
20 25 30

Pro Glu Pro Gly Thr Glu Arg
35

<210> 250
<211> 36
<212> PRT
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多肽"

<220>
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<400> 250
Pro Tyr Leu Asn Thr Thr Val Leu Pro Ser Ser Ser Ser Ser Arg Gly
1 5 10 15

Ser Leu Asp Ser Ser Arg Ser Glu Lys Ile Glu Val Trp Arg Glu Asn
20 25 30

Ala Glu Leu Val
35

<210> 251
<211> 84
<212> PRT
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多肽"

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<223> /注釋="p.F1354fs"

<400> 251
Pro Arg Thr Lys Ser Ser Arg Leu Gln Gly Ser Ser Leu Ser Ser Glu
1 5 10 15

Ser Ala Arg His Lys Ala Val Glu Phe Leu Gln Glu Arg Asn Leu Pro
20 25 30

Pro Lys Val Val Leu Arg His Pro Lys Val His Leu Asn Thr Met Phe
35 40 45

Arg Arg Pro His Ser Cys Leu Ala Asp Val Leu Leu Ser Val His Leu
50 55 60

Ile Val Leu Arg Val Val Arg Leu Pro Ala Pro Phe Arg Val Asn His
65 70 75 80

Ala Val Glu Trp

<210> 252
<211> 52
<212> PRT
<213> 人工序列

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多肽"

<220>
<221> 來源
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<400> 252
Leu Leu Leu Leu Leu Ala Gly Ala Arg Ala Glu Glu Glu Met Leu Glu
1 5 10 15

Asn Val Ser Leu Val Cys Pro Lys Asp Val Val Thr Arg Phe Lys His
20 25 30

Leu Arg Lys Tyr Thr Tyr Asn Tyr Glu Ala Glu Ser Ser Ser Gly Val
35 40 45

Pro Gly Thr Ala
50

<210> 253
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 253
Thr Lys Thr Glu Val Ile Pro Pro Leu Ile Glu Asn Arg Gln Ser Trp
1 5 10 15

Ser Val Cys Lys Gln Val Phe Pro Gly Met Met Asn Tyr Cys Thr Ser
20 25 30

Gly Ala Tyr Ser Asn Ala Ser Ser Thr Asp Ser Ala Ser Tyr Tyr Pro
35 40 45

Leu Thr Gly Asp
50

<210> 254
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.F3102L"

<400> 254
Phe Leu Ser Pro Ser Ala Gln Gln Ala Ser Trp Gln Val Ser Ala Arg
1 5 10 15

Phe Asn Gln Tyr Lys Tyr Asn Gln Asn Leu Leu Ser Ala Gly Asn Asn
20 25 30

Glu Asn Ile Met Glu Ala His Val Gly Ile Asn Gly Glu Ala Asn Leu
35 40 45

Asp Phe Leu Asn
50

<210> 255
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 255
Met Glu Ala His Val Gly Ile Asn Gly Glu Ala Asn Leu Asp Phe Leu
1   5   10   15

Asn Ile Pro Leu Thr Ile Pro Glu Met Cys Cys Leu Pro Tyr Thr Ile
            20   25   30

Ile Thr Thr Pro Pro Leu Lys Asp Phe Ser Leu Trp Glu Lys Thr Gly
        35   40   45

Leu Lys Glu Phe
    50

<210> 256
<211> 52
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多肽"

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<400> 256
Ser Gln Val Glu Ala Phe Glu Ser Arg Glu Gly Gly Pro Trp Gly Gly
1   5   10   15

Arg Val Glu Ala Glu Glu Ser Ala Gly Leu Val Glu Asp Ser Cys Gly
            20   25   30

Leu Asp Pro Ala Gly Ser Gln Thr Ala Arg Ala Glu Gly Met Gly Ala
        35   40   45

Met Val Glu Ala
    50

<210> 257
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<400> 257
Ile Glu Gly Glu Ala Thr Pro Val Asn Leu Thr Glu Pro Ala Lys Leu
1   5   10   15

Glu Val Lys Phe Ser Trp Phe Met Pro Leu Leu Ala Pro Tyr Trp Ile
            20   25   30

Leu Ala Thr Asp Tyr Glu Asn Tyr Ala Leu Val Tyr Ser Cys Thr Cys
        35   40   45

Ile Ile Gln Leu
    50

<210> 258
<211> 52
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<400> 258
Glu Glu Thr Arg Ala Arg Leu Ser Lys Glu Leu Gln Ala Ala Gln Ala
1 5 10 15

Arg Leu Gly Ala Asp Met Glu Asp Val Arg Arg Gly Arg Leu Val Gln
20 25 30

Tyr Arg Gly Glu Val Gln Ala Met Leu Gly Gln Ser Thr Glu Glu Leu
35 40 45

Arg Val Arg Leu
50

<210> 259
<211> 52
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<400> 259
Pro Lys Met Gly Val Ile Thr Val Ser Gly Leu Ala Gly Leu Val Ser
1 5 10 15

Ala Arg Lys Gly Ser Lys Phe Lys Lys Leu Leu Thr Tyr Pro Leu Gly
20 25 30

Leu Ala Thr Leu Gly Ala Thr Val Cys Tyr Pro Val Gln Ser Val Ile
35 40 45

Ile Ala Lys Val
50

<210> 260
<211> 52
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多肽"

<220>
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<400> 260
Glu Arg Val Lys Glu Lys Gln Gln Lys Glu Leu Asn Lys Gln Lys Gln
1 5 10 15

Ile Glu Lys Asp Leu Glu Glu Gln Ser Trp Trp Leu Ile Ala Ala Ser
20 25 30

Ser Arg Pro Asn Gln Ala Ser Ser Glu Gly Gln Phe Val Val Leu Ser
35 40 45

Ser Ser Gln Ser
50

<210> 261
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多肽"

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<223> /注釋="p.Q261L"

<400> 261
Ser Ala Gly Asn Gly Trp Trp Trp Val Pro Val Val Ala Pro Leu Val
1 5 10 15

Gly Ala Thr Val Gly Thr Ala Thr Tyr Leu Leu Leu Leu Val Ala Leu
20 25 30

His His Pro Glu Gly Pro Glu Pro Ala Gln Asp Leu Val Ser Ala Gln
35 40 45

His Lys Ala Ser
50

<210> 262
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多肽"

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<223> /注釋="p.N68T"

<400> 262
Gln Ile Ala Met Ala Phe Gly Leu Gly Ile Gly Thr Leu Val Gln Ala
1 5 10 15

Leu Gly His Ile Ser Gly Ala His Ile Thr Thr Pro Ala Val Thr Val
20 25 30

Ala Cys Leu Val Gly Cys His Val Ser Val Leu Arg Ala Ala Phe Tyr
35 40 45

Val Ala Ala Gln
50

<210> 263
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多肽"

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<400> 263
Lys Glu Asp Val Asn Gly Ser Lys Trp Thr Val Thr Thr Phe Ser Thr
1 5 10 15

Thr Pro His Met Pro Thr Tyr Leu Val Thr Thr Phe Val Ile Cys Asp
20 25 30

Tyr Asp His Val Asn Arg Thr Glu Arg Gly Lys Glu Ile Arg Ile Trp
35 40 45

Ala Arg Lys Asp
50

<210> 264
<211> 52
<212> PRT
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<400> 264
Ala Ser Leu Leu Leu Lys Lys Val Pro Leu Ala Gln Ala Gly Cys Leu
1 5 10 15

Phe Thr Gly Ile Arg Arg Glu Ser Pro Leu Leu Val Gly Leu Leu Arg
20 25 30

Cys Arg Glu Glu Pro Pro Arg Leu Leu Gly Ser Arg Phe Gln Glu Arg
35 40 45

Phe Phe Leu Leu
50

<210> 265
<211> 52
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多肽"

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<400> 265
Phe Ala Asn Lys Gln Asp Leu Pro Asn Ala Met Ala Ile Ser Glu Met
1 5 10 15

Thr Asp Lys Leu Gly Leu Gln Ser Leu His His Asn Arg Thr Trp Tyr
20 25 30

Val Gln Ala Thr Cys Ala Thr Gln Gly Thr Gly Leu Tyr Glu Gly Leu
35 40 45

Asp Trp Leu Ser
50

<210> 266
<211> 52
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多肽"

<220>
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<400> 266
Leu Phe Lys Arg Leu Arg Ala Val Pro Thr Asn Lys Ala Cys Phe Asp
1 5 10 15

Cys Gly Ala Lys Asn Pro Ser Trp Ala Asn Asn Ile Thr Tyr Gly Val
20 25 30

Phe Leu Cys Ile Asp Cys Ser Gly Val His Arg Ser Leu Gly Val His
35 40 45

Leu Ser Phe Ile
50

<210> 267
<211> 46
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多肽"

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<400> 267
Ser Leu Arg Leu Ala Tyr Lys Asp Leu Glu Ile Gln Met Lys Lys Asp
1 5 10 15

Glu Lys Met Asn Ile Ser Gly Lys Lys Met Leu Thr Gln Thr Asp Ser
20 25 30

Ala Trp Asp Leu Glu Ile Ala Glu Val Leu Phe His Ile Gln
35 40 45

<210> 268
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多肽"

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<223> /注釋="p.P1552fs"

<400> 268
Leu Asp Ile Phe Lys Thr Thr Ile Pro His Ala Leu Leu Thr Trp Arg
1 5 10 15

Pro Asn Ser Gly Glu Thr Ala Pro Pro Thr Ser Ile Ser Cys Lys
20 25 30

<210> 269
<211> 52
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多肽"

<220>
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<223> /注釋="p.D1632N"

<400> 269
Lys Phe Pro Glu Gln Lys Leu Phe Ala Ala Leu Leu Ile Lys Cys Val
1 5 10 15

Val Gln Leu Glu Leu Ile Gln Thr Ile Asn Asn Asn Ile Val Phe Phe
20 25 30

Pro Ala Thr Ser Lys Lys Glu Asp Ala Glu Asn Leu Ala Ala Ala Gln
35 40 45

Arg Asp Ala Val
50

<210> 270
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.R86L"

<400> 270
Gly Leu Ile Pro Thr Gly Ser Gly Arg His Pro Ser His Ser Thr Thr
1 5 10 15

Pro Ser Gly Pro Gly Asp Glu Val Ala Leu Leu Gly Ile Ala Gly Glu
20 25 30

Lys Phe Asp Ile Val Lys Lys Trp Gly Ile Asn Thr Tyr Lys Cys Thr
35 40 45

Lys Gln Leu Leu
50

<210> 271
<211> 52
<212> PRT
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多肽"

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<400> 271
Asn Pro Gln Gln Gly Gln Gly Arg Gln Asn Ala Ile Lys Cys Gly Trp
1 5 10 15

Leu Arg Lys Gln Gly Gly Phe Val Lys Ala Ala Trp His Thr Arg Trp
20 25 30

Phe Val Leu Lys Gly Asp Gln Leu Tyr Tyr Phe Lys Asp Glu Asp Glu
35 40 45

Thr Lys Pro Leu
50

<210> 272
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多肽"

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<400> 272
Leu Glu Phe Ala Asp Lys Ser Pro Thr Pro Pro Asn Leu Pro Ser Asp
1 5 10 15

Lys Ile Tyr Pro Pro Ser Gly Ser Pro Lys Lys Glu Asn Thr Ser Thr
20 25 30

Ala Thr Met Thr Tyr Met Thr Thr Thr Pro Ala Thr Ala Gln Met Ser
35 40 45

Thr Lys Glu Ala
50

<210> 273
<211> 52
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多肽"

<220>
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<223> /注釋="p.R128C"

<400> 273
Gly Gln Gln Arg Ala Val Ser His Lys Thr Phe Gly Ile Ser Leu Glu
1 5 10 15

Glu Val Leu Val Asn Glu Phe Thr Arg Cys Cys Lys His Leu Glu Leu
20 25 30

Thr Ala Thr Met Gln Val Glu Glu Ala Thr Gly Gln Ala Ala Gly Arg
35 40 45

Arg Arg Gly Asn
50

<210> 274
<211> 52
<212> PRT

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多肽"

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<223> /注釋="p.A147V"

<400> 274
Val Asn Glu Phe Thr Arg Arg Lys His Leu Glu Leu Thr Ala Thr Met
1 5 10 15

Gln Val Glu Glu Ala Thr Gly Gln Ala Val Val Gly Arg Arg Arg Gly
20 25 30

Asn Val Val Arg Arg Val Phe Gly Arg Ile Arg Arg Phe Phe Ser Arg
35 40 45

Arg Arg Asn Glu
50

<210> 275
<211> 42
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多肽"

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<223> /注釋="p.P16H"

<400> 275
Met Gly Gly Cys Ile Pro Phe Leu Lys Ala Ala Arg Ala Leu Cys His
1 5 10 15

His Arg Ile Met Pro Pro Leu Leu Leu Leu Ser Ala Phe Ile Phe Leu
20 25 30

Val Ser Val Leu Gly Gly Ala Pro Gly His
35 40

<210> 276
<211> 52
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多肽"

<220>
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<400> 276
Glu Ser Leu Ser Phe Ile Gly Glu Phe Ile Gly Lys Ile Arg Thr Glu
1 5 10 15

Ala Ser Gln Ile Arg Lys Asp Lys Tyr Leu Leu Ala Asn Leu Pro Phe
20 25 30

Thr Leu Ile Leu Ala Asn Gln Arg Asp Ser Ile Ser Lys Asn Leu Pro
35 40 45

Ile Leu Arg His
50

<210> 277
<211> 33
<212> PRT
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多肽"

<220>
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<400> 277
Arg Ala Phe Leu Ser Glu Val Gln Asp Thr Ile Pro Val Gln Leu Val
1 5 10 15

Ala Val Thr Asp Ser Gln Ala Asp Phe Leu Lys Met Arg Leu Ser Lys
20 25 30

Ser

<210> 278
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R137C"

<400> 278
Gln Gln Val Ser Leu Ala Glu Gly Asp Arg Phe Leu Leu Leu Arg Lys
1 5 10 15

Thr Asn Ser Asp Trp Trp Leu Ala Arg Cys Cys Leu Glu Ala Pro Ser
20 25 30

Thr Ser Arg Pro Ile Phe Val Pro Ala Ala Tyr Met Ile Glu Glu Ser
35 40 45

Ile Pro Ser Gln
50

<210> 279
<211> 34
<212> PRT
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多肽"

<220>
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<223> /注釋="p.A615fs"

<400> 279
Val Gln Glu Ala Arg Gln Val Phe Glu Lys Ile Gln Arg Met Gly Ala
1 5 10 15

Gln Gln Asp Asp Gly Ser Asp Ala Pro Leu Glu Ala Leu Thr Gly Gln
20 25 30

Gly Met

<210> 280
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 280
Pro Ile Ser Leu Leu Gly Ser Phe Leu Thr Glu Glu Ser Pro Asp Lys
1 5 10 15

Glu Ile Asp Gln Asn Ser Gln Gln Glu Gly Gly Ser Arg Leu Arg Lys
20 25 30

Gly Thr Val Ser Ser Gln Gly Thr Glu Val Val Phe Ala Ser Ala Ser
35 40 45

Val Thr Pro Pro
50

<210> 281
<211> 48
<212> PRT
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<400> 281
Glu Lys Leu Arg Trp Ile Ser Ala Leu Ala Met Pro Arg Glu Glu Leu
1 5 10 15

Asp Leu Leu Glu Cys Tyr Asn Ser Pro Arg Tyr Ser Ala Phe Glu Pro
20 25 30

Thr Ser Pro Glu Arg Met Met Asn Trp His Trp Arg Lys Pro Thr Trp
35 40 45

<210> 282
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.S614L"

<400> 282
Gln Thr Ala Tyr Ser Gln Gln Arg Phe Pro Pro Pro Gln Glu Leu Ser
1 5 10 15

Gln Asp Ser Phe Gly Ser Gln Ala Ser Leu Leu Ala Pro Ser Met Thr
20 25 30

Ser Ser Lys Gly Gly Gln Glu Asp Met Asn Leu Ser Leu Gln Ser Arg
35 40 45

Pro Ser Ser Leu
50

<210> 283
<211> 45
<212> PRT
<213> 人工序列

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多肽"

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<400> 283
Lys Pro Leu Asp Leu Tyr Arg Leu Tyr Val Ser Val Lys Glu Ile Gly
1 5 10 15

Gly Leu Thr Gln Val Asn Lys Asn Lys Asn Gly Gly Asn Leu Gln Pro
20 25 30

Thr Ser Met Trp Ala His Gln Ala Val Leu Pro Ala Pro
35 40 45

<210> 284
<211> 179
<212> PRT
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多肽"

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<223> /注釋="p.Y1324fs"

<400> 284
Ser Thr Gly Ala Pro Gln Pro Asn Leu Met Pro Ser Asn Pro Asp Ser
1 5 10 15

Gly Met Tyr Ser Pro Ser Arg Tyr Pro Arg Ser Ser Ser Ser Ser Ser
20 25 30

Ser Asn Asp Met Ile Pro Met Ala Ile Ser Ser Pro Pro Lys Ala Pro
35 40 45

Leu Leu Ala Ala Pro Ser Pro Ala Ser Arg Leu Gln Cys Ile Asn Ser
50 55 60

Asn Ser Arg Ile Thr Ser Gly Gln Trp Met Ala His Met Ala Leu Leu
65 70 75 80

Pro Ser Gly Thr Lys Gly Arg Cys Thr Ala Cys His Thr Ala Leu Gly
85 90 95

Arg Gly Ser Leu Ser Ser Ser Ser Cys Pro Gln Pro Ser Pro Ser Leu
100 105 110

Pro Ala Ser Asn Lys Leu Pro Ser Leu Pro Leu Ser Lys Met Tyr Thr
115 120 125

Thr Ser Met Ala Met Pro Ile Leu Pro Leu Pro Gln Leu Leu Leu Ser
130 135 140

Ala Asp Gln Gln Ala Ala Pro Arg Thr Asn Phe His Ser Ser Leu Ala
145 150 155 160

Glu Thr Val Ser Leu His Pro Leu Ala Pro Met Pro Ser Lys Thr Cys
165 170 175

His His Lys

<210> 285
<211> 57
<212> PRT
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多肽"

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<223> /注釋="p.G1848fs"

<400> 285
Val Asp Cys Ser Asp Lys Leu Gly Arg Val Gln Glu Phe Asp Ser Gly
1 5 10 15

Leu Leu His Trp Arg Ile Gly Gly Gly Thr Pro Leu Ser Ile Ser Arg
20 25 30

Pro Thr Ser Arg Ala Arg Gln Ser Cys Cys Leu Pro Gly Leu Thr His
35 40 45

Pro Ala His Gln Pro Leu Gly Ser Met
50 55

<210> 286
<211> 83
<212> PRT
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多肽"

<220>
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<223> /注釋="p.P2139fs"

<400> 286
Arg Leu Val Leu Glu Thr Leu Ser Lys Leu Ser Ile Gln Asp Asn Asn
1 5 10 15

Val Asp Leu Ile Leu Ala Thr Pro Pro Ser Ala Ala Trp Arg Ser Cys
20 25 30

Ile Ala Leu Trp Cys Ala Ser Ser Val Thr Glu Arg Thr Arg Cys Ala
35 40 45

Gly Arg Trp Leu Trp Tyr Cys Trp Pro Thr Trp Leu Arg Gly Thr Ala
50 55 60

Trp Gln Leu Val Pro Leu Gln Cys Arg Arg Ala Val Ser Ala Thr Ser
65 70 75 80

Trp Ala Ser

<210> 287
<211> 63
<212> PRT
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多肽"

<220>
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<400> 287
Asn Gly Ile Met Tyr Thr Gly Val Leu Phe Ala Gln Pro Pro Ala Pro
1 5 10 15

Thr Pro Thr Ser Ala Pro Asn Lys Gly Arg Arg Arg Arg Arg Gln Gln
20 25 30

Gln Gln Arg Arg Arg Pro Gly Arg Lys His Arg Asn Gln Arg Arg Pro
35 40 45

Gly Trp Ala Ser Gly Ala Val His Thr Leu His Ile Tyr Leu Lys
50 55 60

<210> 288
<211> 52
<212> PRT
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多肽"

<220>
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<400> 288
Leu Asn Val Ser Lys Pro Gln Lys Leu Ala Arg Ser Pro Ala Arg Ile
1 5 10 15

Ser Pro His Ile Lys Asp Gly Glu Lys Glu Glu Lys His Arg Glu Lys
20 25 30

His Pro Asn Ser Ser Pro Arg Thr Tyr Lys Trp Ser Phe Gln Leu Asn
35 40 45

Glu Leu Asp Asn
50

<210> 289
<211> 52
<212> PRT
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多肽"

<220>
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<400> 289
Glu Thr Asp Arg Pro Ser Leu Glu Ser Ala Asn Gly Lys Lys Lys Thr
1 5 10 15

Lys Lys Leu Arg Met Lys Arg Asn His Leu Leu Val Glu Pro Leu Asn
20 25 30

Ile Asp Asp Cys Ala Pro Glu Ser Pro Thr Pro Pro Pro Pro Pro Pro
35 40 45

Pro Val Gly Trp
50

<210> 290
<211> 32
<212> PRT
<213> 人工序列

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多肽"

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<400> 290
Met Arg Val Ala Gly Arg Arg Arg Ala Leu Ser Arg Gly Ala Glu Leu
1 5 10 15

Arg Val Pro Gly Gly Ala Lys His Gly Met Cys Leu Leu Leu Gly Ala
20 25 30

<210> 291
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.M75L"

<400> 291
Gly Val Val Ser Leu Val Phe Leu Ile Ile Tyr Tyr Leu Asp Pro Ser
1 5 10 15

Val Leu Ser Gly Val Ser Cys Phe Val Leu Leu Phe Leu Cys Leu Ala
20 25 30

Asp Tyr Leu Val Pro Ile Leu Ala Pro Arg Ile Phe Gly Ser Asn Lys
35 40 45

Trp Thr Thr Glu
50

<210> 292
<211> 52
<212> PRT

<213> 人工序列

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多肽"

<220>
<221> 來源
<223> /注釋="p.A514T"

<400> 292
Leu Arg Ser Lys Asn Asp Glu Val Arg Lys His Ala Ser Trp Ala Val
1 5 10 15

Met Val Cys Ala Gly Asp Glu Leu Thr Thr Thr Asn Glu Leu Cys Arg
20 25 30

Leu Gly Ala Leu Asp Ile Leu Glu Glu Val Asn Val Ser Gly Thr Arg
35 40 45

Lys Asn Lys Phe
50

<210> 293
<211> 48
<212> PRT
<213> 人工序列

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多肽"

<220>
<221> 來源
<223> /注釋="p.E22K"

<400> 293
Met Gly Val Ala Leu Arg Lys Leu Thr Gln Trp Thr Ala Ala Gly His
1 5 10 15

Gly Thr Gly Ile Leu Lys Lys Ile Thr Pro Leu Asn Glu Ala Ile Leu
20 25 30

Lys Glu Ile Ile Val Phe Val Glu Ser Phe Ile Tyr Lys His Pro Gln
35 40 45

<210> 294
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.T395M"

<400> 294
Gly Thr Ser Cys Tyr Glu Tyr Phe His Gln Asp Asp Ile Gly His Leu
1 5 10 15

Ala Glu Cys His Arg Gln Val Leu Gln Met Met Arg Glu Lys Ile Thr
20 25 30

Thr Asn Cys Tyr Lys Phe Lys Ile Lys Asp Gly Ser Phe Ile Thr Leu
35 40 45

Arg Ser Arg Trp
50

<210> 295
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<223> /注釋="人工序列的說明書: 合成多肽"

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<400> 295
Ser Lys Met Pro Phe Gly Gln Leu Met Ser Glu Phe Gly Gly Ser Gly
1 5 10 15

Thr Gly Gly Trp Val His Gly Val Ser Leu Leu Ser Ala Ser Gly Ser
20 25 30

Arg Leu Ala Trp Val Ser His Asp Ser Thr Val Ser Val Ala Asp Ala
35 40 45

Ser Lys Ser Val
50

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<400> 296
Ser Ser Ser Glu Asn Glu Leu Lys Trp Ser Asp His Gln Arg Ala Trp
1 5 10 15

Ser Ser Thr Asp Ser Asp Ser Ser Asn His His Asn Leu Lys Pro Ala
20 25 30

Met Thr Lys Thr Ala Ser Phe Gly Gly Ile Thr Val Leu Thr Arg Gly
35 40 45

Asp Ser Thr Ser
50

<210> 297
<211> 100
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<400> 297
His Asn Val Glu Lys Gln Asp Ile Ala Thr Tyr Tyr Cys Ala Leu Trp
1 5 10 15

Glu Val His Ser Lys Leu Gly Lys Lys Ser Arg Tyr Leu Val Pro Glu
20 25 30

Gln Ser Leu Ser Leu Gln Ile Asn Asn Leu Met Gln Met Phe Pro Pro
35 40 45

Ser Pro Leu Phe Phe Phe Leu Gln Leu Leu Lys Gln Ser Ser Arg Arg
50 55 60

Leu Glu His Thr Phe Val Phe Leu Arg Asn Phe Ser Leu Met Leu Leu
65 70 75 80

Arg Tyr Ile Gly Lys Lys Arg Arg Ala Thr Arg Phe Trp Asp Pro Arg
85 90 95

Arg Gly Thr Pro
100

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多肽"

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<400> 298
Leu Ser Phe Arg Lys Asp Leu Phe Ile Ala Thr Tyr Gln Ala Phe Pro
1 5 10 15

Pro Val Pro Asn Pro Pro Arg Pro Pro Pro Pro Arg Leu Gln Asp Arg
20 25 30

Leu Leu Arg Lys Leu Gly Gln His Ala His Pro Phe Phe Phe Thr Val
35 40 45

Arg Met Pro Leu
50

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<400> 299
Ala Leu Arg Leu Glu Ala Gln Gly Arg Ala Thr Ala Ala Trp Gly Pro
1 5 10 15

Ser Thr Cys Pro Arg Ala Ser Ala Ser Ala Ala Ala Ala Leu Ala Val
20 25 30

Phe Ser Glu Val Glu Tyr Leu Asn Val Arg Leu Ser Leu Arg Glu Pro
35 40 45

Pro Ala Gly Glu
50

<210> 300
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<400> 300
Leu Gly Ile Leu Thr Leu Ala Ala Gly Gln Thr Cys Gly Phe Phe Ser
1 5 10 15

Val Ser Ala Arg Ala Val Thr Gly Met Gly Gly Gly Val Gly Cys Leu
20 25 30

Phe Phe Ile Ser Trp Tyr Ser Ser Phe Gly Phe Val Arg Arg Trp Asn
35 40 45

Cys Ile Leu Met
50

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多肽"

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<400> 301
Leu Gly Ile Leu Thr Leu Ala Ala Gly Gln Thr Cys Gly Phe Phe Ser
1 5 10 15

Val Ser Ala Arg Ala Val Thr Gly Met Gly Cys Leu Phe Phe Ile Ser
20 25 30

Trp Tyr Ser Ser Phe Gly Phe Val Arg Arg Trp Asn Cys Ile Leu Met
35 40 45

Arg Asn His Asp Val Thr Glu Gln Pro Met Val
50 55

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多肽"

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<223> /注釋="p.V131I"

<400> 302
Phe Ala Val Thr Ser Val Gly Gly Leu Pro Leu Asn Glu Thr Thr Leu
1 5 10 15

Ala Glu Val Leu Gln Gln Ala Gly Tyr Ile Ile Thr Gly Ile Ile Gly
20 25 30

Lys Trp His Leu Gly His His Gly Ser Tyr His Pro Asn Phe Arg Gly
35 40 45

Phe Asp Tyr Tyr
50

<210> 303
<211> 30
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多肽"

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<400> 303
Ile Trp Thr Cys Leu Gly Ala Pro Ile Lys Gly Tyr Ser Phe Phe Pro
1 5 10 15

Gly Glu Glu Glu Val Leu Ile Pro Pro Leu Arg Pro Ser Lys
20 25 30

<210> 304
<211> 52
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多肽"

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<400> 304
Gln His Val Ala Leu Tyr Leu Glu His Gly Ala Asp Val Gly Leu Arg
1 5 10 15

Thr Ser Gln Gly Glu Thr Ala Leu Asn Ala Ala Ala Cys Ala Gly Ala
20 25 30

Glu Gly Pro Gly Ser Cys Arg Arg His Gln Ala Ala Ala Arg Arg Leu
35 40 45

Leu Glu Ala Gly
50

<210> 305
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多肽"

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<400> 305
Gln Glu Glu Val Leu Ala Lys Cys Ser Met Asp His Gly Val Asp Ser
1 5 10 15

Ser Ile Phe Gln Asn Pro Lys Lys Leu Tyr Tyr Leu Thr Ile Gly Met
20 25 30

Leu Val Leu Leu Ser Glu Glu Glu Ile Gln Gln Thr Cys Glu Met Leu
35 40 45

Gln Gln Cys Lys
50

<210> 306
<211> 52
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多肽"

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<400> 306
Cys Asp Asn Ile Gln Gly Phe Ile Glu Glu Phe Leu Gln Ile Phe Ser
1 5 10 15

Ser Leu Leu Gln Glu Lys Arg Phe Leu Leu Leu Asp Tyr Asp Ala Leu
20 25 30

Phe Pro Val Ala Glu Asp Ile Ser Leu Leu Gln Gln Ala Ser Ser Val
35 40 45

Leu Asp Glu Thr
50

<210> 307
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<400> 307
Val Lys Gln Cys Val His Gln Ile Pro Ser Val Met Met Glu Ala Ser
1 5 10 15

Ile Gln Pro Ile Thr Arg Thr Val Leu Gln Gln Val Thr Leu Ser Ile
20 25 30

Tyr Ala Asp Phe Thr Trp Asn Asp Gln Val His Gly Thr Val Gly Glu
35 40 45

Pro Trp Trp Ile
50

<210> 308
<211> 52
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<400> 308
Glu Thr Lys Ala Ile Lys Gln Met Phe Gly Pro Phe Pro Ser Ser Ser
1 5 10 15

Ala Thr Ala Ala Cys Asn Ala Thr Asn Gln Gln Ile Ile Ser His Phe
20 25 30

Ser Gln Asp Asp Leu Thr Ala Leu Val Gln Met Thr Glu Lys Glu His
35 40 45

Gly Asp Arg Val
50

<210> 309
<211> 77
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<223> /注釋="p.D35fs"

<400> 309
Ala Leu Pro Tyr Ser Leu Arg Thr Ala Pro Leu Gly Val Pro Gly Thr
1 5 10 15

Leu Pro Gly Leu Pro Arg Arg Asp Pro Ser Gly Ser Pro Cys Val Trp
20 25 30

Thr Pro Arg Ala Gly Ser Gly Arg Ala Ala Ala Ala His Gly Asp Gly
35 40 45

Ser Thr Cys Pro Cys Arg Trp Thr Ala Pro Ser Ser Pro Pro Ser Ser
50 55 60

Ala Ser Ala Thr Ser Ala Ser Gly Ser Gly Cys Ala Ala
65 70 75

<210> 310
<211> 52
<212> PRT
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<400> 310
Arg Met Ala Arg Glu Glu Pro Ala Pro Ala Ala Leu Ala Ala Ala Gly
1 5 10 15

Gln Pro Gly Gly Gly Arg Gly Gly Glu Leu Leu Ala Leu Gln Gly Pro
20 25 30

Gly Val Ala Arg Arg Gly Arg Pro Ser Leu Ser Arg Ala Lys Leu His
35 40 45

Gly Leu Arg His
50

<210> 311
<211> 44
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多肽"

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<400> 311
Ala Val His Thr Arg Arg Glu Asn Pro Ala Glu Pro Gly Ala Val Thr
1 5 10 15

Gly Ser Ala Thr Val Thr Ala Phe Trp Arg Arg Ser Leu Leu Ala Cys
20 25 30

Cys Gln Leu Pro Ser Arg Pro Gly Ile His Leu Cys
35 40

<210> 312
<211> 52
<212> PRT
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<400> 312
Glu Glu Asn Lys Ile Pro Ile Ser Pro Ile Ser Pro Ala Phe Asn Glu
1 5 10 15

Cys His Gly Ala Thr Cys Leu Pro Leu Phe Phe Val Arg Arg Ser Thr
20 25 30

Thr Tyr Ser Ser Leu His Ala Ser Glu Asn Arg Glu Leu Leu Asn Val
35 40 45

His Ser Ala Asn
50

<210> 313
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多肽"

<220>
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<223> /注釋="p.F67fs"

<400> 313
Asp Asp Asp Asp Asp Asp Asp Asp Glu Asp Asn Ser Leu Phe Pro
1 5 10 15

Thr Arg Glu Pro Arg Ser His Phe Phe His Leu Ile Cys Phe Gln Cys
20 25 30

Val His Leu Asp Val Ser Ala Ile His Glu Leu Tyr Ile Ala Gln Ile
35 40 45

<210> 314
<211> 53
<212> PRT
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多肽"

<220>
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<223> /注釋="p.L221del"

<400> 314
Glu Ile Val Glu Glu Gln Met His Ile Leu His Ile Ser Val Met Gly
1 5 10 15

Gly Leu Ile Ala Leu Leu Leu Leu Leu Val Phe Thr Val Ala Leu Tyr
20 25 30

Ala Gln Arg Arg Trp Gln Lys Arg Arg Arg Ile Pro Gln Lys Ser Ala
35 40 45

Ser Thr Glu Ala Thr
50

<210> 315
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<400> 315
Glu Gly Leu Ser Lys Ala Thr Gln Asp Gln Ile Leu Gln Thr Leu Ile
1 5 10 15

Gln Arg Val Arg Arg Gln Asn Leu Leu Leu Leu Val Val Pro Pro Ser
20 25 30

Gln Phe Asn Phe Ala His Ser Gly Phe Gln Leu Glu Asp Ile Ser Thr
35 40 45

Ser Gln Arg Phe
50

<210> 316
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多肽"

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<400> 316
Ser Ile Pro Glu Leu Ala Ser Thr Glu Met Ile Lys Val Lys Asn His
1 5 10 15

Ser Val Leu Gln Arg Thr Glu Lys Lys Cys Tyr Leu His His Trp Asn
20 25 30

Tyr Leu Ser Phe Leu Lys Gly Gln Ile Ile Arg Glu Met Ser Phe His
35 40 45

Leu Leu Asn Tyr Arg Thr Ser Asn Ile Ser His Gln Trp Ile Arg Leu
50 55 60

His Phe Gln Lys Ala Leu Glu Ile Lys His Ile Ser Lys Gly Val His
65 70 75 80

Arg Val Gly

<210> 317
<211> 52
<212> PRT
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多肽"

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<400> 317
Asn Arg Ala Asp Asn Ser Gly Lys Pro Gln Gln Pro Pro Gly Gly Phe
1 5 10 15

Ala Pro Ala Ala Ile Asn Arg Ser Ile Gln Gln Cys Lys Val Ile Val
20 25 30

Asp His Ser Thr Thr Leu Thr Ser Ser Leu Ser Leu Thr Val Ser Val
35 40 45

Glu Ser Ser Glu
50

<210> 318
<211> 52
<212> PRT
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<400> 318
Glu Ile Pro Asp Ser Thr Met Ser Ile Cys Val Pro Ser Glu Thr Val
1 5 10 15

Asp Glu Ile Val Lys Ser Gly Tyr Ile Val Gly Glu Ser Glu Asn Ser
20 25 30

Glu Ile Ser Gln Gln Val Arg Phe Lys Thr Val Thr Val Leu Ala Gln
35 40 45

Val His Pro Ile
50

<210> 319
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<212> PRT
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多肽"

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<400> 319
Ser Leu Arg Asn Met Met Gln Leu Cys Thr Arg Cys Leu Ser Asn Cys
1 5 10 15

Thr Lys Lys Ser Pro Asn Lys Ile Ala Phe Phe Gly Phe Phe Leu Arg
20 25 30

Leu Leu Thr Ser Lys Leu Met Asn Asp Ile Ala Asp Ile Cys Lys Ser
35 40 45

Leu Ala Ser Phe
50

<210> 320
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多肽"

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<400> 320
Cys Asn Ser Pro Thr Asn Pro Tyr Trp Val Met Glu Gly Gln Leu Ser
1 5 10 15

Asn Pro Thr Phe Tyr Leu Val Cys Phe Ile Ile Thr Pro Val Val Ala
20 25 30

Leu Leu Pro Arg Tyr Phe Phe Leu Ser Leu Gln Gly Thr Cys Gly Lys
35 40 45

Ser Leu Ile Ser
50

<210> 321
<211> 52
<212> PRT
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<400> 321
Ala Val Val Gly Ile Val Val Tyr Ala Gly His Glu Thr Lys Ala Met
1 5 10 15

Leu Asn Asn Ser Gly Pro Arg Tyr Lys His His Ser Lys Leu Glu Arg
20 25 30

Arg Ala Asn Thr Asp Val Leu Trp Cys Val Met Leu Leu Val Ile Met
35 40 45

Cys Leu Thr Gly
50

<210> 322
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<223> /注釋="p.R858C"

<400> 322
Leu Gly Thr Asp Ile Ile Pro Ser Ile Ala Leu Ala Tyr Glu Lys Ala
1 5 10 15

Glu Ser Asp Ile Met Asn Arg Lys Pro Cys Cys His Lys Asn Lys Asp
20 25 30

Arg Leu Val Asn Gln Pro Leu Ala Val Tyr Ser Tyr Leu His Ile Gly
35 40 45

Leu Met Gln Ala
50

<210> 323
<211> 52
<212> PRT
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<400> 323
Val Glu Pro Ser His Lys Ser Lys Ile Val Glu Tyr Leu Gln Ser Tyr
1 5 10 15

Asp Glu Ile Thr Ala Met Thr Gly Asp Cys Cys Val Asn Asp Ala Pro
20 25 30

Ala Leu Lys Lys Ala Glu Ile Gly Ile Ala Met Gly Ser Gly Thr Ala
35 40 45

Val Ala Lys Thr
50

<210> 324
<211> 63
<212> PRT
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多肽"

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<400> 324
Leu Val Thr Asp Gly Leu Pro Ala Thr Ala Leu Gly Phe Asn Pro Pro
1 5 10 15

Asp Leu Asp Ile Met Asp Arg Pro Pro Pro Glu Pro Gln Gly Ala Pro
20 25 30

His Gln Trp Leu Ala Leu Leu Pro Leu His Gly Asn Arg Gly Leu Cys
35 40 45

Gly Cys Ser His Arg Gly Ser Ser Cys Leu Val Val Pro Val Arg
50 55 60

<210> 325
<211> 52
<212> PRT
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多肽"

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<400> 325
Ser Val Ile Ile Val Val Leu Val Thr Ala Phe Asn Asp Trp Ser Lys
1 5 10 15

Glu Lys Gln Phe Arg Gly Leu Gln Cys His His Ile Glu Gln Glu Gln
20 25 30

Lys Phe Ser Ile Ile Arg Asn Gly Gln Leu Ile Gln Leu Pro Val Ala
35 40 45

Glu Ile Val Val
50

<210> 326
<211> 52
<212> PRT

<213> 人工序列

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多肽"

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<400> 326
Gly Thr Asp Val Cys Lys Glu Ala Ala Asp Met Ile Leu Val Asp Asp
1 5 10 15

Asp Phe Gln Thr Ile Met Ser Ala Ile Lys Lys Glu Gly Lys Gly Ile
20 25 30

Tyr Asn Asn Ile Lys Asn Phe Val Arg Phe Gln Leu Ser Thr Ser Ile
35 40 45

Ala Ala Leu Thr
50

<210> 327
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<212> PRT
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多肽"

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<400> 327
Ile Ser Tyr Pro Leu Glu Asn Ala Val Pro Phe Ser Leu Asp Ser Val
1 5 10 15

Ala Asn Ser Ile His Ser Leu Phe Ser Gln Gln Glu Thr Pro Val Val
20 25 30

Leu Gln Leu Ala Pro Ser Glu Glu Arg Val Tyr Met Val Gly Lys Ala
35 40 45

Asn Ser Val Phe
50

<210> 328
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多肽"

<220>
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<223> /注釋="p.R191Q"

<400> 328
Met Thr Gly Lys Leu Gly Phe Ile Ala Gly Val Ile Asn Arg Glu Arg
1 5 10 15

Met Ala Ser Phe Glu Arg Leu Leu Trp Gln Gln Ile Cys Arg Gly Asn
20 25 30

Val Tyr Leu Lys Phe Ser Glu Met Asp Ala Pro Leu Glu Asp Pro Val
35 40 45

Thr Lys Glu Glu
50

<210> 329
<211> 52
<212> PRT
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多肽"

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<223> /注釋="p.L237P"

<400> 329
Arg Gln Val Arg Pro Val Thr Glu Lys Leu Pro Ala Asn His Pro Leu
1 5 10 15

Leu Thr Gly Gln Arg Val Leu Asp Ala Pro Pro Phe Pro Cys Val Gln
20 25 30

Gly Gly Thr Thr Ala Ile Pro Gly Ala Phe Gly Cys Gly Lys Thr Val
35 40 45

Ile Ser Gln Ser
50

<210> 330
<211> 34
<212> PRT
<213> 人工序列

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多肽"

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<223> /注釋="p.Y383fs"

<400> 330
Asp Leu Thr Gly Phe Ile Thr Glu Gly Gln Ile Tyr Val Asp Arg Gln
1 5 10 15

Leu His Asn Arg Gln Ile Tyr Pro Pro Ser Thr Cys Ser Leu Pro Cys
20 25 30

Arg Gly

<210> 331
<211> 44
<212> PRT
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多肽"

<220>
<221> 來源
<223> /注釋="p.R312fs"

<400> 331
Ser Thr Phe Pro Asp His Lys Val Lys Val Thr Pro Leu Gly Asn Pro
1 5 10 15

Asp Arg Pro Ala Ala Gly Gln Thr Asp Lys Glu Arg Glu Arg Val Arg
20 25 30

Ala Arg Val Arg Ala Pro Cys Cys Ala Gly Ser Arg
35 40

<210> 332
<211> 71
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多肽"

<220>
<221> 來源
<223> /注釋="p.Q990fs"

<400> 332
Ile Val Glu Thr Tyr Phe Pro Gly Tyr Asn Arg Ser Ile Ser Arg Thr
1 5 10 15

Glu Thr Ile Ile Arg Phe Ala Phe Gln Ser Leu Tyr His Ser Ser Val
20 25 30

Tyr Cys Met Ser Leu Phe Thr Gly Thr Gly His Ser Asn Cys Cys Asp
35 40 45

Gly Gly Tyr Arg Ser Arg Cys Ser Lys Trp His Thr Asn Lys Arg Trp
50 55 60

Arg Ala Ile Gly Asp Gly Ser
65 70

<210> 333
<211> 52
<212> PRT
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多肽"

<220>
<221> 來源
<223> /注釋="p.R519Q"

<400> 333
Val Tyr Gln Ala Ser Ser Pro Asp Glu Val Ala Leu Val Gln Trp Thr
1 5 10 15

Glu Ser Val Gly Leu Thr Leu Val Gly Gln Gln Asp Gln Ser Ser Met
20 25 30

Gln Leu Arg Thr Pro Gly Asp Gln Ile Leu Asn Phe Thr Ile Leu Gln
35 40 45

Ile Phe Pro Phe
50

<210> 334
<211> 52
<212> PRT

<213> 人工序列

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多肽"

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<223> /注釋="p.R290Q"

<400> 334
Ala Ser Gly Thr Val Val Gly Val Val Leu Tyr Thr Gly Arg Glu Leu
1 5 10 15

Arg Ser Val Met Asn Thr Ser Asn Pro Gln Gln Ser Lys Ile Gly Leu
20 25 30

Phe Asp Leu Glu Val Asn Cys Leu Thr Lys Ile Leu Phe Gly Ala Leu
35 40 45

Val Val Val Ser
50

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多肽"

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<400> 335
Ala Ala Ala Ala Ala Asn Arg Lys Arg Ala Ala Tyr Tyr Ser Ala Ala
1 5 10 15

Gly Pro Arg Pro Gly Ala Asp Arg His Gly Gly Arg Tyr Gln Leu Glu
20 25 30

Asp Glu Ser Ala His Leu Asp Glu Met Pro Leu Met Met Ser Glu Glu
35 40 45

Gly Phe Glu Asn
50

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<211> 34
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<400> 336
Asn Tyr Leu Ala Ala Asp Gly Lys Ser Thr Thr Trp Ser Val Arg Leu
1 5 10 15

Gly Gln Leu Leu Leu Ser Ala Lys Lys Glu Ile Ser Gln Leu Phe Met
20 25 30

Thr His

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<211> 52
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多肽"

<220>
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<400> 337
Leu Arg Phe Asn His Phe Ala Thr Glu Cys Ser Trp Asp His Leu Tyr
1 5 10 15

Val Tyr Asp Gly Asp Ser Ile Tyr Ala Gln Gln Leu Val Ala Ala Phe
20 25 30

Ser Gly Leu Ile Val Pro Glu Arg Asp Gly Asn Glu Thr Val Pro Glu
35 40 45

Val Val Ala Thr
50

<210> 338
<211> 52
<212> PRT
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<400> 338
Ile Ala Phe Ser Gln His Asn Thr Ile Met Asp Leu Val Gln Phe Phe
1 5 10 15

Val Thr Phe Phe Ser Cys Phe Leu Ser Phe Phe Leu Leu Val Ala Ala
20 25 30

Val Val Trp Lys Ile Lys Gln Thr Cys Trp Ala Ser Arg Arg Arg Glu
35 40 45

Gln Leu Leu Arg
50

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多肽"

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<400> 339
Ile Ala Ser Asp Ser Asp Glu Thr Ser Met Ser Leu Ser Ser Asp Asp
1 5 10 15

Tyr Thr Lys Lys Lys Lys Lys Gly Lys Arg Arg Gly Lys Lys Asp Ser
20 25 30

Ser Ser Ser Gly Ser Gly Ser Asp Asn Asp Val Glu Val Ile Lys Val
35 40 45

Trp Asn Ser Arg
50

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多肽"

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<400> 340
Gly His Lys Ala Glu Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln
1 5 10 15

Gln His Gln His Gln Gln Gln Gln Gln His His Gln Gln Gln Gln Gln
20 25 30

Gln Gln Gln His Leu Ser Arg Ala Pro Gly Leu Ile Thr Pro Gly Ser
35 40 45

Pro Pro Pro Ala
50

<210> 341
<211> 43
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<400> 341
Arg Leu Leu Lys His Asn Pro Ser Gln Arg Pro Met Leu Arg Glu Val
1 5 10 15

Leu Glu His Pro Trp Ile Thr Ala Asn Leu Leu Ser Lys Pro Ser Asn
20 25 30

Cys Gln Asn Lys Glu Ser Ala Ser Lys Gln Ser
35 40

<210> 342
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<212> PRT
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多肽"

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<223> /注釋="p.G64W"

<400> 342
Glu Gly Asp Cys Tyr Val Ile Leu Ser Thr Arg Arg Val Ala Ser Leu
1 5 10 15

Leu Ser Gln Asp Ile His Phe Trp Ile Trp Trp Lys Asp Ser Ser Gln
20 25 30

Asp Glu Gln Ser Cys Ala Ala Ile Tyr Thr Thr Gln Leu Asp Asp Tyr
35 40 45

Leu Gly Gly Ser
50

<210> 343
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肽"

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<400> 343
Asp Leu Leu Asn His Asp Asp Cys Tyr Ile Leu Asp Gln Ser Gly Thr
1 5 10 15

Lys Ile Tyr Val Trp Lys Gly Lys Gly Ser His Lys Gly
20 25

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<211> 52
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多肽"

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<400> 344
Asp Gly Val Pro Arg Gly Pro Val Leu His Ile Val Val Val Gly Phe
1 5 10 15

His His Lys Lys Gly Cys Gln Val Glu Leu Leu Ser Tyr Pro Pro Leu
20 25 30

Ile Pro Gly Asp Gly His Asp Ser His Thr Leu Pro Glu Glu Trp Lys
35 40 45

Tyr Leu Pro Phe
50

<210> 345
<211> 32
<212> PRT

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多肽"

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<400> 345
Met Glu Lys Ala Arg Arg Gly Gly Gly Trp Arg Pro Pro Gly Ala Arg
1 5 10 15

Thr Ala His Arg Gly Gly Arg Ile Ser Pro Gln Glu Gly Leu Pro Gly
20 25 30

<210> 346
<211> 43
<212> PRT
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多肽"

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<400> 346
Glu Asn Pro Thr Ile Thr Ile Thr Ala Leu Leu Gly Ser Leu Asn Ser
1 5 10 15

Cys Cys Asn Pro Trp Ile Tyr Met Phe Leu Val Ala Ile Ser Phe Lys
20 25 30

Thr Val Phe Lys Ala Ser His Ala Ala Lys Thr
35 40

<210> 347
<211> 52
<212> PRT
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多肽"

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<223> /注釋="p.G39R"

<400> 347
Arg Gly Thr Leu Ser Ala Pro Asn Ala Thr Thr Pro Trp Leu Gly Arg
1 5 10 15

Asp Glu Glu Leu Ala Lys Val Glu Ile Arg Arg Val Leu Ala Thr Val
20 25 30

Leu Val Leu Ala Thr Gly Gly Asn Leu Ala Val Leu Leu Thr Leu Gly
35 40 45

Gln Leu Gly Arg
50

<210> 348
<211> 52
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多肽"

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<400> 348
Trp Arg Glu Ser Ala Lys Gln Gly Thr Leu Ala Gln Lys Tyr Leu Glu
1 5 10 15

Ala Met Ala Val Ile Glu His Met Gln Asp Asp Lys Leu Leu Glu Val
20 25 30

Glu Asn Arg Ala Arg Gln Ala Glu Glu Lys Phe Glu Asp Ala Tyr Glu
35 40 45

Lys Leu His His
50

<210> 349
<211> 52
<212> PRT
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多肽"

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<223> /注釋="p.W101R"

<400> 349
Cys Pro Glu Asn Leu Leu Pro Pro Lys Lys Ile Lys Thr Pro Lys Gly
1 5 10 15

Thr Leu Pro Arg Leu Val Asp His Val Arg Arg His His Pro Val Arg
20 25 30

Arg Asn Lys Phe Lys Tyr Leu Ile Asp His Pro Val Ser Leu Thr Gly
35 40 45

Ala Gly Arg Asp
50

<210> 350
<211> 48
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 350
Gln Ser Thr Lys Lys Ala Tyr Pro Leu Glu Ser Ala Arg Ser Ser Pro
1 5 10 15

Gly Glu Arg Ala Ser Arg His His Leu Ser Thr Ala Gly Thr Pro Ala
20 25 30

Pro Pro Pro Val Pro Thr Cys Ser Pro Arg Thr Leu Arg Cys Leu Pro
35 40 45

<210> 351
<211> 65
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多肽"

<220>
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<400> 351
Lys Lys Ala Tyr Pro Leu Glu Ser Ala Arg Ser Ser Pro Gly Glu Arg
1 5 10 15

Ala Ser Arg His His Leu Trp Gly Gly Gln Gln Arg Ala Pro Pro His
20 25 30

His Pro Pro Cys Pro Pro Val His Pro Gly Pro Cys Asp Ala Ser Pro
35 40 45

Asp Pro Thr Gln His Ala Gly Ser Ala Gly Gly Gly Leu Ser Gln Ala
50 55 60

Ser
65

<210> 352
<211> 48
<212> PRT
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多肽"

<220>
<221> 來源
<223> /注釋="p.G665fs"

<400> 352
Thr Lys Lys Ala Tyr Pro Leu Glu Ser Ala Arg Ser Ser Pro Gly Glu
1 5 10 15

Arg Ala Ser Arg His His Leu Trp Gly Ala Thr Ala Gly Thr Pro Ala
20 25 30

Pro Pro Pro Val Pro Thr Cys Ser Pro Arg Thr Leu Arg Cys Leu Pro
35 40 45

<210> 353
<211> 27
<212> PRT
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肽"

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<400> 353
Val Val Ser Arg Ser Val Ala Leu Ala Val Leu Ala Leu Leu Ser Leu
1 5 10 15

Ser Gly Leu Glu Ala Ile Gln Arg Thr Pro Lys
20 25

<210> 354
<211> 54
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.L13fs"

<400> 354
Met Ser Arg Ser Val Ala Leu Ala Val Leu Ala Leu Leu Ser Phe Trp
1 5 10 15

Pro Gly Gly Tyr Pro Ala Tyr Ser Lys Asp Ser Gly Leu Leu Thr Ser
20 25 30

Ser Ser Arg Glu Trp Lys Val Lys Phe Pro Glu Leu Leu Cys Val Trp
35 40 45

Val Ser Ser Ile Arg His
50

<210> 355
<211> 27
<212> PRT
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肽"

<220>
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<400> 355
Ile Ile Ser Arg Ser Val Ala Leu Ala Val Leu Ala Leu Leu Ser Leu
1 5 10 15

Ser Gly Leu Glu Ala Ile Gln Arg Thr Pro Lys
20 25

<210> 356
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.R145Q"

<400> 356
Gln Glu Ala Glu Lys Glu Asp Lys Met Leu Ala Leu Ser Leu Glu Asp
1 5 10 15

Glu His Leu Leu Tyr Gly Asp Ile Ile Gln Gln Asp Phe Leu Asp
20 25 30

Thr Tyr Asn Asn Leu Thr Leu Lys Thr Ile Met Ala Phe Arg Trp Val
35 40 45

Thr Glu Phe Cys
50

<210> 357
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<212> PRT
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多肽"

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<400> 357
Ala Glu Leu Thr Arg Met Ala Asn Thr Leu Leu His Val Pro Asn Leu
1 5 10 15

His Trp Leu Val Val Glu Asp Ala Pro Leu Leu Arg Thr Pro Leu Thr
20 25 30

Ala Arg Leu Leu Arg Asp Thr Gly Leu Asn Tyr Thr His Leu His Val
35 40 45

Glu Thr Pro Arg
50

<210> 358
<211> 33
<212> PRT
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<223> /注釋="p.F30fs"

<400> 358
Gly Arg Arg Val Lys Lys Trp Gln Leu Ile Ile Gln Leu Phe Ala Thr
1 5 10 15

Cys Phe Leu Ala Ser Leu Met Phe Phe Gly Asn Gln Ser Ile Ile Thr
20 25 30

Leu

<210> 359
<211> 37
<212> PRT
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多肽"

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<400> 359
Pro Val Arg Ile Lys Glu Gln Val Val Gly Leu Leu Ala Trp Asn Asn
1 5 10 15

Cys Ser Cys Glu Ser Ser Gly Gly Gly Pro Pro Pro Pro Leu Pro Glu
20 25 30

Thr Ser Pro Ser Tyr
35

<210> 360
<211> 52
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多肽"

<220>
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<223> /注釋="p.R538Q"

<400> 360
Glu Ser Cys Ser Ala Arg Glu Gln Glu Cys Glu Val Lys Leu Pro Phe
1 5 10 15

Asn Ala Gln Arg Ile Ile Ser Leu Ser Gln Gln Asn Asp Phe Gln Ser
20 25 30

Leu Leu Lys Met His Lys Leu Thr Pro Glu Gln Leu Asp Cys Ile His
35 40 45

Asp Ile Arg Arg
50

<210> 361
<211> 52
<212> PRT
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多肽"

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<400> 361
Arg Leu Arg Ala Leu Arg Pro Gly Arg Glu Pro Arg Gln Ser Glu Pro
1 5 10 15

Pro Ala Gln Arg Gly Pro Pro Pro Ser Arg Arg Arg Pro Pro Ala Arg
20 25 30

Ser Thr Ala Ser Gly His Asp Arg Pro Thr Arg Gly Ala Ala Ala Gly
35 40 45

Ala Arg Arg Pro
50

<210> 362
<211> 52
<212> PRT

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多肽"

<220>
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<400> 362
Glu Glu Cys Gly Arg Ala Ala Gly Arg Ala Cys Gly Phe Ala Gln Pro
1 5 10 15

Gly Cys Ser Cys Pro Gly Glu Ala Gly Gly Gly Gly Ser Thr Thr Thr
20 25 30

Thr Ser Pro Gly Pro Pro Ala Ala His Thr Leu Ser Asn Ala Leu Val
35 40 45

Pro Gly Gly Pro
50

<210> 363
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 363
Ser Ser Ala Ser Gly Trp Phe Pro Glu Ala Tyr Val Lys Ala Leu Glu
1 5 10 15

Glu Gly Pro Val Asn Pro Met Thr Pro Met Met Thr Pro Met Thr Ser
20 25 30

Met Thr Ser Met Ser Pro Met Thr Pro Met Asn Pro Gly Asn Glu Leu
35 40 45

Pro Ser Arg Ser
50

<210> 364
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.N78S"

<400> 364
Ile Glu Glu Arg Arg Ser Arg Arg Lys Val Ser Thr Leu Val Asp Asp
1 5 10 15

Thr Ser Val Ile Asp Asp Asp Ile Val Ser Ser Asn Met Phe Phe Ala
20 25 30

His Gln Leu Ile Pro Asn Ser Cys Ala Thr His Ala Leu Leu Ser Val
35 40 45

Leu Leu Asn Cys
50

<210> 365
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.R227C"

<400> 365
Trp Thr Asp Lys Ala Arg Arg Val Ile Met Glu Arg Ile Gly Leu Ala
1 5 10 15

Thr Ala Gly Glu Pro Tyr His Asp Ile Cys Cys Phe Asn Leu Met Ala
20 25 30

Val Val Pro Asp Arg Arg Ile Lys Tyr Glu Ala Arg Leu His Val Leu
35 40 45

Lys Val Asn Arg
50

<210> 366
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<223> /注釋="p.R68P"

<400> 366
Ser Leu Tyr Ser Val Cys Pro Ser Leu Val Val Arg Pro Lys Pro Leu
1 5 10 15

His Ser Cys Thr Gly Ser Pro Ser Leu Pro Pro Ala Tyr Pro Leu Leu
20 25 30

Ser Val Ile Thr Arg Gln Pro Thr Val Ile Ser His Leu Val Pro Ala
35 40 45

Thr Pro Gly Ile
50

<210> 367
<211> 57
<212> PRT
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多肽"

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<223> /注釋="p.M38fs"

<400> 367
Ser Glu Gln Ile Met Lys Thr Gly Ala Leu Leu Leu Gln Gly Phe Ile
1 5 10 15

Gln Asp Arg Ala Gly Arg Met Gly Gly Gly Gly Thr Arg Ala Gly Pro
20 25 30

Gly Pro Gly Ala Ser Gly Cys Val His Gln Glu Ala Glu Arg Val Ser
35 40 45

Gln Ala His Arg Gly Arg Thr Gly Gln
50 55

<210> 368
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.F176V"

<400> 368
Arg Leu Thr Gly Ala Ser Asp Lys Pro Gly Glu Val Ser Lys Leu Gly
1 5 10 15

Lys Arg Met Gly Phe Leu Tyr Leu Thr Val Val Tyr Gly His Thr Trp
20 25 30

Gln Val Gln Asp Lys Ile Asp Ala Asn Asn Val Ala Tyr Thr Thr Gly
35 40 45

Lys Leu Ser Phe
50

<210> 369
<211> 35
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F268fs"

<400> 369
Ala Leu Asp Ile Cys Ile Val Ser Phe Asn Gln Ser Ala Ser Ser Val
1 5 10 15

Phe Val Leu Gly Glu Arg Asn Phe Phe Ala Leu Arg Ile Met Asp Lys
20 25 30

Phe Asp Ser
35

<210> 370
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L133R"

<400> 370
Ser Ser Lys Ser Arg Asn Ala Pro Arg Ser Ser Cys Gly Asn Cys Gly
1 5 10 15

Ala Arg Ala Pro Glu His Pro Pro Val Arg Arg Arg Val Glu Ser Leu
20 25 30

Asn Leu Pro Leu Leu Asn Gly Leu Arg Glu Glu Gly Pro Gly Val Phe
35 40 45

Ser Arg Ser Val
50

<210> 371
<211> 52
<212> PRT
<213> 人工序列

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多肽"

<220>
<221> 來源
<223> /注釋="p.T214M"

<400> 371
Asp Leu His Cys Asn Lys Arg Ile Leu Val Val Val Leu Gln Glu Lys
1 5 10 15

Ile Ala Ala Phe Asp Ser Cys Thr Phe Met Met Lys Lys Phe Phe Val
20 25 30

Thr Ser Cys Tyr Pro Cys Pro Gly Pro Asn Met Asn Pro Ile Ala Leu
35 40 45

Gly Ser Arg Trp
50

<210> 372
<211> 47
<212> PRT
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多肽"

<220>
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<223> /注釋="p.H37fs"

<400> 372
Arg Gly Leu Ser Gln Ala Ala Leu Leu Leu Leu Arg Gln Pro Gly Ala
1 5 10 15

Arg Gly Leu Ala Arg Ser His Pro Pro Gly Ser Ser Ser Ser Phe His
20 25 30

Leu Trp Met Thr Ser Pro Ser Ser Gln Gly Pro Arg Arg Ser Leu
35 40 45

<210> 373
<211> 46
<212> PRT
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<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.G129fs"

<400> 373
Leu Cys Cys Phe Trp Pro Val Gly Ile Ala Ala Phe Cys Leu Ala Gln
1 5 10 15

Lys Val Ser Leu Cys Val Gly Leu Gly Ile Lys Glu Lys Asn Ala Pro
20 25 30

Gln Lys Gln Arg Ala Ile Tyr Leu Arg Arg Glu Gly Gly Arg
35 40 45

<210> 374
<211> 52
<212> PRT
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<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.E579K"

<400> 374
Ser Met Gln His Phe Ser Glu Ala Phe His Gln Val Leu Gly Glu Lys
1 5 10 15

His Lys Arg Gly His Leu Ala Glu Ala Lys Lys Gly His Arg Asp Thr
20 25 30

Cys Asp Glu Asp Ser Val Ala Gly Glu Ser Asp Arg Ile Asp Asp Gly
35 40 45

Thr Val Asn Gly
50

<210> 375
<211> 52
<212> PRT
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<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.N172S"

<400> 375
Ile Val Ala Phe Phe Glu Phe Gly Gly Val Met Cys Val Glu Ser Val
1 5 10 15

Asn Arg Glu Met Ser Pro Leu Val Asp Ser Ser Ile Ala Leu Trp Met
20 25 30

Thr Glu Tyr Leu Asn Arg His Leu His Thr Trp Ile Gln Asp Asn Gly
35 40 45

Gly Trp Asp Ala
50

<210> 376
<211> 46
<212> PRT
<213> 人工序列

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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<400> 376
Met Ala His Ala Gly Arg Thr Gly Tyr Asp Asn Arg Glu Ile Val Met
1 5 10 15

Lys Tyr Ile Gln Gln Tyr Lys Leu Ser Gln Arg Gly Tyr Glu Trp Asp
20 25 30

Ala Gly Asp Val Gly Ala Ala Pro Pro Gly Ala Ala Pro Ala
35 40 45

<210> 377
<211> 52
<212> PRT
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多肽"

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<223> /注釋="p.G33R"

<400> 377
Gly Tyr Asp Asn Arg Glu Ile Val Met Lys Tyr Ile His Tyr Lys Leu
1 5 10 15

Ser Gln Arg Gly Tyr Glu Trp Asp Ala Arg Arg Asp Val Gly Ala Ala
20 25 30

Pro Pro Gly Ala Ala Pro Ala Pro Gly Ile Phe Ser Ser Gln Pro Gly
35 40 45

His Thr Pro His
50

<210> 378
<211> 52
<212> PRT
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多肽"

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<400> 378
Pro Pro Ala Ser Pro Gly Pro Phe Ala Thr Arg Ser Pro Leu Phe Ile
1 5 10 15

Phe Met Arg Arg Ser Ser Leu Leu Ser Gln Gln Ser Ser Ser Gly Tyr
20 25 30

Phe Ser Phe Asp Thr Asp Arg Ser Pro Ala Pro Met Ser Cys Asp Lys
35 40 45

Ser Thr Gln Thr
50

<210> 379
<211> 101
<212> PRT
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多肽"

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<400> 379
Tyr Ala Arg Arg Val Phe Leu Asn Asn Tyr Gln Ala Ala Glu Asp His
1 5 10 15

Pro Arg Met Val Ile Leu Arg Leu Leu Thr Leu His Cys Pro Pro Gly
20 25 30

Val Glu Asn Ala Leu Thr Gly Ser Leu Arg Ser Arg Asp Thr Met Gln
35 40 45

Thr Phe Cys Leu Phe Lys Pro Thr Arg Pro Ser Thr Ala Val Ser Trp
50 55 60

Cys His Tyr Tyr Ala Ala Ser Gly Ser Leu Val Glu Gly Ala Gly Asp
65 70 75 80

Val Ser Glu Asp Thr Glu Leu Asp Gly Thr Thr Phe Leu Phe Ile Thr
85 90 95

Thr Gln Gln Asn Phe
100

<210> 380
<211> 52
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多肽"

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<400> 380
Lys Val Arg Lys Trp Glu Lys Lys Trp Val Thr Val Gly Asp Thr Ser
1 5 10 15

Leu Arg Ile Tyr Lys Trp Val Pro Val Met Met Glu Pro Lys Val Asp
20 25 30

Asp Lys Asn Lys Asn Lys Lys Lys Gly Lys Asp Glu Lys Cys Gly Ser
35 40 45

Glu Val Thr Thr
50

<210> 381
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 381
Pro Gln Thr Pro Ser Gln Met Val Pro Leu Pro Ser Ala Asn Pro Pro
1 5 10 15

Gly Pro Leu Lys Ser Pro Gln Val Leu Cys Cys Ser Ser Leu Ser Val
20 25 30

Arg Ser Pro Thr Gly Ser Pro Ser Arg Leu Lys Ser Pro Ser Met Ala
35 40 45

Val Pro Ser Pro
50

<210> 382
<211> 66
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<223> /注釋="p.P1127fs"

<400> 382
Tyr His Asn Ala Ile Lys Thr Ile Ala Thr Ser Asp Asp Glu Leu Leu
1 5 10 15

Pro Asp Arg Pro Leu Leu Pro Pro Pro Thr Thr Thr Ala Gly Leu Arg
20 25 30

Ala Arg Asp Gln Gln Gln Pro Ala Gln Pro Asp Ala Pro Glu Leu Ser
35 40 45

Arg Cys Pro Glu Pro Tyr Gly His Glu Pro Ala Arg Pro Ala Ala Pro
50 55 60

Val Pro
65

<210> 383
<211> 56
<212> PRT

<213> 人工序列

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多肽"

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<223> /注釋="p.R37fs"

<400> 383
Arg Ser Lys Ser Arg Ser Gln Ser Ser Ser Arg Ser Arg Ser Arg Ser
1 5 10 15

His Ser Arg Lys Lys Arg Tyr Ser Ser Thr Gly Leu Val Pro Glu His
20 25 30

Ile Gln Gly Leu Val Val Glu Ile Val Cys Ile Leu Glu Ile Ile Val
35 40 45

Ala Ile Thr Glu Ile Ile Glu Glu
50 55

<210> 384
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.N1459S"

<400> 384
Leu Pro Cys Ser Ser Ser Pro Gln Glu Thr Thr Gln Ser Arg Pro Met
1 5 10 15

Pro Pro Glu Ala Arg Arg Leu Ile Val Ser Ser Lys Asn Ala Gly Glu
20 25 30

Thr Leu Leu Gln Arg Ala Ala Arg Leu Gly Tyr Glu Glu Val Val Leu
35 40 45

Tyr Cys Leu Glu
50

<210> 385
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 385
Arg Ile Leu Phe Ser Lys Glu Ile Leu Ile Ser Ser Ser Val Asp Ile
1 5 10 15

His Leu Lys Asp Ser Gln Ser Leu Asp Gln Gln Asn Lys Met Ala Ala
20 25 30

Leu Arg Glu Tyr Leu Ala Thr Thr Phe Pro Thr Cys Asp Leu His Glu
35 40 45

His Gly Lys Asp
50

<210> 386
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.E630K"

<400> 386
Asn Asp Gln Arg Gly Arg Asp Gly Gly Glu Gly Cys Ser Trp Met Phe
1 5 10 15

Gln Pro Met Asn Asn Ser Lys Met Arg Lys Lys Lys Arg Asn Leu Gln
20 25 30

Pro Asn Ser Asn Ala Ile Pro Glu Gly Met Arg Glu Pro Ser Thr Asp
35 40 45

Asn Pro Glu Glu
50

<210> 387
<211> 78
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D265fs"

<400> 387
Phe Gln Pro Pro Pro Glu Tyr Gln Leu Thr Ala Ala Glu Leu Lys Gln
1 5 10 15

Ile Val Asp Gln Ser Leu Ser Gly Gly Thr Trp Pro Ala Ala Cys Trp
20 25 30

Cys Ser Ser Ser Pro Ser Ser Ser Ala Thr Trp Thr Ser Pro Gly Ala
35 40 45

Ala Val Pro Val Ala Leu Arg Pro Ser Ala Ser Trp Ser Arg Cys Thr
50 55 60

Cys Ser Ser Ser Ala Thr Met Trp Arg Ser Thr Thr Pro Arg
65 70 75

<210> 388
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.R198C"

<400> 388
Leu Glu Asp Ala Val Val Pro Arg Ala Leu Tyr Glu Glu Leu Leu Arg
1 5 10 15

Asn Tyr Gln Gln Gln Gln Glu Glu Met Cys Cys His Leu Gln Gln Glu
20 25 30

Leu Glu Arg Thr Arg Arg Gln Leu Val Gln Gln Ala Lys Lys Leu Lys
35 40 45

Glu Tyr Gly Ala
50

<210> 389
<211> 42
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.P383L"

<400> 389
Ser Phe Leu Gly Ser Thr Val Gln Met Gly Lys Gln Met Pro Lys Asn
1 5 10 15

Glu Trp Lys Met Glu Asp Ile Lys Ile Leu Leu Leu Pro Gln Pro Gln
20 25 30

Phe Gln Cys Ala Lys Ser Asp Pro Gly Gly
35 40

<210> 390
<211> 82
<212> PRT
<213> 人工序列

<220>
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多肽"

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<223> /注釋="p.P444fs"

<400> 390
Ser Ser Met Phe Leu Pro Arg Asp Asp Leu Ser Pro Ala Arg Asp Leu
1 5 10 15

Leu Asp Val Pro Ser Arg Asn Pro Pro Gln Gly Leu Thr His Leu Glu
20 25 30

Glu Ile Leu Leu Pro Arg Arg Lys Pro His Ala Ala Leu Gln His Gly
35 40 45

Arg Ala Val His His Gln Gly Asp Gln Pro Asp Lys His Phe Thr Glu
50 55 60

Pro Asp Pro Thr Val Gln Cys Glu Asn Phe Pro His Gln Asn Ala Thr
65 70 75 80

Gly Thr

<210> 391
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.L62Q"

<400> 391
Ser Thr Pro Pro Gly Met Asp Leu Ser Leu Ala Pro Pro Pro Arg Glu
1 5 10 15

Arg Pro Ala Ser Ser Ser Ser Ser Pro Gln Gln Gly Cys Phe Glu Pro
20 25 30

Ala Asp Pro Glu Gly Ala Gly Leu Leu Leu Pro Pro Pro Gly Gly Gly
35 40 45

Gly Gly Gly Ser
50

<210> 392
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.R162H"

<400> 392
Ser Glu Asn Glu Arg Leu Ala Ser Val Ala Gln Glu Leu Lys Glu Ile
1 5 10 15

Asn Gln Asn Val Glu Ile Gln Arg Gly His His Leu Arg Asp Asp Ile
20 25 30

Lys Glu Tyr Lys Phe Arg Glu Ala Arg Leu Leu Gln Asp Tyr Ser Glu
35 40 45

Leu Glu Glu Glu
50

<210> 393
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 393
Ser Cys Phe Gly Ser Gly Ser Cys Pro His Phe Leu Ala Ala Ala Thr
1 5 10 15

Lys Arg Gly Lys Ile Cys Ile Trp Asp Leu Leu Ser Lys Leu Met Lys
20 25 30

Val His Leu Lys Phe Glu Ile Asn Ala Tyr Asp Pro Ala Ile Val Gln
35 40 45

Gln Leu Ile Leu
50

<210> 394
<211> 38
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.A225M"

<400> 394
Val Phe Ile Pro Cys Gly His Leu Val Thr Cys Lys Gln Cys Ala Glu
1 5 10 15

Ala Val Asp Arg Cys Pro Met Cys Ser Met Met Val Ile Asp Phe Lys
20 25 30

Gln Arg Val Phe Met Ser
35

<210> 395
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.H660Q"

<400> 395
Ala Ser Arg Asn Leu Lys His Glu Arg Phe Gln Ser Leu Ser Phe Pro
1 5 10 15

His Thr Lys Glu Met Met Lys Ile Phe Gln Gln Lys Lys Phe Gly Leu
20 25 30

His Asn Phe Arg Thr Asn Gln Leu Glu Ala Ile Asn Ala Ala Leu Leu
35 40 45

Gly Glu Asp Cys
50

<210> 396
<211> 52
<212> PRT

<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.S44L"

<400> 396
Ala Gly Ser Val Arg Met Arg Asp Leu Arg Asn Pro His Pro Ser Ser
1 5 10 15

Ala Phe Leu Asn Leu Ile Gly Phe Val Leu Leu Arg Arg Glu Leu Gly
20 25 30

Ser Ile Asp Gly Val Gln Gln Ile Ser Leu Glu Asp Ala Leu Ser Ser
35 40 45

Gln Glu Val Glu
50

<210> 397
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.H487Q"

<400> 397
Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln
1 5 10 15

Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln His His His His His
20 25 30

His His Leu Leu Gln Asp Ala Tyr Met Gln Gln Tyr Gln His Ala Thr
35 40 45

Gln Gln Gln Gln
50

<210> 398
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.R344W"

<400> 398
Lys Pro Tyr Lys Thr Leu Gln Ala Gln Ala Pro Glu Lys Ser Lys Asn
1 5 10 15

Lys Lys Lys Gln Arg Lys Gly Pro His Trp Trp Lys Ser Gln Thr Leu
20 25 30

Gln Phe Asp Glu Gln Thr Leu Lys Lys Ala Arg Arg Lys Gln Trp Ile
35 40 45

Glu Pro Arg Asn
50

<210> 399
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q118L"

<400> 399
Pro Arg Pro Leu His Gly Leu Gln Gln Pro Gln Pro Pro Ala Leu Arg
1 5 10 15

Gln Gln Glu Glu Gln Gln Gln Gln Gln Leu Leu Leu Pro Arg Gly Glu
20 25 30

Pro Pro Pro Gly Arg Leu Lys Ser Ala Pro Leu Phe Met Leu Asp Leu
35 40 45

Tyr Asn Ala Leu
50

<210> 400
<211> 62
<212> PRT
<213> 人工序列

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多肽"

<220>
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<223> /注釋="p.RIAL444del"

<400> 400
Lys Ser Val Glu Leu Val Leu Gly Glu Ser Arg Val Ser Leu Gln Gln
1 5 10 15

His Leu Thr Val Arg Trp Asn Gly Ser Pro Cys Arg Ala Pro His Phe
20 25 30

His Ile Asp Leu Asp Gly Tyr Leu Leu Lys Val Thr Thr Lys Ala Gly
35 40 45

Leu Glu Ile Ser Trp Asp Gly Asp Ser Phe Val Glu Val Met
50 55 60

<210> 401
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R241Q"

<400> 401
Pro Pro Gly Gln Cys Cys Pro Lys Cys Leu Gly Gln Arg Lys Val Phe
1 5 10 15

Asp Leu Pro Phe Gly Ser Cys Leu Phe Gln Gln Ser Asp Val Tyr Asp
20 25 30

Asn Gly Ser Ser Phe Leu Tyr Asp Asn Cys Thr Ala Cys Thr Cys Arg
35 40 45

Asp Ser Thr Val
50

<210> 402
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G455V"

<400> 402
Lys Ala Ile Phe Gly Asp Glu Asp Glu Ser Gly Asp Ser Asp Asp Glu
1 5 10 15

Glu Asp Asp Glu Met Ser Glu Asp Asp Val Val Leu Glu Asn Gly Ser
20 25 30

Ser Asp Glu Glu Ala Glu Glu Glu Glu Asn Ala Glu Met Thr Asp Gln
35 40 45

Tyr Met Ala Val
50

<210> 403
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E878D"

<400> 403
Gly Glu Met Gln Lys Gln Ala Gln Leu Asn Arg Ala Glu Phe Glu Asp
1 5 10 15

Gln Asp Asp Glu Ala Arg Val Gln Tyr Asp Asp Gly Phe Arg Pro Gly
20 25 30

Met Tyr Val Arg Ile Glu Ile Glu Asn Val Pro Cys Glu Phe Val Gln
35 40 45

Asn Phe Asp Pro
50

<210> 404
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Y937N"

<400> 404
Met Glu Lys Ala Asp Gln Ser Leu Ala Ser Leu Pro Ser Gly Leu Pro
1 5 10 15

Ile Thr Cys His Leu Cys Gln Lys Thr Asn Asn Ser Asn Lys Gly Thr
20 25 30

Phe Arg Ala His Tyr Lys Thr Val His Leu Arg Gln Leu His Lys Cys
35 40 45

Lys Val Pro Gly
50

<210> 405
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R512W"

<400> 405
Asn Arg His Ser Ala Asn Pro Asn Pro Arg Leu His Met Pro Met Leu
1 5 10 15

Arg Asn Asn Arg Asp Lys Asp Leu Ile Trp Trp Ala Thr Ser Gly Ala
20 25 30

Ala Thr Pro Val Ile Ala Ser Thr Lys Ser Asn Leu Ala Leu Thr Ser
35 40 45

Pro Gly Arg Pro
50

<210> 406
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S575R"

<400> 406
Leu Gln Asn Pro Leu Pro Ser Gln Leu Val Phe Ser Gly Leu Lys Thr
1 5 10 15

Val Gln Pro Val Pro Pro Phe Tyr Arg Arg Arg Leu Leu Thr Pro Gly
20 25 30

Glu Met Val Ser Pro Pro Thr Ser Leu Pro Thr Ser Pro Ile Ile Pro
35 40 45

Thr Ser Gly Thr
50

<210> 407
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.M255I"

<400> 407
Ile Asp Ser Val Ala Gly Ile Asn Tyr Gly Leu Val Ala Pro Pro Ala
1 5 10 15

Thr Thr Ala Glu Thr Leu Asp Val Gln Ile Ile Lys Gly Glu Phe Tyr
20 25 30

Ser Glu Asn His His Asn Pro Pro Pro Phe Ala Pro Pro Val Met Glu
35 40 45

Phe Pro Ala Ala
50

<210> 408
<211> 32
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P403fs"

<400> 408
Asn Ile Asp Asp Leu Ile Arg Asp Gln Gly Phe Arg Gly Asp Gly Gly
1 5 10 15

Ser Thr Thr Gly Leu Ser Ala Thr Pro Leu Pro His Tyr Leu Ala His
20 25 30

<210> 409
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G466V"

<400> 409
Leu Gly Arg Arg Asp Ser Ser Asp Asp Trp Glu Ile Pro Asp Gly Gln
1 5 10 15

Ile Thr Val Gly Gln Arg Ile Gly Ser Val Val Ser Phe Gly Thr Val
20 25 30

Tyr Lys Gly Lys Trp His Gly Asp Val Ala Val Lys Met Leu Asn Val
35 40 45

Thr Ala Pro Thr
50

<210> 410
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G469A"

<400> 410
Arg Asp Ser Ser Asp Asp Trp Glu Ile Pro Asp Gly Gln Ile Thr Val
1 5 10 15

Gly Gln Arg Ile Gly Ser Gly Ser Phe Ala Ala Thr Val Tyr Lys Gly
20 25 30

Lys Trp His Gly Asp Val Ala Val Lys Met Leu Asn Val Thr Ala Pro
35 40 45

Thr Pro Gln Gln
50

<210> 411
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G469V"

<400> 411
Arg Asp Ser Ser Asp Asp Trp Glu Ile Pro Asp Gly Gln Ile Thr Val
1 5 10 15

Gly Gln Arg Ile Gly Ser Gly Ser Phe Val Val Thr Val Tyr Lys Gly
20 25 30

Lys Trp His Gly Asp Val Ala Val Lys Met Leu Asn Val Thr Ala Pro
35 40 45

Thr Pro Gln Gln
50

<210> 412
<211> 53
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V600K"

<400> 412
Arg Asp Leu Lys Ser Asn Asn Ile Phe Leu His Glu Asp Leu Thr Val
1 5 10 15

Lys Ile Gly Asp Phe Gly Leu Ala Thr Lys Lys Lys Ser Arg Trp Ser
20 25 30

Gly Ser His Gln Phe Glu Gln Leu Ser Gly Ser Ile Leu Trp Met Ala
35 40 45

Pro Glu Val Ile Arg
50

<210> 413
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V600E"

<400> 413
Arg Asp Leu Lys Ser Asn Asn Ile Phe Leu His Glu Asp Leu Thr Val
1 5 10 15

Lys Ile Gly Asp Phe Gly Leu Ala Thr Glu Glu Lys Ser Arg Trp Ser
20 25 30

Gly Ser His Gln Phe Glu Gln Leu Ser Gly Ser Ile Leu Trp Met Ala
35 40 45

Pro Glu Val Ile
50

<210> 414
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K601E"

<400> 414
Asp Leu Lys Ser Asn Asn Ile Phe Leu His Glu Asp Leu Thr Val Lys
1 5 10 15

Ile Gly Asp Phe Gly Leu Ala Thr Val Glu Glu Ser Arg Trp Ser Gly
20 25 30

Ser His Gln Phe Glu Gln Leu Ser Gly Ser Ile Leu Trp Met Ala Pro
35 40 45

Glu Val Ile Arg
50

<210> 415
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K601N"

<400> 415
Asp Leu Lys Ser Asn Asn Ile Phe Leu His Glu Asp Leu Thr Val Lys
1 5 10 15

Ile Gly Asp Phe Gly Leu Ala Thr Val Asn Asn Ser Arg Trp Ser Gly
20 25 30

Ser His Gln Phe Glu Gln Leu Ser Gly Ser Ile Leu Trp Met Ala Pro
35 40 45

Glu Val Ile Arg
50

<210> 416
<211> 74
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.P24fs"

<400> 416
Met Ser Thr Ala Thr Thr Val Ala Pro Ala Gly Ile Pro Ala Thr Pro
1 5 10 15

Gly Pro Val Asn Pro Pro Pro Pro Gly Gly Leu Gln Pro Gln Gln Ala
20 25 30

Arg Pro Gln Asp Gln Pro Ala Ala Val His Ala Glu Cys Gly Gly Glu
35 40 45

Asp Ala Leu Glu Thr Pro Val Arg Leu Ala Leu Leu Pro Ala Arg Gly
50 55 60

Arg Asn Gln Ile Glu Pro Ala Gly Leu Ser
65 70

<210> 417
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G330W"

<400> 417
His Ala Ala Asp Glu Ala Arg Asp Arg Ile Asn Arg Phe Leu Pro Gly
1 5 10 15

Gly Lys Met Gly Tyr Leu Lys Arg Asn Trp Trp Asp Gly Ser Leu Leu
20 25 30

Tyr Ser Val Val Asn Thr Ala Glu Pro Asp Ala Asp Glu Glu Glu Thr
35 40 45

His Pro Val Asp
50

<210> 418
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.V469L"

<400> 418
Asp Gly Glu Leu Asp Leu Ser Gly Ile Asp Asp Leu Glu Ile Asp Arg
1 5 10 15

Tyr Ile Leu Asn Glu Ser Glu Ala Arg Leu Leu Lys Ala Glu Leu Trp
20 25 30

Met Arg Glu Asn Ala Glu Tyr Leu Arg Glu Gln Arg Glu Lys Glu Ala
35 40 45

Arg Ile Ala Lys
50

<210> 419
<211> 32
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.K70Q"

<400> 419
Ser Arg Leu Ala Thr Leu Asn Glu Lys Leu Thr Ala Leu Glu Arg Arg
1 5 10 15

Ile Glu Tyr Ile Glu Ala Arg Val Thr Gln Gln Gly Glu Thr Leu Thr
20 25 30

<210> 420
<211> 46
<212> PRT

<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.G107fs"

<400> 420
Leu Ser Gln Leu Arg Leu Arg Leu Glu Glu Val Gly Ala Glu Arg Ala
1 5 10 15

Pro Glu Tyr Thr Glu Pro Leu Gly Gly Cys Ser Gly Ala Ser Arg Phe
20 25 30

Ala Phe Arg Trp Gln Gly Ser Thr Arg Ala Ser Val Trp Met
35 40 45

<210> 421
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R66C"

<400> 421
His Leu Tyr His Tyr Asp His Asp Asn Pro Pro Pro Pro Gln Gln Thr
1 5 10 15

Pro Leu Arg Lys His Lys Lys Lys Gly Cys Cys Gln Ser Arg Pro Ala
20 25 30

Asn Lys Gln Ser Pro Ser Pro Ser Glu Val Ser Gln Ser Pro Gly Arg
35 40 45

Glu Val Met Ser
50

<210> 422
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K1319R"

<400> 422
Thr Ser Ser Gly Arg Arg Arg Val His Asp Gly Lys Lys Ser Ile Arg
1 5 10 15

Ala Thr Asn Tyr Val Glu Ser Asn Trp Arg Arg Lys Gln Cys Lys Glu
20 25 30

Leu Val Asn Leu Ile Phe Gln Cys Glu Asp Ser Glu Pro Phe Arg Gln
35 40 45

Pro Val Asp Leu
50

<210> 423
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R787C"

<400> 423
Thr Val Glu Lys Lys Lys Lys Pro Ser Tyr Thr Thr Gln Arg Asn Asp
1 5 10 15

Tyr Glu Pro Ser Cys Gly Arg Ser Leu Cys Cys Arg Thr Gln Arg Lys
20 25 30

Arg Gln His Thr Tyr Gln Thr Arg Ser Asn Ile Glu His Asn Ser Gln
35 40 45

Ala Ser Cys Gln
50

<210> 424
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.H160N"

<400> 424
Val Asn Tyr Val Lys Pro Pro Asn Val Val Asn Ile Thr Ser Ala Arg
1 5 10 15

Gln Leu Thr Gly Cys Ser Arg Phe Gly Asn Asn Ile Phe Pro Ser Ser
20 25 30

Ala Tyr Gln His Ile Lys Met His Lys Arg Ile Leu Gly His Leu Ser
35 40 45

Ser Val Tyr Cys
50

<210> 425
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G36A"

<400> 425
Leu Leu Gln Leu Leu Leu Gln Leu Leu Leu Leu Leu Leu Leu Ala
1 5 10 15

Ala Gly Gly Ala Arg Ala Arg Trp Arg Ala Ala Glu Gly Thr Ser Ala
20 25 30

His Leu Arg Asp Ile Phe Leu Gly Arg Cys Ala Glu Tyr Arg Ala Leu
35 40 45

Leu Ser Pro Glu
50

<210> 426
<211> 77
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T451fs"

<400> 426
Leu Ser Asp Leu Val Ser Arg Ala Met His His Leu Gln Pro Leu Asn
1 5 10 15

Ala Lys His His Gly Asn Gly Thr Pro Cys Thr Thr Ser Arg Gly His
20 25 30

Cys Thr Gly Ser Pro Arg Pro Cys Thr Pro Phe Ala Ile Ser Cys Thr
35 40 45

Ala His Lys Trp Asn Gly Lys Thr Pro Thr Trp Ser Leu Pro Lys Ser
50 55 60

Thr Ser Arg Trp Lys Gly Pro Ser Ser Cys Cys Arg Arg
65 70 75

<210> 427
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A561V"

<400> 427
Leu Leu Pro Gly Val Asp Cys Glu Pro Arg Gln Leu Arg Ala Asp Asp
1 5 10 15

Cys Phe Cys Ala Ser Arg Lys Leu Asp Val Val Val Ala Ile Glu Ala
20 25 30

Lys Phe Lys Gln Asp Leu Gly Phe Arg Met Leu Asn Cys Gly Arg Thr
35 40 45

Asp Leu Val Lys
50

<210> 428
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G265A"

<400> 428
Cys Met Glu Ser Leu Phe Arg Asp Ile Tyr Ser Arg Val Val Ala Ser
1 5 10 15

Gly Val Pro Arg Ser Cys Ser Gly Pro Ala Ala Ser Gly Ser Gly Ser
20 25 30

Gly Pro Gly Pro Ser Ser Gly Pro Gly Ala Ala Pro Ala Ala Asp Lys
35 40 45

Glu Arg Glu Ala
50

<210> 429
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S436L"

<400> 429
His Pro Tyr Gly Ser Lys Trp Val His Arg Gln Ala Leu His Phe Leu
1 5 10 15

Cys Glu Glu Phe Ser Gln Val Met Thr Leu Leu Asp Val Phe Tyr Glu
20 25 30

Leu Ser Lys Asp His Leu Leu Thr Ala Ile Gln Ser Asp Tyr Leu Gln
35 40 45

Ala Ser Glu Gln
50

<210> 430
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.L31F"

<400> 430
Thr Arg Ala Ala Thr Met Ile Gly Glu Ile Ala Ala Ala Val Ser Phe
1 5 10 15

Ile Ser Lys Phe Leu Arg Thr Lys Gly Phe Phe Thr Ser Glu Arg Gln
20 25 30

Leu Gln Thr Phe Ser Gln Ser Leu Gln Glu Leu Leu Ala Glu His Tyr
35 40 45

Lys His His Trp
50

<210> 431
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q86K"

<400> 431
Lys Tyr Cys Ala Asn Arg Pro His Val Thr Trp Cys Lys Leu Asn Gly
1 5 10 15

Thr Thr Cys Val Lys Leu Glu Asp Arg Lys Lys Thr Ser Trp Lys Glu
20 25 30

Glu Lys Asn Ile Ser Phe Phe Ile Leu His Phe Glu Pro Val Leu Pro
35 40 45

Asn Asp Asn Gly
50

<210> 432
<211> 41
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L15F"

<400> 432
Met Glu Pro Ala Ala Ala Leu His Phe Ser Leu Pro Ala Ser Phe Phe
1 5 10 15

Leu Leu Leu Leu Leu Leu Leu Leu Leu Ser Leu Cys Ala Leu Val Ser
20 25 30

Ala Gln Phe Thr Val Val Gly Pro Ala
35 40

<210> 433
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E153K"

<400> 433
Phe Gln Asp Gly Asp Phe Tyr Glu Lys Ala Leu Val Glu Leu Lys Val
1 5 10 15

Ala Ala Leu Gly Ser Asn Leu His Val Lys Lys Val Lys Gly Tyr Glu
20 25 30

Asp Gly Gly Ile His Leu Glu Cys Arg Ser Thr Gly Trp Tyr Pro Gln
35 40 45

Pro Gln Ile Gln
50

<210> 434
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.I416M"

<400> 434
Phe Asn Asn Gly Met Met Val Thr Cys Ser Lys Asp Arg Ser Ile Ala
1 5 10 15

Val Trp Asp Met Ala Ser Pro Thr Asp Met Met Thr Leu Arg Arg Val
20 25 30

Leu Val Gly His Arg Ala Ala Val Asn Val Val Asp Phe Asp Asp Lys
35 40 45

Tyr Ile Val Ser
50

<210> 435
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G260W"

<400> 435
Thr Asp Ser Leu Trp Arg Gly Leu Ala Glu Arg Arg Gly Trp Gly Gln
1 5 10 15

Tyr Leu Phe Lys Asn Lys Pro Pro Asp Trp Trp Asn Ala Pro Pro Asn
20 25 30

Ser Phe Tyr Arg Ala Leu Tyr Pro Lys Ile Ile Gln Asp Ile Glu Thr
35 40 45

Ile Glu Ser Asn
50

<210> 436
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F996L"

<400> 436
Val Phe Trp Asp Gly Ser Phe Trp Lys Leu Ser Gln Asn Ile Ser Glu
1 5 10 15

Leu Lys Asp Gly Glu Leu Trp Asn Lys Leu Leu Phe Val Arg Ile Leu
20 25 30

Asn Ala Asn Asp Glu Ala Thr Val Ser Val Leu Gly Glu Leu Ala Ala
35 40 45

Glu Met Asn Gly
50

<210> 437
<211> 64
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P1416fs"

<400> 437
Cys Leu Glu Asp Met Pro Gly Leu Val Gly Gly Ser Ser Arg Arg Arg
1 5 10 15

Gly Gly Gly Ser Pro Glu Lys Pro Pro Lys Pro Gln Ala Ala Ser Arg
20 25 30

Ser Pro Arg Thr Leu Gln Pro Thr Ser Gln Gln Gln Trp Ala Pro Gly
35 40 45

Leu Trp Thr Thr Gly Pro His Thr Gly Glu Gly Trp Pro Pro Arg Asn
50 55 60

<210> 438
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<223> /注釋="p.V1627I"

<400> 438
Val Leu Arg Pro Ser Thr Ala Glu Leu Val Pro Ala Arg Ser Pro Ser
1 5 10 15

Glu Thr Leu Ala Tyr Gln His Leu Pro Ile Ile Arg Ile Phe Val Ala
20 25 30

Leu Phe Asp Tyr Asp Pro Val Ser Met Ser Pro Asn Pro Asp Ala Gly
35 40 45

Glu Glu Glu Leu
50

<210> 439
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.A85S"

<400> 439
Gly Arg Arg Arg Arg Ser Cys Ser Pro Ala Pro Thr Trp Pro Pro Leu
1 5 10 15

Cys Cys Tyr Pro Gln Ser Arg Pro Thr Ser Ser Ser Ala Ala Gly Pro
20 25 30

Gly Ala Cys Met Arg Ala Ser Gly Arg Pro His Gly Asn Thr Thr Ala
35 40 45

Ser Thr Ala Pro
50

<210> 440
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.R1111C"

<400> 440
Lys Gln Thr Ala Ser Gln Val Glu Gln Pro Ile Ile Thr Gln Gly Ser
1 5 10 15

Ser Val Thr Lys Ile Thr Phe Glu Gly Cys Cys Gln Pro Pro Thr Val
20 25 30

Thr Lys Ile Thr Gly Gly Ser Ser Val Pro Lys Leu Thr Ser Pro Val
35 40 45

Thr Ser Ile Ser
50

<210> 441
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V135L"

<400> 441
Pro Gly Ser Pro Asn Ser Glu Pro Val Gly Trp Ile Ala Val Tyr Gly
1 5 10 15

Gln Gly Tyr Ser Pro Asn Ser Gly Asp Leu Leu Gln Gly Leu Gln Ala
20 25 30

Ala Trp Glu Ala Leu Gln Thr Ser Gly Arg Pro Ile Thr Pro Gly Thr
35 40 45

Leu Arg Gln Leu
50

<210> 442
<211> 98
<212> PRT
<213> 人工序列

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多肽"

<220>
<221> 來源
<223> /注釋="p.S261fs"

<400> 442
Gln Leu Leu Gln Gln His Gly Ala Glu Leu Pro Thr His Pro Ser Lys
1 5 10 15

Lys Arg Lys His Ser Glu Ser Pro Pro Gln His Pro Gln Cys Pro Asp
20 25 30

Ala Glu Trp Asn Asp Gln Thr Gly Ala Trp Asp Arg Asp Ser Pro Ala
35 40 45

Ser Ala Pro His Ser Ser Pro Ile Ala Thr Leu Ala Ser Pro Gly Ser
50 55 60

Ala Leu Pro Gly Pro Trp Phe Leu Ala Ser Gln His Cys Pro Cys Pro
65 70 75 80

Asp Thr Ala Leu Ala Pro Ala Arg Cys Pro Leu Pro Arg Pro Pro Ala
85 90 95

Gly Gln

<210> 443
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D60V"

<400> 443
Leu Pro Ile Thr His Thr Arg Gln Val Pro Ser Lys Pro Ile Asp His
1 5 10 15

Ser Thr Ile Thr Ser Trp Val Ser Pro Val Val Phe Asp Thr Ala Ala
20 25 30

Gly Ser Leu Phe Pro Ala Tyr Gln Lys His Gln Asn Arg Ala Arg His
35 40 45

Ser Ser Arg Lys
50

<210> 444
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R335Q"

<400> 444
Lys Leu His Arg Leu Gln Thr Ala Leu Ser Leu Tyr Ser Thr Ser Leu
1 5 10 15

Cys Gly Leu Val Leu Leu Val Asp Asn Gln Gln Ile Asn Ser Tyr Ser
20 25 30

Gly Ile Lys Arg Asp Phe Ala Thr Val Cys Gln Glu Cys Thr Asp Phe
35 40 45

His Phe Pro Arg
50

<210> 445
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E28Q"

<400> 445
Ala Pro Ser Gly Thr Val Ser Asp Ser Glu Ser Ser Asn Ser Ser Ser
1 5 10 15

Asp Ala Glu Glu Leu Glu Arg Cys Arg Gln Gln Ala Ala Met Pro Ala
20 25 30

Trp Gly Leu Glu Gln Arg Pro His Val Ala Gly Lys Pro Arg Ala Gly
35 40 45

Ala Ala Asn Ser
50

<210> 446
<211> 50
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K143T"

<400> 446
Val Phe Tyr Asn Gly Glu Asn Ser Pro Val His Lys Glu Lys Arg Glu
1 5 10 15

Ala Ala Lys Lys Lys Gln Glu Arg Lys Thr Thr Arg Ala Lys Glu Thr
20 25 30

Leu Glu Lys Lys Lys Leu Leu Lys Glu Leu Trp Glu Ser Ser Lys Lys
35 40 45

Val His
50

<210> 447
<211> 53
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R67fs"

<400> 447
Gln Pro Gly Ala Phe Gln Leu Ser Gly Asp Gln Leu Val Val Ala Arg
1 5 10 15

Pro Gly Glu Pro Ala Ala Ala Arg Gly Ala Ser Thr Ser Ser Val Thr
20 25 30

Ala Ser Cys Ala Ser Thr Gly Ser Ser Thr Ala Ser Ala Ala Thr Ser
35 40 45

Arg Gly Met Trp Asn
50

<210> 448
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E295K"

<400> 448
Phe Ser Leu Ala Lys Ser Glu Ile Gly Ser Ser Met Ser Glu Ile Leu
1 5 10 15

Leu Ser Gln Val Thr Asn Met Arg Thr Lys Lys Leu Ser Phe Asn Ile
20 25 30

Gln Ala Leu Ala Val Cys Ala Asn Ile Cys Leu Ala Thr Lys Asp Arg
35 40 45

Gln Asn Pro Ser
50

<210> 449
<211> 93
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R90fs"

<400> 449
Ser Ser Asp Glu Ser Asp Thr Asn Lys Lys Leu Lys Gln Thr Ser Arg
1 5 10 15

Lys Lys Lys Lys Glu Lys Lys Lys Lys Gly Ser Ile Ser Ile Ile Arg
20 25 30

Lys Gln Arg Gly Ser Met Gly Arg Arg Val Ala Ala Gly Leu Arg Gln
35 40 45

Thr Pro Ile Leu Lys Arg Thr Asn Leu Pro Glu Ala Leu Glu Ala Val
50 55 60

Lys Arg Asn Leu Arg Asn Arg Ile Lys Glu Ile Met Leu Gln Leu Ile
65 70 75 80

Leu Asp Ile Ala Leu Phe Gly Leu Arg Thr Phe Arg Leu
85 90

<210> 450
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D115N"

<400> 450
Arg Lys His Gln His His Lys Lys Thr Lys Arg Lys His Gly Pro Ser
1 5 10 15

Ser Ser Ser Arg Ser Glu Thr Asp Thr Asn Asn Ser Glu Lys Asp Lys
20 25 30

Pro Ser Arg Gly Val Gly Gly Ser Lys Lys Glu Ser Glu Glu Pro Asn
35 40 45

Gln Gly Asn Asn
50

<210> 451
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R100I"

<400> 451
Ala Ser Arg Asp Met Tyr Phe Asp Ile Pro Leu Glu His Arg Glu Thr
1 5 10 15

Ser Ile Ile Lys Arg His Pro Pro Gln Ile Ile Leu Gln Lys Leu Glu
20 25 30

Pro Ile Asp Leu Pro Arg Val Ile Thr Ser Gly Arg Leu Leu Ser Gln
35 40 45

Arg Glu Ala Arg
50

<210> 452
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R279I"

<400> 452
Gly Glu Cys Val Pro Gly Phe Thr Val Pro Asn Leu Leu Pro Lys Trp
1 5 10 15

Ala Pro Asp His Cys Ser Glu Val Glu Ile Ile Met Asp Ser Gly Leu
20 25 30

Asp Lys Phe Ser Asp Ser Thr Phe Leu Leu Pro Ser Arg Pro Ala Gln
35 40 45

Arg Gly Tyr His
50

<210> 453
<211> 32
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R6W"

<400> 453
Met Ala Glu Gly Ser Trp Trp Ile Pro Gln Ala Arg Ala Leu Leu Gln
1 5 10 15

Gln Cys Leu His Ala Arg Leu Gln Ile Arg Pro Ala Asp Gly Asp Val
20 25 30

<210> 454
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F230L"

<400> 454
Asp Ser Ala Ala Leu Leu Cys Gln Ala Leu Ser Thr Asn Tyr Gln Ile
1 5 10 15

Lys Lys Leu Asp Leu Ser His Asn Gln Leu Leu Ser Asp Val Gly Gly
20 25 30

Glu His Leu Gly Gln Met Leu Ala Ile Asn Val Gly Leu Thr Ser Leu
35 40 45

Asp Leu Ser Trp
50

<210> 455
<211> 52
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多肽"

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<400> 455
Cys Cys Gly Glu Cys Ser Thr Cys Phe Cys Thr Glu Glu Lys Ser Glu
1 5 10 15

Cys Gln Arg His Glu Glu Thr Ser Pro Val Val Ser Cys Asn His Gln
20 25 30

Ile Met Ser Ala Ser Thr Ile Ser Ala Phe Cys Ala Thr Pro Arg Phe
35 40 45

Lys Gln Leu Phe
50

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<211> 28
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肽"

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<400> 456
Gly Leu Gln Pro Ala Gly Pro Leu Gly Gln Ser His Leu Ala His His
1 5 10 15

Ser Met Ala Pro Tyr Pro Phe Pro Pro Thr Gln Ile
20 25

<210> 457
<211> 52
<212> PRT
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<400> 457
Leu Ala Leu Pro Ala Asp Leu Val Pro Ile Leu Gly Asp Gln Ser Asn
1 5 10 15

Glu Lys Gly Gly Ser Tyr Asn Ser Val Ile Ile Gly Ala Ala Pro Leu
20 25 30

Thr Ser Asp Pro Pro Thr Pro Pro Ser Ser Thr Pro Ser Phe Lys Pro
35 40 45

Pro Val Thr Arg
50

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<400> 458
Pro Gly Ser Gly Asn Thr Gln Pro Ser Gly Asn Thr Ala Ser Val Gln
1 5 10 15

Gly Ser Thr Ser Leu Pro Ala Gln Ser Phe Phe Arg Ala Pro Ala Thr
20 25 30

Ala Ser Asn His Pro Leu Asn Pro Gly Ala Thr Pro Gln Pro Lys Phe
35 40 45

Gly Ala Pro Asp
50

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<400> 459
Arg Arg Pro Thr Thr Thr Ser Ser His Pro Leu Asn Thr Gly Ser Ile
1 5 10 15

Ser His Ser Thr Leu Gly Ala Thr Asp Trp Trp Gln Gln Lys Ser Asp
20 25 30

Ser Ser Phe Ile Leu Gly Asn Pro Ala Thr Pro Ala Pro Val Ile Gly
35 40 45

Leu Thr Ser Pro
50

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<400> 460
Met Ala Ala Pro Glu Ala Pro Pro Leu Asp Arg Val Phe Arg Thr Thr
1 5 10 15

Trp Leu Ser Thr Glu Cys Asp Phe Phe His Pro Leu Pro Pro Ser Tyr
20 25 30

Arg Lys Phe Leu Phe Glu Thr Gln Ala Ala Asp Leu Ala Gly Gly Thr
35 40 45

Thr Val
50

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<211> 52
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多肽"

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<400> 461
Gly Ser Lys Lys Ala Pro Ala Lys Ser Val Lys Glu Arg Ile Ala Asp
1 5 10 15

Ser Gln Glu His Ile Ser Thr Ser Ile Asn Asn Phe Asn Ile Ile Lys
20 25 30

Ile Leu Asn Asn Pro Arg Ala Tyr Thr Leu Pro Ile Ser Lys Glu Glu
35 40 45

Ser Arg Leu Ser
50

<210> 462
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<400> 462
Arg Lys Lys Asn Gln Ala Leu Leu Arg Arg Tyr Gln Glu Ile Gln Glu
1 5 10 15

Asp Arg Arg Gln Ala Glu Gln Gly Gly Trp Leu
20 25

<210> 463
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多肽"

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<400> 463
Arg Ala Cys Pro Val Ala Cys Pro Val Gly Cys Pro Ile Ala Cys Pro
1 5 10 15

Val Ser Cys Pro Val Ala Cys Pro Val Ser Ser Cys Pro Val Gly Ser
20 25 30

Met Ala Thr Ala Pro Gln Gly Leu Ser Pro Gln Glu Trp Glu Ala Asp
35 40 45

Arg Glu Thr Gly
50

<210> 464
<211> 49
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多肽"

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<400> 464
Arg Ala Ser Asn Glu Thr Leu Val Ser Cys Ser Ser Ser Gly Ser Asp
1 5 10 15

Gln Gln Arg Thr Ile Arg Glu Pro Glu Ala Ala Trp Gly Pro Tyr Arg
20 25 30

Arg His Arg Asn Pro Ser Thr Ala Asp Ala Tyr Asn Ser His Leu Lys
35 40 45

Glu

<210> 465
<211> 52
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<400> 465
Ser Asp Thr Ser Val Ile Gln Phe Tyr Pro Ser Lys Phe Val Leu Ile
1 5 10 15

Thr Asp Ile Leu Asp Thr Phe Gly Lys Ile Ile Val Tyr Glu Arg Ile
20 25 30

Phe Ser Met Cys Val Asp Ser Arg Ser Val Leu Pro Asp His Phe Ser
35 40 45

Pro Glu Asn Ala
50

<210> 466
<211> 48
<212> PRT
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多肽"

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<400> 466
Met Gly Leu Lys Met Ser Cys Leu Lys Gly Phe Gln Met Cys Val Ser
1 5 10 15

Ser Ser Ser Ser His Asp Glu Ala Pro Val Leu Asn Asp Lys His Leu
20 25 30

Asp Val Pro Asp Ile Ile Ile Thr Pro Pro Thr Pro Thr Gly Met Met
35 40 45

<210> 467
<211> 30
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多肽"

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<400> 467
Ala Asn Leu Ser Asp Glu Lys Ala Phe Val Phe Ser Val Ala Leu Ala
1 5 10 15

Glu Ile Asn Arg Lys Ile Ile Asn Gln Ile Ile Leu Ile Leu
20 25 30

<210> 468
<211> 52
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<400> 468
Leu Cys Leu Arg Ala Leu Ala Phe Cys Ala Leu Ala Lys Pro Arg Ala
1 5 10 15

Ser Ser Leu Gly Pro Gly Pro Gly Glu Val Val Ala Ala Arg Ser Pro
20 25 30

Val Leu Arg Gly Pro Gln Ala Pro Leu Arg Pro Gly Gly Trp Ala Pro
35 40 45

Asp Gly Leu Lys
50

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多肽"

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<400> 469
Met Ala Ala Pro Ser Gly Gly Trp Asn Gly Val Arg Arg Ala Ser Leu
1 5 10 15

Trp Ala Ala Leu Leu Leu Gly Ala Val Ala Leu Arg Pro Ala Glu Ala
20 25 30

Val Ser Glu Pro Thr Thr
35

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<211> 52
<212> PRT
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多肽"

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<400> 470
Pro His Leu Ala Asn Gly His Val Val Pro Ile Lys Pro Gln Val Lys
1 5 10 15

Gly Val Val Arg Glu Glu Asn Lys Val Cys Cys Ala Val Pro Thr Trp
20 25 30

Ala Ser Val Gln Val Val Asp Asp Pro Gly Ser Leu Ala Ser Val Glu
35 40 45

Ser Pro Gly Thr
50

<210> 471
<211> 63
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多肽"

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<400> 471
Tyr Asp Gln Glu Leu Leu Gly Pro Ser Asp Lys Ser Gln Ala Ala Leu
1 5 10 15

Gln Lys Ala Gly Glu Val Val Pro Pro Pro Cys Thr Ser Ser Ala Ser
20 25 30

Thr Cys Val Ser Arg Gln Ala Cys Arg Tyr Pro Ser Ser Gln Pro Leu
35 40 45

Gln Arg Phe Thr Phe Pro Ser Val Thr Pro Gly Met Gln Ala Ser
50 55 60

<210> 472
<211> 52
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多肽"

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<400> 472
Glu Ser Asp Ile Phe Ser Ile Arg Glu Val Ser Phe Gln Ser Thr Gly
1 5 10 15

Glu Ser Glu Trp Lys Asp Thr Asn Tyr Ile Ile Leu Asn Thr Asp Ser
20 25 30

Leu Asp Trp Ala Leu Tyr Asp His Leu Met Asp Phe Leu Ala Asp Arg
35 40 45

Gly Val Asp Asn
50

<210> 473
<211> 30
<212> PRT
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多肽"

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<400> 473
Cys Val Trp His Ile Gln Val Ala Thr Asp His Ala Ile Gln Leu Lys
1 5 10 15

Ile Glu Ala Leu Ser Ile Glu Ser Val Gly Leu Leu Pro Phe
20 25 30

<210> 474
<211> 31
<212> PRT
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多肽"

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<400> 474
Asn Cys Ala Asp Gly Ser Asp Glu Thr Asn Cys Ser Ala Lys Phe Ser
1 5 10 15

Gly Ser Val Glu Gln Ser His Pro Pro Pro Arg Leu Leu Ala Pro
20 25 30

<210> 475
<211> 124
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多肽"

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<400> 475
Ala Glu Cys Ser Ser Glu Leu Tyr Thr Glu Ala Ser Gly Tyr Ile Ser
1 5 10 15

Ser Leu Glu Tyr Pro Arg Ser Tyr Pro Leu Thr Cys Ala Ala Thr Thr
20 25 30

Ala Ser Gly Trp Ser Gly Ala Ser Pro Cys Thr Ser Ser Ser Trp Ser
35 40 45

Leu Leu Ile Leu Met Thr Thr Ser Lys Tyr Thr Ala Pro Met Thr Ser
50 55 60

Tyr Arg Ser Met Pro Thr Gly Arg Thr Leu Ala Ser Ser Val Gly Ser
65 70 75 80

Lys Gly Pro Pro Thr Ser Thr Pro Ala Ala Met Leu Trp Ile Cys Cys
85 90 95

Ser Ser Gln Met Ser Arg Gly Thr Ala Gly Ala Gly Ser Cys Ala Thr
100 105 110

Pro Pro Arg Ser Ser Ser Ala Pro Ser Pro Arg Pro
115 120

<210> 476
<211> 59
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<400> 476
Pro Asp Tyr Arg Gln Asn Glu Ser His Asn Phe Ser Gly Asp Ile Ala
1 5 10 15

Leu Leu Glu Leu Gln His Ser Ile Pro Trp Ala Pro Thr Ser Ser Arg
20 25 30

Ser Val Cys Pro Ile Met Arg Pro Ser Thr Ala Ala Ala Cys Trp Ala
35 40 45

Thr Ser Val Gly Leu Ala Trp Arg Trp Ala Gly
50 55

<210> 477
<211> 52
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多肽"

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<400> 477
Pro Pro Gly Tyr Phe Pro Ala Gly Arg Tyr Val Val Val Ala Glu Ser
1 5 10 15

Pro Leu Pro Pro Gly Glu Trp Glu Leu Cys Cys Arg Ala Ala Pro Gly
20 25 30

Pro Ala Tyr Glu Glu Glu Gly Thr Pro Leu Arg Tyr Gln Arg Leu Val
35 40 45

Pro Ser Arg Ser
50

<210> 478
<211> 52
<212> PRT
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多肽"

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<400> 478
Trp Trp His Leu Arg Ala Leu Gly Pro Asp Ala Thr Ser Ser Cys Thr
1 5 10 15

Lys Thr Pro Ser Ala Leu Glu Pro Leu Gly Gly Ser Ser Thr Leu Gln
20 25 30

Asp Ser Leu Glu Lys Val Pro Arg Ala Pro Thr Leu Pro Asp Thr Leu
35 40 45

Gln Gly Ser Leu
50

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<211> 52
<212> PRT
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多肽"

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<400> 479
Glu Ser Phe Glu Asn Val Leu Lys Glu Gly Thr Glu Lys Gly Thr Gln
1 5 10 15

Glu Ile Ala Glu Gly Leu Ser Glu Lys Tyr Tyr Gly Lys His Val Ser
20 25 30

Ala Glu Glu Lys Glu Lys Asp Lys Ser Lys Leu Trp Glu Glu Ser Thr
35 40 45

Ala Gln Val Lys
50

<210> 480
<211> 52
<212> PRT
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<400> 480
Ala Gly Val Gly Thr Pro Gly Ala Leu Glu Arg Lys Thr Ser Gly Leu
1 5 10 15

Gly Gln Glu Gln Glu Glu Gly Ser Glu Ser Ser Gln Glu Ala Ala Thr
20 25 30

Gly Ser Gly Asp Gly Arg Gln Glu Thr Gly Ala Ala Glu Lys Phe Arg
35 40 45

Leu Gly Leu Ser
50

<210> 481
<211> 42
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<400> 481
Pro Gly Leu Arg Asp Ile Leu Asn Thr Trp Glu Lys Asp Leu Arg Thr
1 5 10 15

Arg Phe Arg Thr Gln Asn Asp Phe Ala Asn Asn Leu Ser Ile Ser Ser
20 25 30

Glu Ile Val Thr Leu Pro Ala Val Ala Leu
35 40

<210> 482
<211> 32
<212> PRT
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多肽"

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<400> 482
Leu Ser Pro Gln Lys Ile Asp Gln Ala Leu Arg Arg Phe Arg Ser Gly
1 5 10 15

Glu Asn Met Leu Leu Glu Pro Ala Leu Leu Leu Tyr Leu Lys Glu Leu
20 25 30

<210> 483
<211> 52
<212> PRT
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多肽"

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<400> 483
Leu Lys Leu Pro Leu Arg Phe Gln Arg Leu Gly His Leu Val Ala Leu
1 5 10 15

Met Ala Leu Leu Cys Gly Asp Pro Gln Asp Asp Lys Val Ala Glu Glu
20 25 30

Ala Ala Glu Gly Ile His Ser Leu Leu His Ile Thr Leu Arg Leu Lys
35 40 45

Tyr Ile Thr His
50

<210> 484
<211> 51
<212> PRT
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多肽"

<220>
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<400> 484
Lys Ala Gly Arg Arg Ala Ala Cys Arg Ser Ser Val Ser Arg Arg Pro
1 5 10 15

Leu His Ser Met Pro Leu Tyr Pro Pro Thr Thr Ser Ser Thr Pro Arg
20 25 30

Phe Cys Cys Val Thr Thr Trp Arg Lys Arg Ser Ser Ser Trp Ala Thr
35 40 45

Leu Pro Gly
50

<210> 485
<211> 52
<212> PRT
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多肽"

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<400> 485
Leu Glu Val Gln Met Ala Gln Pro Asn Tyr Gly Leu Glu Leu Val Thr
1 5 10 15

Gly Ser Ala Lys Asn Gly Thr Tyr Phe Gln Gln Ile His Ile Asn Lys
20 25 30

Tyr Lys Met Val Glu Thr Ile Thr Cys Leu Ser Arg Glu Pro Phe Pro
35 40 45

Ala Ser Asn Tyr
50

<210> 486
<211> 52
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多肽"

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<400> 486
Ala Ser Ala Thr Ala Ala Trp His Cys Pro Pro Leu Cys Leu Pro Pro
1 5 10 15

Leu Pro Ala Ser Ala Pro Thr Ser Pro Leu Leu Asn Pro Ala Thr Arg
20 25 30

Pro Ala Pro Gly Pro Gly Arg Arg Ala Arg Cys Pro Gln Ser Ala His
35 40 45

Pro Ala Pro Thr
50

<210> 487
<211> 209
<212> PRT
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<220>
<221> 來源
<223> /注釋="p.P32fs"

<400> 487
Arg Pro Leu Gly Val Phe Glu Cys Glu Leu Cys Thr Leu Thr Ala Pro
1 5 10 15

Tyr Ser Tyr Val Gly Gln Lys Pro Pro Gln His Pro Val Asp Gly Pro
20 25 30

Pro Gly Gly Lys Leu Cys His Glu Gly Ser Leu His Leu Arg Gln Gly
35 40 45

Gln Ile Pro Gly Pro Arg Leu Val Leu Gln Phe Val Gln Gln Ala Gly
50 55 60

Val Cys Gly Pro Gly Met Gln Phe Ile Leu Leu Gln Glu Ile Leu Pro
65 70 75 80

Pro Leu Cys Pro Gly Glu His Gln Cys Phe Ser Ser Gly Asn Ser Ala
85 90 95

Arg Leu Gly Glu Lys Glu Ser Ser Ile Lys Glu Asp Pro Gln Pro Ala
100 105 110

Arg Phe Ser Asp Val Ser Ala Thr Gly Ala Arg Ser Ser Gly Gly Thr
115 120 125

Leu His Arg Ala Pro Gly Pro Ala Cys Ala Arg Asp Ala Ala Glu Leu
130 135 140

Gly Ala Ala Met Pro Gly Leu Val Ser Gly Pro Leu Gly Ala Ala Leu
145 150 155 160

Gln Pro Arg Gly Ala Gly Val Gln Leu Gly Ala Ala Thr Gly Pro Gly
165 170 175

Ser Cys Ser Lys Arg Val Val Gln Arg Gln Met Pro Asp Lys Thr Gln
180 185 190

Pro Gly Thr Arg Pro Gly Pro Pro Thr Cys Pro Ser Gly Pro Arg Pro
195 200 205

Glu

<210> 488
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多肽"

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<400> 488
Met Gly Asn Ile Leu Thr Cys Cys Ile Asn Ser His Cys Gly Trp Pro
1 5 10 15

Arg Gly Glu Glu Asp Ala Pro Cys Tyr Glu Ser Asp Thr Asp Ile Tyr
20 25 30

Glu Thr Val Ala Ala Ala Thr Ser Glu Ser Thr Thr Val
35 40 45

<210> 489
<211> 52
<212> PRT
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多肽"

<220>
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<400> 489
Ile Met Leu Glu Glu Glu Pro Ser Ile Thr Ser Gly Glu Ser Gln Thr
1 5 10 15

Thr Tyr Ser Thr Phe Ser Ala Pro Leu Lys Lys Lys Ala Asn Arg Lys
20 25 30

Lys Leu Ile Glu Ser Leu Ser Pro Asp Phe Cys His Gln Asn Lys Gly
35 40 45

Leu Leu Leu Thr
50

<210> 490
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.P272H"

<400> 490
Val Glu Tyr Pro Ile Cys Leu Val Cys Leu Arg Pro Arg Ser Pro Ser
1 5 10 15

Cys Pro Leu Pro Arg Tyr Arg Thr Gly His His Arg Leu Leu Ala Phe
20 25 30

Pro Gln Leu Leu Pro Cys Val Gln Gly Gln Glu Ser Gly Pro Leu Arg
35 40 45

Ile Gly Ile Gly
50

<210> 491
<211> 54
<212> PRT
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多肽"

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<400> 491
Gly Arg Pro Gln Pro Pro Thr Leu Asp Pro Thr Ser Thr Ser Tyr Glu
1 5 10 15

Ser Gln Leu Gly Gln Asn Ser Ser Ser Ser Ser Glu Glu Ser Pro Lys
20 25 30

Lys Asp Thr Glu Pro Gly Ser Ser Pro Cys Ser Pro Glu Leu Gln Gly
35 40 45

Gly Thr Arg Arg Ala Ser
50

<210> 492
<211> 52
<212> PRT
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多肽"

<220>
<221> 來源
<223> /注釋="p.T315P"

<400> 492
Leu Glu Leu Arg Ser Glu Gly Val Pro Cys Ile Ala Ser Gly Val Leu
1 5 10 15

Val Ser Tyr Pro Ser Val Gly Gly Ala Pro Pro Arg Pro Ser Ala Ser
20 25 30

Cys Gln Gln Gln Arg Ala Gly His Ser Asp Val Arg Leu Ser Ala His
35 40 45

His His Arg Met
50

<210> 493
<211> 37
<212> PRT
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多肽"

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<400> 493
Leu Leu His Asn Pro Ala Phe Cys Ser Leu Ala Thr Thr Lys Arg Arg
1 5 10 15

His Gln Gln Thr Val Thr Ile Pro Pro Ser Pro Arg Cys Pro Phe His
20 25 30

Met Ser Ser Cys Arg
35

<210> 494
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.R552Q"

<400> 494
Arg Thr Cys His Ala Leu Gln Glu Asp Glu Lys Leu Val Lys Lys Ala
1 5 10 15

Glu Lys Gln Val Thr Leu Ala Leu Gln Gln Gln Gln Arg Asn Leu His
20 25 30

Glu His Lys Val Ser Leu Val Glu Asn His Leu Ala Gly Leu Glu Gly
35 40 45

Arg Ala Leu Ala
50

<210> 495
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<400> 495
Ile Ile Ser Ser Gln Asn Tyr Thr Ser Thr Gly Gln Leu Gln Trp Leu
1 5 10 15

Leu Asn Thr Leu Tyr Asn His Gln Gln Leu Leu Gly Arg Gly Ser Pro
20 25 30

Cys Ile Gln Cys Arg Tyr Asp Ser Tyr Arg Leu Leu Gln Tyr Asp Leu
35 40 45

Asp Ser Pro Leu
50

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<400> 496
Ser Trp Leu Asp Asn Asn Gly Lys Ser Ala Val Lys Lys Leu Lys Asn
1   5   10   15

Ser Leu Pro Leu Arg Lys Glu Leu Asp Cys Cys Leu Lys Asp Glu Leu
            20   25   30

Ser His Gln Leu Gln Leu Ser Asp Ile Arg Trp Gln Arg Ser Trp Gly
        35   40   45

Ile Ala His Arg
    50

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<400> 497
Ala Glu Arg Arg Thr Ser Glu Gln Ile Thr His Arg Leu Ser Lys Leu
1   5   10   15

Ser Glu Arg Arg Pro Ser Val Gln Ile Glu Glu Ser Gly Ser Ser Val
            20   25   30

Pro Ser Asp Gln Ser Pro Ser Val Gln Ile Asp Ser Gly Ser Ser Val
        35   40   45

Pro Ser Asp Gln
    50

<210> 498
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<400> 498
Leu Ala Leu Ala Gln Glu Phe Gln Met Lys Thr Val Thr Val Ser Leu
1   5   10   15

Glu Asp His Thr Phe Ala Asp Val Val Trp Trp Leu Val Ser Asn Ala
            20   25   30

Ser Met Leu Val Ser Met His Gly Ala Gln Leu Val Thr Thr Leu Phe
        35   40   45

Leu Pro Arg Gly
    50

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<400> 499
Ser Asn Met Pro Leu Asn Asn Ser Ser Gln Glu Val Thr Lys Asp Leu
1 5 10 15

Leu Asp Met Ile Asp His Thr Ser Ile Gln Gln Thr Ile Glu Glu Leu
20 25 30

Ala Gly Lys Ile Glu Phe Glu Asn Glu Leu Asn His Met Cys Gly His
35 40 45

Cys Gln Asp Ser
50

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<400> 500
Met Ser Ala Ala Ala Leu Leu Pro Ala Ser Glu Arg Gly Trp Lys Ser
1 5 10 15

Glu Lys Leu Asp Glu Ala Gln Ala Leu Ala Arg Ser Cys Ala Ala Arg
20 25 30

<210> 501
<211> 52
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多肽"

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<400> 501
Ser Lys Asp Thr Glu Ala His Ile Ser Glu Pro Glu Asp Leu Gly Lys
1 5 10 15

Ile Arg Ser Pro Pro Pro Asp His Val Gln Gln Val Glu Thr Ala Arg
20 25 30

Glu Gly Lys Gln Tyr Trp Asn Pro Arg Asn Ser Ser Glu Leu Ser Gly
35 40 45

Leu Val Asn Thr
50

<210> 502
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<400> 502
Met Glu Val Asn Asn Ile Asn Gly Glu Ser Arg Ser Thr Leu Thr Thr
1 5 10 15

Leu Pro Phe Pro Gly Ala Glu Ala Asn Ser Pro Gly Lys Ala
20 25 30

<210> 503
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<400> 503
Leu Phe Phe Trp Ser Phe Asn Gly Leu Leu Leu Val Val Asp Thr Thr
1 5 10 15

Gly Lys Pro Asn Phe Ile Ser Arg Tyr Gln Gln Ile Gln Val Gly Lys
20 25 30

Asn Glu Pro Val Asp Pro Val Lys Leu Arg Gln Ser Ile Arg Thr Val
35 40 45

Leu Phe Asn Gln
50

<210> 504
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多肽"

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<400> 504
Pro Arg Ala Ala Gly Ala Pro Arg Pro Arg Leu Leu Leu Arg Thr Gly
1 5 10 15

Ser Leu Asp Glu Ser Leu Gly Pro Leu Arg Arg Ala Ala Ala Gly Phe
20 25 30

Val Gln Thr Ala Leu Ala Arg Lys Leu Ser Pro Glu Ala Pro Ala Pro
35 40 45

Ser Ser Ala Thr
50

<210> 505
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<400> 505
Arg Thr Gly Ala Ile Asn Glu Cys Val Thr Phe Ile Phe Asn Arg Tyr
1 5 10 15

Ala Lys Lys Leu Gln Val Ser Arg His Thr Thr Lys Phe Gly Tyr Gly
20 25 30

Val Leu Val Thr Arg Val Ala Ser Thr Ala Ala Gly Gly Ile Ala Leu
35 40 45

Lys Lys Ser Gly
50

<210> 506
<211> 34
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多肽"

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<223> /注釋="p.P58fs"

<400> 506
Gly Met Ser Glu Lys Ala Ile Glu Lys Phe Ile Arg Gln Leu Leu Glu
1 5 10 15

Lys Asn Glu Pro Gln Arg Pro Pro Pro Ala Val Ser Ser Pro Tyr Ser
20 25 30

Cys Val

<210> 507
<211> 52
<212> PRT
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多肽"

<220>
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<400> 507
Gly Met Ser Leu Glu Gly Pro Ser Ala Phe Leu Cys Gly Ser Ser Leu
1 5 10 15

Lys Trp Ser Pro Glu Met Lys Asn Ala Ser Ser Cys Val Gln Lys Glu
20 25 30

Asn Pro Leu Thr Gln Ala Val Pro Lys Cys Gln Arg Trp Glu Lys Leu
35 40 45

Gln Asn Ser Arg
50

<210> 508
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多肽"

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<400> 508
Gly Ser Ser Ser Glu Glu Glu Asp Ser Gly Lys Gln Ala Leu Ala Pro
1 5 10 15

Gly Leu Ser Pro Ser Gln Arg Pro Gly Val Pro Ala Leu Pro Val Ala
20 25 30

Gly Ala Leu Arg Arg Arg Arg Lys Arg Met Cys
35 40

<210> 509
<211> 160
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多肽"

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<400> 509
Arg Ala Arg Glu Leu Thr Val Gln Lys Ala Glu Ala Leu Met Arg Glu
1 5 10 15

Leu Asp Glu Glu Gly Ser Asp Pro Pro Cys Arg Gly Gly Pro Ser Ala
20 25 30

Ser Asp Arg Cys Cys Ser Cys Ser Pro Ser Gly Phe Ser Ala Gly Arg
35 40 45

Gly Arg Cys Pro Val Gln Gly Cys Leu Arg Pro His Arg Val Gln Leu
50 55 60

Leu Arg Arg Trp Gly Pro Gly Ser Pro Ala Gly Gln Arg Leu Ser Lys
65 70 75 80

Gly Phe Gln Leu Leu Arg Trp Trp Gly Pro Gly Ser Pro Ala Pro Glu
85 90 95

Pro Arg Lys Gly Pro Phe Pro Pro Pro Asp Pro Pro Trp Pro Val Thr
100 105 110

Ala Val Thr Val Met Ala Gly Ser Val Pro Ser Ala Gln Ser Val Asp
115 120 125

Ala Leu Glu Ser Pro Gly Pro Leu Ala Leu Glu Gly Pro Ser Ser Pro
130 135 140

Arg Asn Leu Leu Trp Arg Glu Met Ser Ile Phe Leu Pro Gly Ile Phe
145 150 155 160

<210> 510
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<400> 510
Ser Lys Glu Leu Gln Gly Ala Thr His Arg Tyr Ala Pro Cys Asp Trp
1 5 10 15

Tyr Tyr His Val Pro Val Lys Arg Ser Lys Lys Lys Ala Val Asp Ala
20 25 30

Pro Pro Ala Ser Gln Ile Pro Gly Leu Ser Asn Leu Gly Asp Ser His
35 40 45

Ser Glu Asn Leu
50

<210> 511
<211> 52
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<400> 511
His Gln His Ile Leu Thr Gln His Gly Tyr Thr Val Val Ile Ala Glu
1 5 10 15

Glu Arg Leu Asn Ala Gly Leu Gly Pro Trp Trp Leu Leu Glu Gln Gly
20 25 30

Asp Leu Gly Ser Trp Asp Leu Leu Ile Cys Leu Ser Ser Lys Lys Ala
35 40 45

Glu Gly Thr Pro
50

<210> 512
<211> 52
<212> PRT

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<400> 512
Pro Ser Val Cys Leu Asp Gln Gly Met Gln Leu Lys Pro Ser Thr Ser
1 5 10 15

Ser His Leu Leu Lys Thr Val Lys Pro Leu Leu Val Trp Lys Pro Gly
20 25 30

Asp Trp Ser Arg Glu Gln Leu Asn Glu Thr Thr Val Leu Ala Pro His
35 40 45

Glu Thr Ile Phe
50

<210> 513
<211> 36
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多肽"

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<223> /注釋="p.A10T"

<400> 513
Met Trp Thr Glu Glu Ala Gly Ala Thr Thr Thr Glu Ala Gln Glu Ser
1 5 10 15

Gly Ile Arg Asn Lys Ser Ser Ser Ser Ser Gln Ile Pro Val Val Gly
20 25 30

Val Val Thr Glu
35

<210> 514
<211> 73
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<220>
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多肽"

<220>
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<223> /注釋="p.P342fs"

<400> 514
Gly Tyr Glu Thr His Leu Glu Thr Thr Gly His Lys Lys Met Pro Gln
1 5 10 15

Ala Phe Glu Pro Pro Met Pro Pro Pro Ala Asn Pro Gln Leu Leu Cys
20 25 30

Gln Asn Pro Glu Lys Leu Ala Leu Lys Glu Asp Leu Leu Tyr Leu Arg
35 40 45

Thr Ser Gly Glu Pro Trp Asp Thr Glu Arg Asn Leu Arg Pro Leu Ser
50 55 60

Leu Gln Cys Gln Ser Leu Ala Leu Pro
65 70

<210> 515
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多肽"

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<400> 515
Ile Thr Asn His Arg Glu Lys Lys Leu Gln Gln Ser Thr Lys Tyr Trp
1 5 10 15

Cys Leu Asn Gln Ser Ala Glu Ser Leu Trp Trp Ile Cys Ala Met Arg
20 25 30

Gly Gly Glu Asn Arg Pro Pro Ala Arg Val Gln Ser Ser Ser Glu Glu
35 40 45

Leu Glu Leu Arg
50

<210> 516
<211> 48
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<400> 516
Asn Gly Asp Gly Glu Ile Thr Leu Val Glu Leu Gln Gln Ala Met Gln
1 5 10 15

Arg Leu Leu Gly Glu Arg Leu Thr Pro Gly Arg Ser Leu Arg Leu Ser
20 25 30

Gly Arg Leu Met Leu Met Glu Thr Ala Gln Leu Thr Leu Lys Ser Leu
35 40 45

<210> 517
<211> 52
<212> PRT
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<400> 517
Ser Leu Met Asp Lys Ala Phe Asp Pro Thr Arg Arg Gln Trp Tyr Leu
1 5 10 15

His Ala Val Ala Asn Pro Gly Leu Ile Tyr Tyr Leu Thr Gly Pro Tyr
20 25 30

Leu Asp Val Gly Gly Ala Gly Tyr Val Val Thr Ile Ser His Thr Ile
35 40 45

His Ser Ser Ser
50

<210> 518
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<400> 518
Asn Phe Asp Glu Gly Thr Pro Pro Thr Asn Phe Asp Thr Phe Pro Ala
1 5 10 15

Ala Ile Met Thr Val Phe Gln Ile Leu Met Met Gly Glu Asp Trp Asn
20 25 30

Glu Val Met Tyr Asp Gly Ile Lys Ser Gln Gly Gly Val Gln Gly Gly
35 40 45

Met Val Phe Ser
50

<210> 519
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<400> 519
Glu Val Ser Pro Leu Ser Ala Ala Asn Met Ser Ile Ala Val Lys Glu
1 5 10 15

Gln Gln Lys Asn Gln Lys Pro Ala Lys Tyr Tyr Val Trp Glu Gln Arg
20 25 30

Thr Ser Glu Met Arg Lys Gln Asn Leu Leu Ala Ser Arg Glu Ala Leu
35 40 45

Tyr Asn Glu Met
50

<210> 520
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<400> 520
Arg Arg Ser Thr Phe Asp Asn Phe Pro Gln Ser Leu Leu Thr Val Phe
1 5 10 15

Gln Ile Leu Thr Gly Glu Asp Trp Asn Leu Leu Val Met Tyr Asp Gly
20 25 30

Ile Met Ala Tyr Gly Gly Pro Ser Phe Pro Gly Met Leu Val Cys Ile
35 40 45

Tyr Phe Ile Ile
50

<210> 521
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<400> 521
Ala Lys Ser Asn Pro Glu Glu Cys Arg Gly Leu Phe Ile Leu Tyr Lys
1 5 10 15

Asp Gly Asp Val Asp Ser Pro Val Val Leu Leu Glu Arg Ile Trp Gln
20 25 30

Asn Ser Asp Phe Asn Phe Asp Asn Val Leu Ser Ala Met Met Ala Leu
35 40 45

Phe Thr Val Ser
50

<210> 522
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多肽"

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<400> 522
Ala Lys Gly Ile Thr Asp Tyr Lys Lys Gly Phe Ser Phe Ala Phe Glu
1 5 10 15

Gln Leu Leu Asn Tyr Asn Val Ser Arg Glu Glu Asn Cys Asn Lys Ile
20 25 30

Ile Met Leu Phe Thr Asp Gly Gly Glu Glu Arg Ala Gln Glu Ile Phe
35 40 45

Asn Lys Tyr Asn
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<210> 523
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多肽"

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<400> 523
Cys Leu Asn Gly Thr Leu Val Gln Ala Asp Arg Thr Asn Lys Glu His
1 5 10 15

Phe Arg Glu His Leu Asp Lys Leu Phe Thr Thr Lys Gly Ile Gly Met
20 25 30

Leu Asp Ile Ala Leu Asn Glu Ala Phe Asn Ile Leu Ser Asp Phe Asn
35 40 45

His Thr Gly Gln
50

<210> 524
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多肽"

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<400> 524
Ala Ser His Arg Asp His Asn His Arg Asp Glu Thr His Gly Ser Ser
1 5 10 15

Asp His Arg His Arg Glu Ser Arg His His His Ser Arg Asp Val Asp
20 25 30

Arg Glu Gln Asp His Asn Glu Cys Asn Lys Gln Arg Ser Arg His Lys
35 40 45

Ser Lys Asp Arg
50

<210> 525
<211> 52
<212> PRT
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多肽"

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<400> 525
Ile Leu Ser Val Thr Leu Leu Phe Phe Gly Gly Leu Cys Val Ala Ala
1 5 10 15

Ser Glu Phe His Arg Ser Arg His Asn Ile Ile Ile Leu Ser Ala Gly
20 25 30

Ile Phe Phe Val Ser Ala Gly Leu Ser Asn Ile Ile Gly Ile Ile Val
35 40 45

Tyr Ile Ser Ala
50

<210> 526
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多肽"

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<400> 526
Thr Leu Leu Phe Phe Gly Gly Leu Cys Val Ala Ala Ser Glu Phe His
1 5 10 15

Arg Ser Arg His Asn Val Ile Leu Ser Val Val Gly Ile Phe Phe Val
20 25 30

Ser Ala Gly Leu Ser Asn Ile Ile Gly Ile Ile Val Tyr Ile Ser Ala
35 40 45

Asn Ala Gly Asp
50

<210> 527
<211> 52
<212> PRT
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多肽"

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<400> 527
Leu Arg Ala Lys Ser His Ser Glu Phe Leu Lys Lys Ser Thr Phe Ala
1 5 10 15

Arg Leu Pro Pro Tyr Arg Tyr Arg Phe Trp Trp Arg Arg Ser Ser Ser
20 25 30

Arg Ser Thr Glu Pro Arg Ser Arg Asp Leu Ser Pro Ile Ser Lys Gly
35 40 45

Phe His Thr Ile
50

<210> 528
<211> 52
<212> PRT
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多肽"

<220>
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<400> 528
Met Ile Arg Ser Ala Thr Pro Phe Pro Leu Val Ser Leu Phe Phe Met
1 5 10 15

Phe Ile Gly Phe Ile Leu Asn Asn Ile Arg Arg His Ile Arg Pro His
20 25 30

Arg Thr Ile Leu Ala Phe Val Ser Gly Ile Phe Phe Ile Leu Ser Gly
35 40 45

Leu Ser Leu Val
50

<210> 529
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.V146G"

<400> 529
Leu Arg Val Val Arg Ala Ser Ser Ile Phe Pro Ile Leu Ser Ala Ile
1 5 10 15

Leu Leu Leu Leu Gly Gly Val Cys Val Gly Gly Ala Ser Arg Val Tyr
20 25 30

Lys Ser Lys Arg Asn Ile Ile Leu Gly Ala Gly Ile Leu Phe Val Ala
35 40 45

Ala Gly Leu Ser
50

<210> 530
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.S190L"

<400> 530
Asn Cys Thr Ala Met Ala Ser Lys Pro Ala Thr Thr Ile Arg Trp Phe
1 5 10 15

Lys Gly Asn Thr Glu Leu Lys Gly Lys Leu Leu Glu Val Glu Glu Trp
20 25 30

Ser Asp Met Tyr Thr Val Thr Ser Gln Leu Met Leu Lys Val His Lys
35 40 45

Glu Asp Asp Gly
50

<210> 531
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.R959S"

<400> 531
Asp Ala Ala Leu Glu Val Gln Pro Pro Asp Thr Trp Asp Ser Phe Pro
1 5 10 15

Leu Phe Gln Leu Leu Asn Asp Phe Leu Ser Ser Thr Asp Tyr Asn Leu
20 25 30

Cys Asn Gly Lys Phe His Lys His Leu Gln Asp Leu Phe Ala Pro Leu
35 40 45

Val Val Arg Tyr
50

<210> 532
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.A1073T"

<400> 532
Pro Ser Trp Met Ala Ala Ile Tyr Asp Ala Asp Asn Gly Ser Gly Thr
1 5 10 15

Ser Glu Asp Leu Phe Trp Lys Leu Asp Thr Thr Leu Gln Thr Phe Ile
20 25 30

Arg Asp Leu His Trp Pro Glu Glu Glu Phe Gly Lys His Leu Glu Gln
35 40 45

Arg Leu Lys Leu
50

<210> 533
<211> 52
<212> PRT
<213> 人工序列

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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<400> 533
Tyr Ile Glu Gly Lys Glu Leu Glu Asn Phe Phe Gln Glu Leu Glu Lys
1 5 10 15

Ala Arg Lys Gly Ser Gly Met Met Ser Asn Asn Ser Asp Asn Phe Gly
20 25 30

Glu Lys Met Lys Glu Phe Met Gln Lys Tyr Asp Lys Asn Ser Asp Gly
35 40 45

Lys Ile Glu Met
50

<210> 534
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<212> PRT
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<223> /注釋="p.R258C"

<400> 534
Lys Glu Met Asn Ile Gln Gln Leu Thr Asn Tyr Arg Lys Ser Val Met
1 5 10 15

Ser Leu Ala Glu Ala Gly Lys Leu Tyr Cys Cys Lys Asp Leu Glu Ile
20 25 30

Val Leu Cys Ser Glu Pro Pro Met
35 40

<210> 535
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R81T"

<400> 535
Asp Tyr Val Gln Met Lys Ala Ser Glu Leu Lys Gln Glu Gln Glu Thr
1 5 10 15

Gln Gly Ser Ser Ser Ala Ala Gln Lys Thr Thr Ala Cys Asn Thr Ala
20 25 30

Thr Cys Val Thr His Arg Leu Ala Gly Leu Leu Ser Arg Ser Gly Gly
35 40 45

Met Val Lys Ser
50

<210> 536
<211> 52
<212> PRT
<213> 人工序列

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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.E340K"

<400> 536
Glu Arg Met Arg Glu Glu Glu Lys Arg Ala Ala Glu Glu Arg Gln Arg
1 5 10 15

Ile Lys Glu Glu Glu Lys Arg Ala Ala Lys Lys Glu Arg Gln Arg Ile
20 25 30

Lys Glu Glu Glu Lys Arg Ala Ala Glu Glu Arg Gln Arg Ile Lys Glu
35 40 45

Glu Glu Lys Arg
50

<210> 537
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V231I"

<400> 537
Leu Asn Glu Thr Ser Gly Asn Cys Gln Thr Glu Phe Glu Gly Val His
1 5 10 15

Ser Gln Lys Gln Asn Arg Gln Thr Cys Ile Ile Arg Lys Ser Leu Ile
20 25 30

Cys Ala Phe Ala Met Ala Phe Ile Ile Ser Val Met Leu Ile Ala Ala
35 40 45

Asn Gln Ile Leu
50

<210> 538
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G131V"

<400> 538
Glu Tyr Tyr Ser Glu Ala Asp Ala Ser His Cys Ile Gln Gln Ile Leu
1 5 10 15

Glu Ala Val Leu His Cys His Gln Met Val Val Val Val His Arg Asp
20 25 30

Leu Lys Pro Glu Asn Leu Leu Leu Ala Ser Lys Cys Lys Gly Ala Ala
35 40 45

Val Lys Leu Ala
50

<210> 539
<211> 43
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.T466fs"

<400> 539
Arg His Arg Ser Asn Ser Leu Thr Arg Val Asp Gly Gln Pro Arg Gly
1 5 10 15

Ala Ala Ile Ala Trp Pro Glu Lys Lys Asn Gln Ala Cys Val Pro Ala
20 25 30

Asn Thr Phe Cys Ser Thr Ser Arg Cys Glu Leu
35 40

<210> 540
<211> 70
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.T466fs"

<400> 540
Arg His Arg Ser Asn Ser Leu Thr Arg Val Asp Gly Gln Pro Arg Gly
1 5 10 15

Ala Ala Ile Ala Trp Pro Glu Lys Lys Pro Gly Leu Arg Pro Ser Gln
20 25 30

His Leu Leu Leu Tyr Ile Thr Leu Arg Val Val Lys Trp Ile Pro Ala
35 40 45

Leu Ala Thr Ala Ser Ala Trp Pro Ala Pro Ser Ala Lys Thr Val Trp
50 55 60

His Pro Thr Leu Leu Ile
65 70

<210> 541
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.K131R"

<400> 541
Arg Ile Ala Val Ile Ala Asp Leu Asp Thr Glu Ser Arg Ala Gln Glu
1 5 10 15

Glu Asn Thr Trp Phe Ser Tyr Leu Lys Arg Arg Gly Tyr Leu Thr Leu
20 25 30

Ser Asp Ser Gly Asp Lys Val Ala Val Glu Trp Asp Lys Asp His Gly
35 40 45

Val Leu Glu Ser
50

<210> 542
<211> 42
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.LV303del"

<400> 542
Leu His Thr Ser Ser Glu Leu Gln Ser Pro Ser Ser Tyr Phe Ala Ser
1 5 10 15

Arg Pro Trp Val Arg Ala Lys Gly Leu Leu Gly Phe Pro Val Leu Thr
20 25 30

Leu His Pro Pro Leu Pro Ser Gly Cys Ser
35 40

<210> 543
<211> 39
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E13K"

<400> 543
Met Glu Val Gln Val Ser Gln Ala Ser Leu Gly Phe Lys Lys Leu Thr
1 5 10 15

Ser Val Glu Lys Ser Leu Arg Glu Trp Ser Arg Leu Ser Arg Glu Val
20 25 30

Ile Ala Trp Leu Cys Pro Ser
35

<210> 544
<211> 52
<212> PRT

<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R423Q"

<400> 544
Ile Glu Lys Asp Lys Tyr Arg Lys Gln Ile Arg Glu Leu Glu Glu Lys
1 5 10 15

Asn Asp Glu Met Arg Ile Glu Met Val Gln Gln Arg Glu Ala Cys Ile
20 25 30

Val Asn Leu Glu Ser Lys Leu Arg Arg Leu Ser Lys Asp Ser Asn Asn
35 40 45

Leu Asp Gln Ser
50

<210> 545
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E626K"

<400> 545
Leu Asp Asp Asp Ser His Glu Arg Tyr Ser Phe Gly Pro Ser Ser Ile
1 5 10 15

His Ser Ser Ser Ser Ser His Gln Ser Lys Lys Gly Leu Asp Ala Tyr
20 25 30

Asp Leu Glu Gln Val Asn Leu Met Phe Arg Lys Phe Ser Leu Glu Arg
35 40 45

Pro Phe Arg Pro
50

<210> 546
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E93D"

<400> 546
Ser Lys Ile Asn Arg Ala Gly Arg Leu Leu Asp Ile Leu His Thr Lys
1 5 10 15

Gly Gln Arg Gly Tyr Val Val Phe Leu Asp Asp Ser Leu Glu Phe Tyr
20 25 30

Tyr Pro Glu Leu Tyr Lys Leu Val Thr Gly Lys Glu Pro Thr Arg Arg
35 40 45

Phe Ser Thr Ile
50

<210> 547
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.I1065M"

<400> 547
Ala Asn Ile Glu Ala Val Ala Ala Lys Asn Lys His Cys Leu Leu Glu
1 5 10 15

Ala Gly Ile Gly Cys Thr Arg Asp Leu Met Met Lys Ser Asn Ile Tyr
20 25 30

Pro Ile Val Leu Phe Ile Arg Val Cys Glu Lys Asn Ile Lys Arg Phe
35 40 45

Arg Lys Leu Leu
50

<210> 548
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A202V"

<400> 548
Leu Gln Asn His Thr Asp Phe Lys Asp Lys Ile Val Leu Asp Val Gly
1 5 10 15

Cys Gly Ser Gly Ile Leu Ser Phe Phe Val Val Ala Gln Ala Gly Ala
20 25 30

Arg Lys Ile Tyr Ala Val Glu Ala Ser Thr Met Ala Gln His Ala Glu
35 40 45

Val Leu Val Lys
50

<210> 549
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R54Q"

<400> 549
Glu Arg Arg Leu Lys Glu Glu Glu Glu Ala Arg Leu Lys Tyr Glu Lys
1   5   10   15

Glu Glu Met Glu Arg Leu Glu Ile Gln Gln Gln Ile Glu Lys Glu Lys
            20   25   30

Trp His Arg Leu Glu Ala Lys Asp Leu Glu Arg Arg Asn Glu Glu Leu
        35   40   45

Glu Glu Leu Tyr
    50

<210> 550
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P603L"

<400> 550
Met Asn Leu Pro His Pro Gly Leu His Pro His Gln Thr Pro Ala Pro
1   5   10   15

Leu Pro Asn Pro Gly Leu Tyr Pro Pro Leu Leu Val Ser Met Ser Pro
            20   25   30

Gly Gln Pro Pro Pro Gln Gln Leu Leu Ala Pro Thr Tyr Phe Ser Ala
        35   40   45

Pro Gly Val Met
    50

<210> 551
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P645L"

<400> 551
Thr Tyr Phe Ser Ala Pro Gly Val Met Asn Phe Gly Asn Pro Ser Tyr
1   5   10   15

Pro Tyr Ala Pro Gly Ala Leu Pro Pro Leu Leu Pro Pro Pro His Leu
            20   25   30

Tyr Pro Asn Thr Gln Ala Pro Ser Gln Val Tyr Gly Gly Val Thr Tyr
        35   40   45

Tyr Asn Pro Ala
    50

<210> 552
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S658L"

<400> 552
Pro Ser Tyr Pro Tyr Ala Pro Gly Ala Leu Pro Pro Pro Pro Pro Pro
1 5 10 15

His Leu Tyr Pro Asn Thr Gln Ala Pro Leu Leu Gln Val Tyr Gly Gly
20 25 30

Val Thr Tyr Tyr Asn Pro Ala Gln Gln Gln Val Gln Pro Lys Pro Ser
35 40 45

Pro Pro Arg Arg
50

<210> 553
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S232F"

<400> 553
Arg Gln Arg Lys Leu Trp Lys Asp Glu Gly Arg Trp Glu His Asp Lys
1 5 10 15

Phe Arg Glu Asp Glu Gln Ala Pro Lys Phe Phe Arg Gln Glu Leu Ile
20 25 30

Ala Leu Tyr Gly Tyr Asp Ile Arg Ser Ala His Asn Pro Asp Asp Ile
35 40 45

Lys Pro Arg Arg
50

<210> 554
<211> 45
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F781fs"

<400> 554
Asp Leu Ala Gln Ile Ile Ile Pro Lys Asp Asn Ser Ser Leu Leu Lys
1 5 10 15

Arg Leu Ala Cys Ile Ala Ala Phe Phe Val Asp Ser Ser Ser Tyr His
20 25 30

Pro Phe Lys Ile Asn Gln Asn Ile Arg Phe Gln Lys Phe
35 40 45

<210> 555
<211> 31
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R5W"

<400> 555
Met Ser Asn Pro Trp Trp Ser Leu Glu Glu Glu Lys Tyr Asp Met Ser
1 5 10 15

Gly Ala Arg Leu Ala Leu Ile Leu Cys Val Thr Lys Ala Arg Glu
20 25 30

<210> 556
<211> 42
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R23fs"

<400> 556
Met Ala Ala Val Pro Arg Val Glu Gly Val Phe Ile Phe Leu Ile Glu
1 5 10 15

Asp Ser Gly Lys Lys Lys Gly Val Arg Ile Leu Lys Leu Cys Ser Lys
20 25 30

Val Ser Phe Arg Val Asp Trp Ile Thr Ser
35 40

<210> 557
<211> 97
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R471fs"

<400> 557
Tyr Glu Val Ser Asn Lys Asp Asp Lys Lys Asn Met Gly Lys Gln Met
1 5 10 15

Pro Gln Pro Thr Phe Thr Leu Arg Lys Asn Leu Ser Ser Leu Leu Ile
20 25 30

Asp Gly Ala Ile Leu Phe Val Leu Phe Cys Phe Val Phe Leu Arg Gln
35 40 45

Asn Leu Ala Leu Ser Pro Arg Leu Glu Cys Ser Gly Val Ile Ser Ala
50 55 60

His Arg Lys Leu Arg Leu Pro Gly Ser Gly His Ser Pro Ala Ser Ala
65 70 75 80

Ser Arg Val Ala Gly Thr Thr Gly Ala Arg His His Thr Trp Leu Ile
85 90 95

Phe

<210> 558
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D639E"

<400> 558
Asp Asp Ala Leu Asp Lys Leu Ser Asp Ser Leu Gly Gln Arg Gln Pro
1 5 10 15

Asp Pro Asp Glu Asn Lys Pro Met Glu Glu Glu Lys Val Lys Glu Lys
20 25 30

Ala Lys Ala Glu His Arg Asp Lys Leu Gly Glu Arg Asp Asp Thr Ile
35 40 45

Pro Pro Glu Tyr
50

<210> 559
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T425M"

<400> 559
Met Ile Val Glu Glu Val Arg Ala Ile Arg Phe Asn Gln Glu Gln Glu
1 5 10 15

Ser Glu Val Leu Asn Arg Arg Ser Ser Met Met Ser Gly Ser Leu Glu
20 25 30

Thr Thr Ser Ser Lys Asp Ile Arg Gln Met Ser Gln Gln Gln Asp Leu
35 40 45

Leu Ser Ala Leu
50

<210> 560
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E152K"

<400> 560
Phe Asp Glu Glu Arg Ala Gln Gln Glu Asp Ala Leu Ala Gln Gln Ala
1 5 10 15

Phe Glu Glu Ala Arg Arg Arg Thr Arg Lys Lys Phe Glu Asp Arg Asp
20 25 30

Arg Ser His Arg Glu Glu Met Glu Val Arg Val Ser Gln Leu Leu Ala
35 40 45

Val Thr Gly Lys
50

<210> 561
<211> 76
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E138fs"

<400> 561
Pro Ile Lys Ile Tyr Gly Arg Met Ile Pro Cys Lys His Val Phe Cys
1 5 10 15

Tyr Asp Cys Ala Ile Leu His Glu Lys Arg Glu Ile Arg Cys Val Gln
20 25 30

Ala Val Val Ile Leu Cys Ser Glu Leu Ser Ser Val His Glu Val Leu
35 40 45

Ser Ser Cys Val Ala Leu Phe Lys Gly Ala Arg Glu His Ile Cys Leu
50 55 60

Arg Glu Thr Tyr Arg Leu Ile Ser Thr Ile Ala Ile
65 70 75

<210> 562
<211> 59
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P69fs"

<400> 562
Glu Cys Leu Val Val Cys Glu Pro Gly Arg Ala Ala Ala Gly Gly Pro
1 5 10 15

Gly Gly Ala Ala Leu Gly Glu Ala Pro Leu Gly Glu Trp His Leu Leu
20 25 30

Arg Ser Glu Ala Thr Thr Met Ser Gln Gln Gly Lys Pro Ala Met Ala
35 40 45

Pro Val Gly Pro Ser Thr Ser Thr Arg Ser Trp
50 55

<210> 563
<211> 27
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.E102fs"

<400> 563
Glu Ser Gly Glu Gly Ser Ala Leu Glu Lys Ser Leu Ala Val Ser Gln
1 5 10 15

Gly Gly Glu Leu Tyr Glu Glu Trp Leu Gly Thr
20 25

<210> 564
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R1284C"

<400> 564
Glu Ser Gln Glu Asp Glu Lys Leu Leu Gln Ala Thr Glu Lys Phe Gln
1 5 10 15

Ala Glu Cys Ala Leu Lys Phe Pro Asn Cys Cys Gln Cys Leu Thr Thr
20 25 30

Val Ile Asp Ile Ser Gly Lys Thr Val Phe Ile Thr Arg Tyr Leu Lys
35 40 45

Pro Leu Asn Pro
50

<210> 565
<211> 29
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.P1164fs"

<400> 565
Leu Glu Arg Asp Pro Thr Pro Cys Glu Leu Thr Tyr Lys Val Pro Thr
1   5   10   15

Arg His Ser Met Ser Gln Ile Pro Pro Ser Ser Pro Leu
            20   25

<210> 566
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R417L"

<400> 566
Gly Ile Lys Gly Gly Ile Arg Arg Trp Asn Tyr Phe Phe Pro Glu Glu
1   5   10   15

Leu Leu Val Tyr Asp Ile Cys Lys Tyr Leu Leu Trp Cys Glu Asn Ile
            20   25   30

Gly Arg Ala His Lys Ser Asn Asn Ile Met Ile Leu Val Asp Leu Lys
        35   40   45

Asn Glu Val Trp
    50

<210> 567
<211> 34
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.I8V"

<400> 567
Met Glu Val Lys Gly Gln Leu Val Val Ser Ser Pro Thr Phe Asn Ala
1   5   10   15

Pro Ala Ala Leu Phe Gly Glu Ala Ala Pro Gln Val Lys Ser Glu Arg
            20   25   30

Leu Arg

<210> 568
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.W397L"

<400> 568
Ile Glu Gln Ala Gln Lys Leu Thr Ala Thr Gln Ser His Leu Glu Asn
1 5 10 15

Arg Lys Gln Gln Leu Gln Gln Glu Gln Leu Leu Tyr Leu Glu Ser Leu
20 25 30

Ile Gln Ala Arg Gln Arg Leu Gln Gly Ser His Asn Gln Cys Leu Asn
35 40 45

Arg Gln Asp Val
50

<210> 569
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R838C"

<400> 569
Asn Ile Tyr Val Asp Ala Leu Leu Lys Glu Phe Glu Gln Phe Asn Arg
1 5 10 15

Arg Leu Asn Glu Val Ser Lys Arg Val Cys Cys Ile Pro Leu Pro Val
20 25 30

Ser Asn Ile Leu Trp Glu His Cys Ile Arg Leu Ala Asn Arg Thr Ile
35 40 45

Val Glu Gly Tyr
50

<210> 570
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E313K"

<400> 570
Ala Glu Lys Ala Lys Pro Asp Ala Leu His Gly Leu Arg Val His Ser
1 5 10 15

Trp Val Leu Val Leu Ser Gly Lys Arg Lys Lys Val Pro Glu Asn Phe
20 25 30

Phe Ile Asp Pro Phe Thr Gly His Ser Tyr Ser Thr Gln Asp Glu His
35 40 45

Phe Leu Gly Ile
50

<210> 571
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S1264L"

<400> 571
Asn Thr Thr Ser Ile Lys Thr Gln Met Glu Leu Thr Ile Lys Asp Leu
1 5 10 15

Glu Ser Glu Ile Ser Arg Ile Lys Thr Leu Leu Gln Ala Asp Phe Asn
20 25 30

Lys Thr Glu Leu Glu Arg Tyr Lys Glu Leu Tyr Leu Glu Glu Val Lys
35 40 45

Val Arg Glu Ser
50

<210> 572
<211> 39
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K420fs"

<400> 572
Lys Glu Glu Glu Lys Glu Lys Leu Trp Lys Lys Lys Glu Leu Leu Gln
1 5 10 15

Arg Ala Glu Lys Lys Lys Lys Ile Lys Asn Thr Gly Pro Arg Lys Asn
20 25 30

Arg Ser Gly Lys Lys Trp Lys
35

<210> 573
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P488H"

<400> 573
Ile Leu Pro Lys Tyr Gln Asp Gln Asn Phe Leu Pro Lys Asp Gln Asn
1 5 10 15

Phe Leu Ser Arg Asp Gln His Val Leu His His Lys Asp Gln Asp Ile
20 25 30

Leu Pro Lys Tyr Gln Asp Gln Asn Phe Leu Pro Lys Asp Gln Asn Phe
35 40 45

Leu Ser Arg Asp
50

<210> 574
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E153Q"

<400> 574
Gly Tyr Lys Lys Glu Ile Ser Lys Leu Tyr Gln Asp Met Gln Arg Lys
1 5 10 15

Val Glu Leu Asn Glu Glu Lys His Lys Gln Gln Leu Ile Glu Lys Lys
20 25 30

Glu Met Glu Ile Ser Glu Leu Asn Ala Lys Leu Arg Ser Gln Glu Lys
35 40 45

Glu Lys Gln Asn
50

<210> 575
<211> 33
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<220>
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多肽"

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<400> 575
Gln Trp Asp Gly Ala Ala Leu Arg Leu His Ala Arg His Lys Glu Gln
1 5 10 15

Gln Arg Gln Phe Gly Leu Thr Pro Pro Trp Ile Phe Glu Ala Thr Ser
20 25 30

Pro

<210> 576
<211> 28
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肽"

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<400> 576
Gln Gln Trp Asp Gly Ala Ala Leu Arg Leu His Ala Arg His Lys Glu
1 5 10 15

Gln Gln Arg Gln Phe Gly Leu Thr Pro Leu Asp Leu
20 25

<210> 577
<211> 52
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多肽"

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<400> 577
Lys Glu Leu Ser Asp Ile Trp Ser Ala Val His Val Leu Gln Asn Ser
1 5 10 15

Ile Asp Ser Leu Thr Leu Cys Ser Gly Ser Ser Cys Pro Lys Ala Ser
20 25 30

Ser Leu Arg Gly His Lys Gly His Gln Cys Leu Ser Pro Pro Leu Pro
35 40 45

Ser Trp Asp Ser
50

<210> 578
<211> 52
<212> PRT
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<400> 578
Gly Tyr Thr Leu Ser Asn Ser Lys Gly Pro Val Gln Pro Thr Ala Gln
1 5 10 15

Gly Glu Glu Lys Gly Gly Leu Arg Ile Tyr Tyr Met Glu Asp Lys Met
20 25 30

Leu Pro Lys Cys Thr Asp Leu Lys Ala Lys Gln Leu Leu Leu Ser Asp
35 40 45

Ile Leu Asn Thr
50

<210> 579
<211> 52
<212> PRT
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多肽"

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<400> 579
Leu Asp Asp Cys Ile Phe Asn Met Val Leu Leu Lys Val Pro Ser Ser
1 5 10 15

Leu Ser Ala Glu Glu Leu Glu Ala Ile Arg Arg Leu Ile Arg Phe Gly
20 25 30

Lys Lys Lys Asn Thr His Ser Leu Phe Val Phe Ile Ile Pro Glu Asn
35 40 45

Phe Lys Gly Cys
50

<210> 580
<211> 52
<212> PRT
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多肽"

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<400> 580
Lys Leu Arg Met Glu Gln Glu Glu Glu Leu Lys Asp Met Ser Lys Ile
1 5 10 15

Ile Leu Asn Ala Lys Cys His Ala Ile Leu Leu Asp Ala Gln Ile Leu
20 25 30

Glu Lys Gln Gln Ile Gln Lys Glu Leu Asp Thr Glu Glu Lys Arg Leu
35 40 45

Asp Gln Met Met
50

<210> 581
<211> 52
<212> PRT
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多肽"

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<400> 581
Arg Ile Arg Gly Arg Arg Gln Ile Val Glu Gln Met Glu Lys Asn Gln
1 5 10 15

Glu Glu Arg Ser Leu Leu Ala Glu Gln Leu Leu Glu Gln Glu Lys Glu
20 25 30

Gln Met Leu Glu Tyr Met Glu Gln Leu Gln Glu Glu Asp Leu Lys Asp
35 40 45

Met Glu Arg Arg
50

<210> 582
<211> 52
<212> PRT
<213> 人工序列

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<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R209I"

<400> 582
Ala Gln Asn Asp Leu Val Phe Glu Ala Val Gln Asp Lys Gly Asn Met
1 5 10 15

Glu Gln Ala Ile Leu Glu Met Lys Lys Ile Ile Phe Glu Ala Arg Gln
20 25 30

Gly Glu Phe Ile Glu Met Lys Ser Asn Leu Lys His Leu Glu Val Leu
35 40 45

Val Ala Gln Gln
50

<210> 583
<211> 52
<212> PRT
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多肽"

<220>
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<400> 583
Phe Val Val His Thr Val Gln Phe Leu Asn Arg Phe Ser Thr Val Cys
1 5 10 15

Glu Glu Lys Leu Ala Asp Leu Ser Leu Cys Cys Ile Gln Gln Ile Glu
20 25 30

Thr Thr Leu Asn Ile Leu Asp Ala Lys Leu Ser Ser Ile Pro Gly Leu
35 40 45

Asp Asp Val Thr
50

<210> 584
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 584
Gly Gln Lys Trp Glu His Phe Ile Thr Ala Pro Lys Thr Lys Lys Phe
1 5 10 15

Lys Ile Pro Thr Met Arg Val Thr Asn His His Lys Pro Ser Arg Arg
20 25 30

Gly Ser Thr Leu Ser Leu Ser Arg Ala Ser Gly Gly Ser Ser Pro Gln
35 40 45

Ser Ser Met Ile
50

<210> 585
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.N440T"

<400> 585
Ile Glu Gln Leu Glu Arg Glu Gly Asn Glu Glu Glu Ile Gln Arg Glu
1 5 10 15

Asn Tyr Gln Asp Asn Ile Ser Ser Met Thr Thr Ile Ser Ile Gln Asn
20 25 30

Thr Trp Lys His Leu His Ala Asp Arg Ile Gly Arg Gly Ser Lys Ala
35 40 45

Glu Asp Glu Asp
50

<210> 586
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<223> /注釋="p.R259I"

<400> 586
Asn Arg Glu Arg Lys Cys Lys Leu Lys Asp Gln Ser Asp Lys Glu Glu
1 5 10 15

Gly Thr Arg Asp Ile Ser Ser Pro Lys Ile Ile Leu Arg Asp Arg Gln
20 25 30

Ala Leu Phe Pro Ala Lys Val Thr Asn Val Ser Leu Leu Glu Lys Phe
35 40 45

Glu Arg Ser Glu
50

<210> 587
<211> 28
<212> PRT
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肽"

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<400> 587
Ile Thr Cys Glu Lys Ile Glu Ala Leu Glu Gln Glu Asn Ser Glu Leu
1 5 10 15

Glu Arg Glu Asn Arg Lys Leu Lys Lys Asn Ile Gly
20 25

<210> 588
<211> 28
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<220>
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肽"

<220>
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<400> 588
Gln Lys Leu Gly Ala Pro Glu Ala Leu Gly Gly Arg Glu Thr Gly Ser
1 5 10 15

His Thr Leu Gln Ser Pro Ala Pro Pro Gln Leu Pro
20 25

<210> 589
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 589
Gln Lys Lys Ser Ala Lys Glu Arg Lys Pro Ser Thr Thr Ser Ser Gly
1 5 10 15

Lys Tyr Glu Asp Ser Asp Gly Cys Tyr Met Met Gln Lys Thr Arg Pro
20 25 30

Pro Arg Lys Leu Glu Leu Arg Gln Leu Ser Thr Gly Ser Ser Ser Arg
35 40 45

Ala Asn Arg Ile
50

<210> 590
<211> 52
<212> PRT
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多肽"

<220>
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<400> 590
Ser Ala Arg Val Arg Gln Thr Trp Ser Val Leu Leu Leu Leu Leu Leu
1 5 10 15

Phe Phe Ile Pro Gly Val Val Met Ala Met Met Ala Tyr Gly Leu Ile
20 25 30

Ser Arg Glu Leu Tyr Leu Gly Leu Arg Phe Asp Gly Asp Ser Asp Ser
35 40 45

Asp Ser Gln Ser
50

<210> 591
<211> 52
<212> PRT
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多肽"

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<400> 591
Glu Thr Leu Leu Lys Lys Pro Leu Ala Leu Lys Met Ser Thr Ile Asn
1 5 10 15

Glu Ala Val Leu Phe Glu Asp Met Ile Thr Thr Leu Asn Glu Lys Pro
20 25 30

Thr Thr Gly Lys Glu Leu Ser Phe Lys Glu Pro Leu Ala Leu Gln Glu
35 40 45

Ser Pro Thr Tyr
50

<210> 592
<211> 52
<212> PRT
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多肽"

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<223> /注釋="p.S185I"

<400> 592
Ser Leu Pro Gly Ile Ile Phe Thr Arg Ser Gln Lys Glu Gly Leu His
1 5 10 15

Tyr Thr Cys Ser Ser His Phe Pro Tyr Ile Ile Gln Tyr Gln Phe Trp
20 25 30

Lys Asn Phe Gln Thr Leu Lys Ile Val Ile Leu Gly Leu Val Leu Pro
35 40 45

Leu Leu Val Met
50

<210> 593
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 593
Ile Phe Gly Gly Ile Ser Phe Phe Pro Leu Asp Lys Met Thr Tyr Leu
1 5 10 15

Lys Ile Gln Ser Phe Ile Asn Arg Met Asp Asp Glu Ser Leu Asn Ile
20 25 30

Val Lys Tyr Thr Ala Phe Leu Tyr Asn Asp Gln Leu Ile Trp Ser Gly
35 40 45

Leu Glu Gln Asp
50

<210> 594
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.R594Q"

<400> 594
Ser Asp Leu Lys Val Pro Leu Thr Val Thr Trp Gln Phe Gln Pro Ala
1 5 10 15

Ser Ser His Ile Phe His Gln Leu Ile Gln Gln Ile Thr His Asn Gly
20 25 30

Thr Ile Glu Trp Gly Asn Phe Leu Ser Arg Phe Gln Lys Lys Thr Lys
35 40 45

Val Ser Gln Ser
50

<210> 595
<211> 52
<212> PRT
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多肽"

<220>
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<400> 595
Pro Asp Glu Thr Trp Met Phe Ile Thr Lys Lys Gln Thr Asp Gln Thr
1 5 10 15

Thr Leu Arg Ile Gln Pro Ala Val Lys Tyr Tyr Phe Gln Val Asn Ile
20 25 30

Thr Ala Asp Ser Leu Phe Ala Glu Gly Lys Pro Leu Glu Leu Val Cys
35 40 45

Leu Val Val Ser
50

<210> 596
<211> 52
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多肽"

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<400> 596
Ala Tyr Phe Leu Gly Ser Lys Ser Ser Met Ala Val His Ser Leu Phe
1 5 10 15

Lys Ser Pro Ser Lys Thr Tyr Ile Gln Gln Gln Lys Thr Arg Asp Glu
20 25 30

Asn Ile Lys Val Gly Ser Pro Phe Glu Leu Val Val Ser Gly Asn Lys
35 40 45

Arg Leu Lys Glu
50

<210> 597
<211> 52
<212> PRT
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多肽"

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<400> 597
Ser Asp Met Glu Leu Arg Leu Val Gly Gly Ser Ser Arg Cys Ala Gly
1 5 10 15

Lys Val Glu Val Asn Val Gln Gly Ala Met Met Gly Ile Leu Cys Ala
20 25 30

Asn Gly Trp Gly Met Asn Ile Ala Glu Val Val Cys Arg Gln Leu Glu
35 40 45

Cys Gly Ser Ala
50

<210> 598
<211> 52
<212> PRT
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多肽"

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<400> 598
Ser Leu Asn Phe Asn Gly Asn Asn Val Lys Gly Ile Glu Leu Gly Ala
1 5 10 15

Phe Asp Ser Thr Ile Phe Gln Ser Leu Thr Thr Phe Gly Gly Thr Pro
20 25 30

Asn Leu Ser Val Ile Phe Asn Gly Leu Gln Asn Ser Thr Thr Gln Ser
35 40 45

Leu Trp Leu Gly
50

<210> 599
<211> 52
<212> PRT
<213> 人工序列

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多肽"

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<400> 599
Gly Asn Ser Glu His Ala Phe Gln Gly Pro Thr Ser Phe His Val Ile
1 5 10 15

Gln Thr Ser Ser Phe Thr Asn Ser Thr Leu Leu Ala Gln Thr Gln Gly
20 25 30

Ser Gly Trp Leu Asp Asp Leu Gln Ile His Gly Trp Asp Ser Asp Ser
35 40 45

Gly Thr Ala Ile
50

<210> 600
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<212> PRT
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多肽"

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<400> 600
Thr Ile Ile Phe Leu His Asn Trp Ser Lys Gly Asn Phe Ser Asn Glu
1 5 10 15

Glu Leu Ser Asp Leu Glu Leu Leu Phe Cys Cys Phe Tyr Leu Phe Gly
20 25 30

Leu Thr Arg Glu Ile Gln Asp His Ala Ser Gln Asp Tyr Ser Lys Tyr
35 40 45

Pro Phe Glu Val
50

<210> 601
<211> 67
<212> PRT
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多肽"

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<400> 601
Met Gly Cys Leu Leu Phe Leu Leu Leu Trp Ala Leu Leu Gln Ala Trp
1 5 10 15

Gly Ser Ala Glu Val Pro Gln Arg Leu Ser Pro Ser Ala Ala Ser Arg
20 25 30

Ser Arg Pro Ser Pro Ile Ala Ala Gly Arg Ala Pro Thr Ala Trp Arg
35 40 45

Gly Trp Gly Ser Cys Arg Arg Thr Ala Gly Ala Thr Thr Arg Thr Pro
50 55 60

Ser Ala Leu
65

<210> 602
<211> 52
<212> PRT
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多肽"

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<221> 來源
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<400> 602
Gly Asp Leu Gln Thr His Gly Trp Asp Thr Val Leu Gly Thr Ile Arg
1 5 10 15

Phe Leu Lys Pro Trp Ser His Gly Asn Val Val Ser Lys Gln Glu Leu
20 25 30

Lys Asn Leu Gln Ser Leu Phe Gln Leu Tyr Phe His Ser Phe Ile Gln
35 40 45

Ile Val Gln Ala
50

<210> 603
<211> 52
<212> PRT
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多肽"

<220>
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<400> 603
Trp Glu Trp Thr Phe Phe Gln Gly Asn Cys Tyr Phe Met Ser Asn Ser
1 5 10 15

Gln Arg Asn Trp His Asp Ser Ile Thr Thr Thr Cys Lys Glu Val Gly
20 25 30

Ala Gln Leu Val Val Ile Lys Ser Ala Glu Glu Gln Asn Phe Leu Gln
35 40 45

Leu Gln Ser Ser
50

<210> 604
<211> 55
<212> PRT
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多肽"

<220>
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<400> 604
Thr Leu Glu Ser Pro Pro Gly Ser Ser Pro Ser Val Gln Cys Arg Ser
1 5 10 15

Pro Arg Gly Lys Asn Ile Gln Gly Gly Arg Pro Ser Pro Cys Leu Ser
20 25 30

Trp Ser Ser Arg Ile Val Ala Pro Gly His Ala Leu Ser Cys Arg Thr
35 40 45

Arg Arg Arg Trp Ser Ser Lys
50 55

<210> 605
<211> 52
<212> PRT
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多肽"

<220>
<221> 來源
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<400> 605
Pro Gly Tyr Arg Arg Glu Pro Ser Leu Ser Pro Lys Leu Thr Cys Leu
1 5 10 15

Gln Asn Leu Lys Trp Ser Thr Ala Val Lys Lys Phe Cys Lys Lys Lys
20 25 30

Ser Cys Pro Asn Pro Gly Glu Ile Arg Asn Gly Gln Ile Asp Val Pro
35 40 45

Gly Gly Ile Leu
50

<210> 606
<211> 36
<212> PRT
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多肽"

<220>
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<223> /注釋="p.P174fs"

<400> 606
Ala Ser Ala Leu Pro Ala Pro Pro Thr Gly Ser Ala Leu Pro Asp Pro
1 5 10 15

Gln Thr Ala Ser Ala Leu Pro Asp Pro Gln Gln Pro Leu Pro Ser Leu
20 25 30

Arg Pro Trp Arg
35

<210> 607
<211> 52
<212> PRT
<213> 人工序列

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多肽"

<220>
<221> 來源
<223> /注釋="p.Y197H"

<400> 607
Leu Phe Ile Ile Val Pro Ile Phe Leu Leu Leu Asp Lys Asp Asp Ser
1 5 10 15

Lys Ala Gly Met Glu Glu Asp His Thr His His Glu Gly Leu Asp Ile
20 25 30

Asp Gln Thr Ala Thr Tyr Glu Asp Ile Val Thr Leu Arg Thr Gly Glu
35 40 45

Val Lys Trp Ser
50

<210> 608
<211> 52
<212> PRT
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多肽"

<220>
<221> 來源
<223> /注釋="p.Y197D"

<400> 608
Leu Phe Ile Ile Val Pro Ile Phe Leu Leu Leu Asp Lys Asp Asp Ser
1 5 10 15

Lys Ala Gly Met Glu Glu Asp His Thr Asp Asp Glu Gly Leu Asp Ile
20 25 30

Asp Gln Thr Ala Thr Tyr Glu Asp Ile Val Thr Leu Arg Thr Gly Glu
35 40 45

Val Lys Trp Ser
50

<210> 609
<211> 43
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多肽"

<220>
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<223> /注釋="p.D280fs"

<400> 609
Pro Leu Cys Val Ser Pro Lys Tyr Gly Cys Asn Phe Asn Asn Gly Gly
1 5 10 15

Cys His Gln Asp Cys Phe Glu Gly Gly Met Ala Pro Ser Ser Ala Ala
20 25 30

Ala Asp Gln Asp Ser Gly Cys Trp Met Thr Trp
35 40

<210> 610
<211> 31
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.L646fs"

<400> 610
Gly Glu Arg Lys Gln Phe Ala Val Val Leu Leu Ser Leu Arg Leu Leu
1 5 10 15

Ala Lys Phe Leu Gly Phe Val Ala Phe Pro Ala Ile Pro Gly Ala
20 25 30

<210> 611
<211> 88
<212> PRT
<213> 人工序列

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多肽"

<220>
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<223> /注釋="p.N123fs"

<400> 611
Ala Tyr Ala Val Ile Tyr Leu Lys Lys Thr Pro Glu Glu Ala Tyr Arg
1 5 10 15

Ala Leu Leu Ser Gly Ser Asn Pro Pro Ile Phe His Ser Gly Met Leu
20 25 30

Pro Leu Glu Ile Ala Leu Thr Ile Ser Pro Phe Ser Thr Val Cys Arg
35 40 45

Glu Ser Glu Arg Asp Tyr Asn Met Asp Phe Leu Thr Leu Arg His Leu
50 55 60

Met Trp Met Asn Met Asn Ile Met Ser Glu Leu Lys Met Val Thr Ser
65 70 75 80

Thr Gly Leu Phe Gln Glu Asn Phe
85

<210> 612
<211> 52
<212> PRT
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多肽"

<220>
<221> 來源
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<400> 612
Gly Ser Val Ile Gly Pro Gln Gln Gln Phe Leu Val Met Lys Gln Thr
1 5 10 15

Asn Leu Trp Leu Glu Gly Asp Tyr Phe Cys Cys Gln Lys Leu Lys Gly
20 25 30

Gln Glu Asn Gly Gln His Arg Ala Ala Phe Ser Lys Leu Leu Ser Gly
35 40 45

Val Asp Asp Ile
50

<210> 613
<211> 39
<212> PRT
<213> 人工序列

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多肽"

<220>
<221> 來源
<223> /注釋="p.K322fs"

<400> 613
Glu Asn Leu Asn Arg Pro Arg Leu Lys Gln Val Glu Lys Phe Lys Asp
1 5 10 15

Asn Thr Ile Pro Asp Lys Val Lys Lys Ser Ile Phe Leu Ala Lys Glu
20 25 30

Ser Ser Gly Arg Ala Tyr Val
35

<210> 614
<211> 33
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L460fs"

<400> 614
Ile Thr Lys Leu Asp Ser Ser Ile Ile Ser Glu Gly Lys Ile Ser Thr
1 5 10 15

Ile Thr Pro Gln Ile Gln Ala Phe Asn His Lys Lys Gln Gln Gln Lys
20 25 30

Val

<210> 615
<211> 52
<212> PRT
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D555E"

<400> 615
Glu Val Arg Arg Ile Glu Asn Tyr Arg Val Glu Gly Met Glu Ile Tyr
1 5 10 15

Ser Thr Thr Leu Trp His Leu Gln Lys Glu Glu Val Ala Leu Ser Val
20 25 30

Leu Ser Lys Asp Leu Thr Asp Met Asp Lys Asn Ser Pro Glu Ala Trp
35 40 45

Cys Ala Ala Gly
50

<210> 616
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.N571I"

<400> 616
Ser Thr Thr Leu Trp His Leu Gln Lys Asp Val Ala Leu Ser Val Leu
1 5 10 15

Ser Lys Asp Leu Thr Asp Met Asp Lys Ile Ile Ser Pro Glu Ala Trp
20 25 30

Cys Ala Ala Gly Asn Cys Phe Ser Leu Gln Arg Glu His Asp Ile Ala
35 40 45

Ile Lys Phe Phe
50

<210> 617
<211> 78
<212> PRT
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<220>
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多肽"

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<223> /注釋="p.I91fs"

<400> 617
Cys Thr Thr Pro Gln Cys Lys Tyr Leu Leu Ala Lys Cys Cys Val Asp
1 5 10 15

Leu Ser Lys Leu Ala Glu Gly Glu Gln Ser Tyr Leu Val Glu Cys Leu
20 25 30

Ile Ser Arg Lys Ala Met Met Ile Leu Leu Leu Ser Leu Val Ile Gln
35 40 45

Leu Ala Leu Leu Phe His Cys Trp Asp Met Tyr Ile Ala Arg Gln Ile
50 55 60

Gly Leu Pro Lys Asp Gln Asn Val Thr Lys Arg Ala Leu Val
65 70 75

<210> 618
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.P242S"

<400> 618
Leu Glu Ser Ser Asn Ser Lys Tyr Ser Leu Asn Thr Asp Ser Ser Val
1 5 10 15

Ser Tyr Ile Asp Ser Ala Val Ile Ser Ser Ser Asp Thr Val Pro Leu
20 25 30

Gly Thr Gly Thr Ser Ile Leu Ser Lys Gln Val Gln Asn Lys Pro Lys
35 40 45

Thr Gly Arg Ser
50

<210> 619
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.P675T"

<400> 619
Glu Gln Ser Glu His Tyr Ser Lys Gln Leu Glu Asn Glu Leu Glu Gly
1 5 10 15

Leu Lys Gln Lys Gln Ile Ser Tyr Ser Thr Thr Gly Val Cys Ser Ile
20 25 30

Glu His Gln Gln Glu Ile Thr Lys Leu Lys Thr Asp Leu Glu Lys Lys
35 40 45

Ser Ile Phe Tyr
50

<210> 620
<211> 70
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.P405fs"

<400> 620
Gly Pro Cys Leu Arg Asn Arg Tyr Gly Glu Asp Val Arg Ser Ala Leu
1 5 10 15

Leu Asp Pro Asp Trp Val Cys Pro Pro Val Val Gly Ser Ala Ile Ala
20 25 30

Ala Thr Val Gly Ser Val Thr Ala Ala Val Pro Gln Glu Ser Ser Phe
35 40 45

Ile Trp Pro Ser Phe Met Val Met Thr Met Leu Arg Asn Ile Trp Arg
50 55 60

Ala Tyr Lys Arg Ser Trp
65 70

<210> 621
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.E243K"

<400> 621
Glu Pro Leu Asp Arg Glu Arg Ile Ala Thr Tyr Thr Leu Phe Ser His
1 5 10 15

Ala Val Ser Ser Asn Gly Asn Ala Val Lys Lys Asp Pro Met Glu Ile
20 25 30

Leu Ile Thr Val Thr Asp Gln Asn Asp Asn Lys Pro Glu Phe Thr Gln
35 40 45

Glu Val Phe Lys
50

<210> 622
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D254Y"

<400> 622
Thr Leu Phe Ser His Ala Val Ser Ser Asn Gly Asn Ala Val Glu Asp
1 5 10 15

Pro Met Glu Ile Leu Ile Thr Val Thr Tyr Tyr Gln Asn Asp Asn Lys
20 25 30

Pro Glu Phe Thr Gln Glu Val Phe Lys Gly Ser Val Met Glu Gly Ala
35 40 45

Leu Pro Gly Thr
50

<210> 623
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.E349K"

<400> 623
Asp Thr Gln Glu Gly Ile Ile Thr Val Lys Lys Pro Leu Asp Tyr Glu
1 5 10 15

Ser Arg Arg Leu Tyr Thr Leu Lys Val Lys Lys Ala Glu Asn Thr His
20 25 30

Val Asp Pro Arg Phe Tyr Tyr Leu Gly Pro Phe Lys Asp Thr Thr Ile
35 40 45

Val Lys Ile Ser
50

<210> 624
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R472C"

<400> 624
Leu Asp Arg Glu Leu Ser Gln Trp His Asn Leu Thr Val Ile Ala Ala
1 5 10 15

Glu Ile Asn Asn Pro Lys Glu Thr Thr Cys Cys Val Ala Val Phe Val
20 25 30

Arg Ile Leu Asp Val Asn Asp Asn Ala Pro Gln Phe Ala Val Phe Tyr
35 40 45

Asp Thr Phe Val
50

<210> 625
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.S577R"

<400> 625
Asn Gly Phe Asn Arg His Glu Ile Ser Thr Tyr Leu Leu Pro Val Val
1 5 10 15

Ile Ser Asp Asn Asp Tyr Pro Ile Gln Arg Arg Ser Thr Gly Thr Leu
20 25 30

Thr Ile Arg Val Cys Ala Cys Asp Ser Gln Gly Asn Met Gln Ser Cys
35 40 45

Ser Ala Glu Ala
50

<210> 626
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.R128S"

<400> 626
Ile Ile Asp Glu Lys Thr Gly Asp Ile His Ala Thr Arg Arg Ile Asp
1 5 10 15

Arg Glu Glu Lys Ala Phe Tyr Thr Leu Ser Ser Ala Gln Ala Ile Asn
20 25 30

Arg Arg Thr Leu Arg Pro Val Glu Pro Glu Ser Glu Phe Val Ile Lys
35 40 45

Ile His Asp Ile
50

<210> 627
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K357T"

<400> 627
Lys Lys Pro Val Asp Phe Glu Thr Lys Arg Ala Tyr Ser Leu Lys Val
1 5 10 15

Glu Ala Ala Asn Val His Ile Asp Pro Thr Thr Phe Ile Ser Asn Gly
20 25 30

Pro Phe Lys Asp Thr Val Thr Val Lys Ile Ser Val Glu Asp Ala Asp
35 40 45

Glu Pro Pro Met
50

<210> 628
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D674N"

<400> 628
Ser Lys Glu Asp Ile Arg Asp Asn Val Ile His Tyr Asp Asp Glu Gly
1 5 10 15

Gly Gly Glu Glu Asp Thr Gln Ala Phe Asn Asn Ile Gly Ala Leu Arg
20 25 30

Asn Pro Lys Val Ile Glu Glu Asn Lys Ile Arg Arg Asp Ile Lys Pro
35 40 45

Asp Ser Leu Cys
50

<210> 629
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P706T"

<400> 629
Pro Lys Val Ile Glu Glu Asn Lys Ile Arg Arg Asp Ile Lys Pro Asp
1 5 10 15

Ser Leu Cys Leu Pro Arg Gln Arg Pro Thr Thr Met Glu Asp Asn Thr
20 25 30

Asp Ile Arg Asp Phe Ile His Gln Arg Leu Gln Glu Asn Asp Val Asp
35 40 45

Pro Thr Ala Pro
50

<210> 630
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成多肽"

<220>
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<223> /注釋="p.A721S"

<400> 630
Lys Leu Thr Pro Arg His Gln Thr Ser Ser Thr Leu Glu Ser Ile Asp
1 5 10 15

Val Gln Glu Phe Ile Lys Gln Arg Leu Ser Ser Glu Ala Asp Leu Asp
20 25 30

Pro Ser Val Pro Pro Tyr Asp Ser Leu Gln Thr Tyr Ala Tyr Glu Gly
35 40 45

Gln Arg Ser Glu
50

<210> 631
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成多肽"

<220>
<221> 來源
<223> /注釋="p.A195T"

<400> 631
Glu Met Ser Asp Met Gly Thr Ser Val Leu Gln Val Thr Ala Thr Asp
1 5 10 15

Ala Asp Asp Pro Thr Tyr Gly Asn Ser Thr Thr Arg Val Val Tyr Ser
20 25 30

Ile Leu Gln Gly Gln Pro Tyr Phe Ser Val Asp Pro Lys Thr Gly Val
35 40 45

Ile Arg Thr Ala
50

<210> 632
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成多肽"

<220>
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<223> /注釋="p.D547Y"

<400> 632
Gln Asp Pro Asp Arg Tyr Met Gln Gln Asn Ile Arg Tyr Thr Lys Leu
1 5 10 15

Ser Asp Pro Ala Asn Trp Leu Lys Ile Tyr Tyr Pro Val Asn Gly Gln
20 25 30

Ile Thr Thr Ile Ala Val Leu Asp Arg Glu Ser Pro Asn Val Lys Asn
35 40 45

Asn Ile Tyr Asn
50

<210> 633
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.P433H"

<400> 633
Ile Gln Ile Ile Ser Ala Lys Asp Pro Asp Val Thr Asn Asn Ser Ile
1 5 10 15

Arg Tyr Ser Ile Asp Arg Ser Ser Asp His His Gly Arg Phe Phe Tyr
20 25 30

Val Asp Ile Thr Thr Gly Ala Leu Met Thr Ala Arg Pro Leu Asp Arg
35 40 45

Glu Glu Phe Ser
50

<210> 634
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A134V"

<400> 634
Ile Asp Asp Thr Thr Gly Asp Ile His Ala Ile Gln Arg Leu Asp Arg
1 5 10 15

Glu Glu Arg Ala Gln Tyr Thr Leu Arg Val Val Gln Ala Leu Asp Arg
20 25 30

Arg Thr Gly Arg Pro Met Glu Pro Glu Ser Glu Phe Ile Ile Lys Ile
35 40 45

Gln Asp Ile Asn
50

<210> 635
<211> 52
<212> PRT

<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.V403I"

<400> 635
Glu Gly Leu Asn Ser Met Phe Glu Val Tyr Leu Val Gly Asn Asn Ser
1 5 10 15

His His Phe Ile Ile Ser Pro Thr Ser Ile Ile Gln Gly Lys Ala Asp
20 25 30

Ile Arg Ile Arg Val Ala Ile Pro Leu Asp Tyr Glu Thr Val Asp Arg
35 40 45

Tyr Asp Phe Asp
50

<210> 636
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 636
Ala Ser Val Pro Glu Asp Ile Pro Glu Gly His Ser Ile Leu Gln Leu
1 5 10 15

Lys Ala Thr Asp Ala Asp Glu Gly Glu Tyr Tyr Gly Arg Val Trp Tyr
20 25 30

Arg Ile Leu His Gly Asn His Gly Asn Asn Phe Arg Ile His Val Ser
35 40 45

Asn Gly Leu Leu
50

<210> 637
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.F177L"

<400> 637
Phe Ile Val Asn Ala Thr Asp Pro Asp Leu Gly Ala Gly Gly Ser Val
1 5 10 15

Leu Tyr Ser Phe Gln Pro Pro Ser Gln Leu Leu Phe Ala Ile Asp Ser
20 25 30

Ala Arg Gly Ile Val Thr Val Ile Arg Glu Leu Asp Tyr Glu Thr Thr
35 40 45

Gln Ala Tyr Gln
50

<210> 638
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.Q237K"

<400> 638
Ser Glu Thr Gly Ile Ile Lys Thr Ala Leu Leu Asn Met Asp Arg Glu
1 5 10 15

Asn Arg Glu Gln Tyr Gln Val Val Ile Lys Lys Ala Lys Asp Met Gly
20 25 30

Gly Gln Met Gly Gly Leu Ser Gly Thr Thr Thr Val Asn Ile Thr Leu
35 40 45

Thr Asp Val Asn
50

<210> 639
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.Q225K"

<400> 639
Pro Tyr Phe Ser Val Glu Pro Lys Thr Gly Val Ile Lys Thr Ala Leu
1 5 10 15

Pro Asn Met Asp Arg Glu Ala Lys Asp Lys Lys Tyr Leu Leu Val Ile
20 25 30

Gln Ala Lys Asp Met Val Gly Gln Asn Gly Gly Leu Ser Gly Thr Thr
35 40 45

Ser Val Thr Val
50

<210> 640
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.F523L"

<400> 640
Glu Asn Ala Lys Pro Gly Gln Leu Ile Gln Thr Val Ser Val Met Asp
1   5   10   15

Lys Asp Asp Pro Pro Arg Gly His Lys Leu Leu Phe Phe Glu Pro Val
            20   25   30

Pro Glu Phe Thr Leu Asn Pro Asn Phe Thr Ile Val Asp Asn Lys Asp
        35   40   45

Asn Thr Ala Gly
    50

<210> 641
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R218G"

<400> 641
Gln Ala Gly Ala Thr Leu Asp Tyr Glu Arg Ser Arg Thr His Tyr Ile
1   5   10   15

Thr Val Val Ala Lys Asp Gly Gly Gly Gly Gly Leu His Gly Ala Asp
            20   25   30

Val Val Phe Ser Ala Thr Thr Thr Val Thr Val Asn Val Glu Asp Val
        35   40   45

Gln Asp Met Ala
    50

<210> 642
<211> 53
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E79del"

<400> 642
Ser Pro Tyr Arg Arg Glu Asp Ser Met Glu Asp Arg Gly Glu Glu Asp
1   5   10   15

Asp Ser Leu Ala Ile Lys Pro Pro Gln Met Ser Arg Lys Glu Lys Val
            20   25   30

His His Arg Lys Asp Glu Lys Arg Lys Glu Lys Cys Arg His His Ser
        35   40   45

His Ser Ala Glu Gly
    50

<210> 643
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R880S"

<400> 643
Asp Phe Gly Leu Ala Arg Leu Tyr Ser Ser Glu Glu Ser Arg Pro Tyr
1 5 10 15

Thr Asn Lys Val Ile Thr Leu Trp Tyr Ser Ser Pro Pro Glu Leu Leu
20 25 30

Leu Gly Glu Glu Arg Tyr Thr Pro Ala Ile Asp Val Trp Ser Cys Gly
35 40 45

Cys Ile Leu Gly
50

<210> 644
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R108C"

<400> 644
Gly Ser Asp Gly Glu Ser Asp Gln Ala Ser Ala Thr Ser Ser Asp Glu
1 5 10 15

Val Gln Ser Pro Val Arg Val Arg Met Cys Cys Asn His Pro Pro Arg
20 25 30

Lys Ile Ser Thr Glu Asp Ile Asn Lys Arg Leu Ser Leu Pro Ala Asp
35 40 45

Ile Arg Leu Pro
50

<210> 645
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.H1592Q"

<400> 645
Leu Asp Glu Glu His Arg Arg Leu Arg Glu Ala Ser Gly Glu Gly Trp
1 5 10 15

Lys Gly Gln Asp Pro Phe Arg Asp Leu Gln Gln Ser Leu Leu Met Glu
20 25 30

Ile Gln Ala Leu Arg Leu Gln Leu Glu Arg Ser Ile Glu Thr Ser Ser
35 40 45

Thr Leu Gln Ser
50

<210> 646
<211> 53
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P409L"

<400> 646
Tyr Lys Phe Pro Ser Leu Phe Ile Asn Gln Phe Tyr Pro Arg Pro Gly
1 5 10 15

Thr Pro Ala Ala Lys Met Glu Gln Val Leu Leu Ala Gln Val Lys Lys
20 25 30

Gln Arg Thr Lys Asp Leu Ser Arg Val Phe His Ser Tyr Ser Pro Tyr
35 40 45

Asp His Lys Ile Gly
50

<210> 647
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.H83Y"

<400> 647
Arg Val Ala Glu Leu Leu Leu Leu His Gly Ala Glu Pro Asn Cys Ala
1 5 10 15

Asp Pro Ala Thr Leu Thr Arg Pro Val Tyr Tyr Asp Ala Ala Arg Glu
20 25 30

Gly Phe Leu Asp Thr Leu Val Val Leu His Arg Ala Gly Ala Arg Leu
35 40 45

Asp Val Arg Asp
50

<210> 648
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D108Y"

<400> 648
His Asp Ala Ala Arg Glu Gly Phe Leu Asp Thr Leu Val Val Leu His
1 5 10 15

Arg Ala Gly Ala Arg Leu Asp Val Arg Tyr Tyr Ala Trp Gly Arg Leu
20 25 30

Pro Val Asp Leu Ala Glu Glu Leu Gly His Arg Asp Val Ala Arg Tyr
35 40 45

Leu Arg Ala Ala
50

<210> 649
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V31A"

<400> 649
Asp Val Asp Phe Leu Glu Asp Val Pro Leu Leu Glu Asp Ile Pro Leu
1 5 10 15

Leu Glu Asp Val Pro Leu Leu Glu Asp Ala Ala Pro Leu Leu Glu Asp
20 25 30

Thr Ser Arg Leu Glu Asp Ile Asn Leu Met Glu Asp Met Ala Leu Leu
35 40 45

Glu Asp Val Asp
50

<210> 650
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.A60G"

<400> 650
Val Ser Ala Pro Asp Gly Pro Ser Asp Pro Ser Ile Ser Val Ser Ser
1 5 10 15

Glu Gln Ser Gly Ala Gln Gln Pro Pro Gly Gly Leu Gln Val Glu Arg
20 25 30

Ile Val Asp Lys Arg Lys Asn Lys Lys Gly Lys Thr Glu Tyr Leu Val
35 40 45

Arg Trp Lys Gly
50

<210> 651
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成多肽"

<220>
<221> 來源
<223> /注釋="p.L640I"

<400> 651
Cys His Ser Ala Ser Asn Pro Ser Pro Gln Tyr Ser Trp Arg Ile Asn
1 5 10 15

Gly Ile Pro Gln Gln His Thr Gln Val Ile Ile Phe Ile Ala Lys Ile
20 25 30

Thr Pro Asn Asn Asn Gly Thr Tyr Ala Cys Phe Val Ser Asn Leu Ala
35 40 45

Thr Gly Arg Asn
50

<210> 652
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成多肽"

<220>
<221> 來源
<223> /注釋="p.A309P"

<400> 652
Tyr Leu Asn Pro Met Ala Ala Phe Ala Ala Ala Gln Met Gln Gln Met
1 5 10 15

Ala Ala Leu Asn Met Asn Gly Leu Ala Pro Pro Ala Pro Met Thr Pro
20 25 30

Thr Ser Gly Gly Ser Thr Pro Pro Gly Ile Thr Ala Pro Ala Val Pro
35 40 45

Ser Ile Pro Ser
50

<210> 653
<211> 78
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成多肽"

<220>
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<223> /注釋="p.G614fs"

<400> 653
Ala Val Asp Ala Asp Ser Gly Glu Asn Ala Arg Leu His Tyr Arg Leu
1 5 10 15

Val Asp Thr Ala Ser Thr Phe Leu Gly Ala Ala Ala Leu Gly Leu Arg
20 25 30

Ile Leu Pro Pro Pro Leu Thr Ser Pro Ser Arg Ser Thr Thr Ala Pro
35 40 45

Val Gly Ser Gln Cys Val Pro Ser Trp Thr Ala Arg Arg Trp Ser Thr
50 55 60

Thr Ala Ser Gly Trp Arg Arg Trp Thr Thr Ala Arg Pro Pro
65 70 75

<210> 654
<211> 45
<212> PRT
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<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<400> 654
Met Arg Ser Pro Ala Thr Gly Val Pro Leu Pro Thr Pro Pro Pro Pro
1 5 10 15

Pro Pro Leu Leu Leu Leu Leu Leu Leu Leu Leu Pro Pro Pro Leu Leu
20 25 30

Gly Asp Gln Val Gly Pro Cys Arg Ser Leu Gly Ser Arg
35 40 45

<210> 655
<211> 43
<212> PRT
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多肽"

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<400> 655
Met Arg Ser Pro Ala Thr Gly Val Pro Leu Pro Thr Pro Pro Pro Pro
1 5 10 15

Pro Pro Leu Leu Leu Leu Leu Leu Leu Leu Pro Pro Pro Leu Leu Gly
20 25 30

Asp Gln Val Gly Pro Cys Arg Ser Leu Gly Ser
35 40

<210> 656
<211> 47
<212> PRT
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 656
Met Ser Leu Asp Phe Gly Ser Val Ala Leu Pro Val Gln Asn Glu Asp
1 5 10 15

Glu Glu Tyr Asp Lys Lys Glu Asp Tyr Glu Arg Glu Lys Glu Leu Gln
20 25 30

Gln Leu Leu Thr Asp Leu Pro His Asp Met Leu Asp Asp Asp Leu
35 40 45

<210> 657
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 657
Thr Glu Val Tyr Asp Leu Pro Gln Arg Pro Asn Asp Val Gln Leu Phe
1 5 10 15

Tyr Gly Ser Met Cys Lys Ile Ile Leu Leu Leu Val Ile Gly Glu Phe
20 25 30

Arg Asp Cys Ile Ser Ser Arg Glu Phe Leu Gln Pro Ser Ser Lys Ala
35 40 45

Ser Leu Glu Ser
50

<210> 658
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 658
Val Asn Val Asn Pro Glu Ile Thr Ala Leu Gln Thr Met Leu Ala Glu
1 5 10 15

Cys Gln Glu Asn Leu Lys Lys Leu Thr Leu Leu Ile Glu Lys Arg Leu
20 25 30

Asp Cys Leu Glu Gln Lys Met Lys Gly Lys Val Met Val Asp Glu Asn
35 40 45

Thr Trp Thr Asn
50

<210> 659
<211> 60
<212> PRT
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多肽"

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<400> 659
Arg Ala Arg Met Ala Leu Trp Cys Ala Thr Asp His Asn Val Asp Asn
1 5 10 15

Thr Thr Glu Met Leu Gln Glu Trp Leu Gly Ala Met Thr Met Leu Leu
20 25 30

Trp Ser Gly Gly Leu Arg Ala Ser Pro Gly Ser Thr Gln Met Lys Arg
35 40 45

Val Pro Ser Thr Gly Pro Lys Lys Gly Thr Ser Phe
50 55 60

<210> 660
<211> 52
<212> PRT
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多肽"

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<223> /注釋="p.E95D"

<400> 660
Phe Val Ala Ser Pro Leu Ala Lys Ser Phe Gly Ile Lys Glu Thr Val
1 5 10 15

Arg Lys Val Thr Pro Asn Thr Val Leu Asp Asp Asn Phe Phe Lys His
20 25 30

Ser Thr Arg Gln Pro Leu Gln Thr Asp Ile Tyr Gly Leu Ala Lys Lys
35 40 45

Cys Asn Leu Thr
50

<210> 661
<211> 28
<212> PRT
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<220>
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肽"

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<223> /注釋="p.K63fs"

<400> 661
Thr Asp Lys Asp Glu Ala Ile Asp Tyr His Glu Leu Lys Val Ala Met
1 5 10 15

Arg Ala Leu Gly Phe Asp Val Lys Lys Leu Met Tyr
20 25

<210> 662
<211> 53
<212> PRT
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<220>
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多肽"

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<223> /注釋="p.R314M"

<400> 662
Ile Asn Val Ser Val Ala Ile Ile Thr Phe Ala Ser Glu Pro Lys Val
1 5 10 15

Leu Met Ser Val Leu Asn Asp Asn Ser Met Met Asp Met Thr Glu Val
20 25 30

Ile Ser Ser Leu Glu Asn Ala Asn Tyr Lys Asp His Glu Asn Gly Thr
35 40 45

Gly Thr Asn Thr Tyr
50

<210> 663
<211> 29
<212> PRT
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<220>
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肽"

<220>
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<223> /注釋="p.P129fs"

<400> 663
Ala Arg Lys Lys Lys Glu Asp Glu Leu Trp Ala Ser Phe Leu Asn Asp
1 5 10 15

Val Gly Pro Lys Ser Lys Val Pro Pro Lys Tyr Thr Ser
20 25

<210> 664
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 664
Leu Cys Lys Glu Asn Tyr Leu Leu Pro Glu Ala Lys Glu Ile Val Cys
1 5 10 15

Lys Asp Gly Arg Trp Gln Ser Leu Pro His His Cys Val Glu Ser Thr
20 25 30

Ala Tyr Cys Gly Pro Pro Pro Ser Ile Asn Asn Gly Asp Thr Thr Ser
35 40 45

Phe Pro Leu Ser
50

<210> 665
<211> 89
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.K37fs"

<400> 665
Cys Phe His Leu Arg Phe Cys Lys Val Thr Tyr Thr Ser Gln Glu Asp
1 5 10 15

Leu Val Glu Lys Lys Cys Leu Ala Lys Asn Ile Leu Thr Ser Pro Ala
20 25 30

Ile Lys Ser Ser Ala Ser His Gly Arg Asp Ala Leu Arg Ala Pro Val
35 40 45

Phe Val Asn Tyr Arg Ile Ser Ala Gln Arg Met Ala Leu Gln Cys Val
50 55 60

Gln Leu Thr Gly Glu Ala Ser Gln His Thr Val Asn Lys Arg Val Trp
65 70 75 80

Asn Val Phe Ile Gln Gly Gln Ser Phe
85

<210> 666
<211> 44
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<223> /注釋="p.T18A"

<400> 666
Met Glu Met Phe Gln Gly Leu Leu Leu Leu Leu Leu Leu Ser Met Gly
1 5 10 15

Gly Ala Ala Trp Ala Ser Arg Glu Met Leu Arg Pro Arg Cys Arg Pro
20 25 30

Ile Asn Ala Thr Leu Ala Val Glu Lys Glu Gly Cys
35 40

<210> 667
<211> 52
<212> PRT
<213> 人工序列

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多肽"

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<223> /注釋="p.T79M"

<400> 667
Pro Cys Leu Gly Gly Met Ala Ser Gly Pro Cys Gly Glu Gln Phe Lys
1 5 10 15

Ser Ala Phe Ser Cys Phe His Tyr Ser Met Met Glu Glu Ile Lys Gly
20 25 30

Ser Asp Cys Val Asp Gln Phe Arg Ala Met Gln Glu Cys Met Gln Lys
35 40 45

Tyr Pro Asp Leu
50

<210> 668
<211> 40
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P597fs"

<400> 668
Trp Arg Trp Gly Glu Pro Pro Val Ala Val Pro Ala Pro Gln Gln Ala
1 5 10 15

Asp Gly Asn Pro Asp Val Pro Pro Pro Val Leu Phe Lys Ala Asp Gln
20 25 30

Ser Glu Ser Ser Leu Ser Ser Gly
35 40

<210> 669
<211> 52
<212> PRT
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<220>
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多肽"

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<221> 來源
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<400> 669
Leu Gly Pro His Met Leu Arg Arg Leu Lys Ala Asp Val Phe Lys Asn
1 5 10 15

Met Pro Ser Lys Thr Glu Leu Ile Val His His Val Glu Leu Ser Pro
20 25 30

Met Gln Lys Lys Tyr Tyr Lys Tyr Ile Leu Thr Arg Asn Phe Glu Ala
35 40 45

Leu Asn Ala Arg
50

<210> 670
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<223> /注釋="p.A801T"

<400> 670
Tyr Val Val Thr Tyr Thr Gly Asp Lys Glu Ser Arg Ser Val Ile Arg
1 5 10 15

Glu Asn Glu Phe Ser Phe Glu Asp Asn Thr Thr Ile Arg Ser Gly Lys
20 25 30

Lys Val Phe Arg Met Lys Lys Glu Val Gln Ile Lys Phe His Val Leu
35 40 45

Leu Thr Ser Tyr
50

<210> 671
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<221> 來源
<223> /注釋="p.E40A"

<400> 671
Ala Arg Gly Ala Leu Gly Gln Gln Gln Ser Leu Gly Ala Arg Ala Leu
1 5 10 15

Ala Ser Ala Gly Ser Glu Ser Arg Asp Ala Ala Tyr Ser Tyr Val Val
20 25 30

Val Gly Ala Gly Ser Ala Gly Cys Val Leu Ala Gly Arg Leu Thr Glu
35 40 45

Asp Pro Ala Glu
50

<210> 672
<211> 53
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<221> 來源
<223> /注釋="p.K373E"

<400> 672
Leu Lys Pro Glu Asn Val Leu Leu Ser Ser Gln Glu Glu Asp Cys Leu
1 5 10 15

Ile Lys Ile Thr Asp Phe Gly His Ser Glu Glu Ile Leu Gly Glu Thr
20 25 30

Ser Leu Met Arg Thr Leu Cys Gly Thr Pro Thr Tyr Leu Ala Pro Glu
35 40 45

Val Leu Val Ser Val
50

<210> 673
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K373E"

<400> 673
Leu Lys Pro Glu Asn Val Leu Leu Ser Ser Gln Glu Glu Asp Cys Leu
1 5 10 15

Ile Lys Ile Thr Asp Phe Gly His Ser Glu Glu Ile Leu Gly Glu Thr
20 25 30

Ser Leu Met Arg Thr Leu Cys Gly Thr Pro Thr Tyr Leu Ala Pro Glu
35 40 45

Val Leu Val Ser
50

<210> 674
<211> 45
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.P284fs"

<400> 674
Leu Ile Leu Gly Met Pro Thr Tyr Gly Arg Ser Phe Thr Leu Ala Ser
1 5 10 15

Ser Ser Asp Thr Arg Val Gly Ala Pro Ser His Arg Val Trp His Ser
20 25 30

Arg Pro Leu His Gln Gly Arg Arg Asp Ala Gly Leu Leu
35 40 45

<210> 675
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.K264N"

<400> 675
Cys Gly Leu Asn Val His Lys Gln Cys Ser Lys Met Val Pro Asn Asp
1 5 10 15

Cys Lys Pro Asp Leu Lys His Val Lys Asn Asn Val Tyr Ser Cys Asp
20 25 30

Leu Thr Thr Leu Val Lys Ala His Thr Thr Lys Arg Pro Met Val Val
35 40 45

Asp Met Cys Ile
50

<210> 676
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<223> /注釋="p.I43M"

<400> 676
Ala Glu Glu Tyr Gln Pro Pro Ile Trp Lys Ser Tyr Leu Tyr Gln Leu
1 5 10 15

Gln Gln Glu Ala Pro Arg Pro Lys Arg Met Met Ile Cys Pro Arg Glu
20 25 30

Val Glu Asn Arg Pro Lys Tyr Tyr Gly Arg Glu Phe His Gly Ile Ile
35 40 45

Ser Arg Glu Gln
50

<210> 677
<211> 50
<212> PRT
<213> 人工序列

<220>
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多肽"

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<221> 來源
<223> /注釋="p.L23del"

<400> 677
Met Gly Ser Gly Pro Leu Ser Leu Pro Leu Ala Leu Ser Pro Pro Arg
1 5 10 15

Leu Leu Leu Leu Leu Leu Ser Leu Leu Pro Val Ala Arg Ala Ser Glu
20 25 30

Ala Glu His Arg Leu Phe Glu Arg Leu Phe Glu Asp Tyr Asn Glu Ile
35 40 45

Ile Arg
50

<210> 678
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.S396R"

<400> 678
Leu Ile Glu Ser Met His Lys Met Ala Ser Ala Pro Arg Phe Trp Pro
1 5 10 15

Glu Pro Glu Gly Glu Pro Pro Ala Thr Arg Arg Gly Thr Gln Ser Leu
20 25 30

His Pro Pro Ser Pro Ser Phe Cys Val Pro Leu Asp Val Pro Ala Glu
35 40 45

Pro Gly Pro Ser
50

<210> 679
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.P361Q"

<400> 679
Trp Ala Arg Val Val Ile Leu Lys Tyr Met Ser Arg Val Leu Phe Val
1 5 10 15

Tyr Asp Val Gly Glu Ser Cys Leu Ser Gln Gln His His Ser Arg Glu
20 25 30

Arg Asp His Leu Thr Lys Val Tyr Ser Lys Leu Pro Glu Ser Asn Leu
35 40 45

Lys Ala Ala Arg
50

<210> 680
<211> 38
<212> PRT
<213> 人工序列

<220>
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多肽"

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<223> /注釋="p.R507fs"

<400> 680
Pro Glu Gly Asn Lys Gly Phe Gly Arg Lys Val Phe Ser Pro Val Ile
1 5 10 15

Arg Ser Ser Phe Thr His Cys Arg Pro His Trp Thr Leu Ser Pro Gln
20 25 30

Gly Pro Arg Ile Leu Leu
35

<210> 681
<211> 58
<212> PRT
<213> 人工序列

<220>
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多肽"

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<223> /注釋="p.A1114fs"

<400> 681
Ile Thr Ala Phe Tyr Ser Gly Ser Pro Ala Pro Thr Ser Ser Ala Pro
1 5 10 15

Leu Ala Gln Pro Ser Gln Ala Pro Pro Lys Pro Gly Leu His Cys Gly
20 25 30

His Gln His Asn Pro Thr Cys Ser His His Ser Ala Gln Gly Pro Ala
35 40 45

Ser Pro Cys His Cys His Pro Ser Pro Asp
50 55

<210> 682
<211> 69
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A1114fs"

<400> 682
Val Ile Thr Ala Phe Tyr Ser Gly Ser Pro Ala Pro Thr Ser Ser Ala
1 5 10 15

Pro Leu Ala Gln Pro Ser Gln Ala Pro Gln Ala Trp Ser Thr Leu Trp
20 25 30

Pro Pro Ala Gln Pro His Leu Gln Pro Pro Phe Cys Pro Arg Ala Arg
35 40 45

Gln Pro Leu Pro Leu Pro Pro Gln Pro Arg Leu Ala Leu Ser Pro Ala
50 55 60

Pro Gln Gln Val Pro
65

<210> 683
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E728K"

<400> 683
Ala Glu Ser Glu Leu Ala Phe Pro Ser Phe Leu Leu Gln Cys Phe Leu
1 5 10 15

Gly Ala Leu Trp Leu Ala Leu Ser Gly Lys Lys Ile Lys Asp Lys Glu
20 25 30

Leu Pro Gln Tyr Leu Ala Leu Thr Pro Arg Lys Lys Arg Pro Tyr Asp
35 40 45

Asn Trp Leu Glu
50

<210> 684
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V553M"

<400> 684
Val Thr Phe Val Asp Pro Ser Gly Glu Phe Met Asp Ala Val Arg Val
1 5 10 15

Leu Pro Phe Asp Pro Arg Gly Ala Gly Met Met Tyr His Glu Val Lys
20 25 30

Ala Met Arg Lys Lys Ala Pro Val Ile Leu His Thr Ser Gln Ser Asn
35 40 45

Thr Ile Pro Leu
50

<210> 685
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S250I"

<400> 685
Thr Gly Thr Leu Val Lys Ser His Leu Ile Ala Asn Ala Asp Val Gln
1 5 10 15

Ser Ile Ala Val Ala Asp Gln Glu Asp Ile Ile Phe Val Val Gly Thr
20 25 30

Ala Glu Gly Thr Val Phe His Phe Gln Leu Val Pro Val Thr Ser Asn
35 40 45

Ser Ser Glu Lys
50

<210> 686
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成多肽"

<220>
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<223> /注釋="p.V668A"

<400> 686
Ser Glu Pro Gln His Gln Gln Arg Leu Gly Glu Ile Gln His Met Ser
1 5 10 15

Gln Ala Cys Leu Leu Ser Leu Leu Pro Ala Ala Pro Arg Asp Val Leu
20 25 30

Glu Thr Glu Asp Glu Glu Pro Pro Pro Arg Arg Trp Cys Asn Thr Cys
35 40 45

Gln Leu Tyr Tyr
50

<210> 687
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成多肽"

<220>
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<223> /注釋="p.L89P"

<400> 687
Gln Leu Leu Gln Leu Gln Gln Leu Leu Gln Gln Ser Pro Pro Gln Ala
1 5 10 15

Pro Leu Pro Met Ala Val Ser Arg Gly Pro Pro Pro Pro Gln Gln Pro
20 25 30

Gln Gln Pro Leu Leu Asn Leu Gln Gly Thr Asn Ser Ala Ser Leu Leu
35 40 45

Asn Gly Ser Met
50

<210> 688
<211> 29
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<220>
<221> 來源
<223> /注釋="p.*684K"

<400> 688
Gly Arg Glu Thr Asp Ala Phe Val Cys Arg Pro Asn Ala Ala Leu Cys
1 5 10 15

Arg Val Tyr Tyr Glu Ala Asp Thr Thr Lys Lys Glu Lys
20 25

<210> 689
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.G576A"

<400> 689
Ala Gly Gly Pro Pro Lys Lys Gly Lys Pro Ala Ala Pro Gly Gly Ala
1 5 10 15

Gly Asn Thr Gly Thr Lys Asn Lys Lys Ala Ala Leu Glu Thr Lys Glu
20 25 30

Ile Val Glu Pro Glu Leu Ser Ile Glu Val Cys Glu Glu Lys Ala Ser
35 40 45

Ala Val Leu Pro
50

<210> 690
<211> 55
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.645_645R>RR"

<400> 690
Ile Leu Leu Gly Ser Ile Glu Arg Ser Gln Val Val Ala Leu Leu Gly
1 5 10 15

Ala Gln Leu Ser Pro Ala Arg Arg Arg Arg Arg Arg Gln His Met Gln
20 25 30

Glu Arg Arg Ala Thr Gln Thr Ser Pro Leu Ser Asp Gln Glu Gly Pro
35 40 45

Pro Thr Pro Glu Ala Ser Val
50 55

<210> 691
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P124Q"

<400> 691
Tyr Pro Val Ala Leu Val Ser Phe Ser Ser Gly Phe Ser Gln Ser Ile
1 5 10 15

Thr Pro Ser Ser Gly Gly Ser Gly Ile Gln Gln Glu Leu Lys Thr Met
20 25 30

Leu Ala Gly Val Ile Leu Glu Asp Tyr Leu Asp Ile Lys Asn Phe Gly
35 40 45

Ala Lys Val Val
50

<210> 692
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V210M"

<400> 692
Cys Asp Glu Arg Cys Arg Arg Arg Arg Lys Gly Pro Ser Ala Gly Pro
1 5 10 15

Arg Arg Ser Ser Val Ser Thr Ile Gln Met Met Glu Trp Pro Glu Pro
20 25 30

Asp Leu Ala Pro Ala Ile Lys Tyr Tyr Ser Asp Gly Gln His Arg Pro
35 40 45

Pro Pro Ala Gln
50

<210> 693
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S172A"

<400> 693
Asp Phe Tyr Asn Pro Leu Ile Pro Thr Asn Ile Lys Tyr Glu Phe Gly
1 5 10 15

Pro Ala Ile Phe Ile Gly Trp Ala Gly Ala Ala Ala Leu Val Ile Leu
20 25 30

Gly Gly Ala Leu Leu Ser Cys Ser Cys Pro Gly Asn Glu Ser Lys Ala
35 40 45

Gly Tyr Arg Val
50

<210> 694
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.W217L"

<400> 694
Met Ser Gln Pro Leu Leu Met Phe Ser Phe Phe Trp Leu Gly Leu Ser
1 5 10 15

Trp Asp Ser Ser Gly Arg Ser Trp Phe Leu Leu Glu Asp Gly Ser Val
20 25 30

Pro Ser Pro Ser Leu Phe Ser Thr Lys Glu Leu Asp Gln Ile Asn Gly
35 40 45

Ser Lys Gly Cys
50

<210> 695
<211> 50
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多肽"

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<400> 695
Gly Gln Pro Asp Asn His Gly Phe Gly Asn Cys Val Glu Leu Gln Ala
1 5 10 15

Ser Ala Ala Phe Asn Trp Asn Asn Gln His His Cys Lys Thr Arg Asn
20 25 30

Arg Tyr Ile Cys Gln Phe Ala Gln Glu His Ile Ser Arg Trp Gly Pro
35 40 45

Gly Ser
50

<210> 696
<211> 52
<212> PRT
<213> 人工序列

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<400> 696
Tyr Asn Glu Ser Ser Thr Phe Trp His Pro Arg Glu Pro Ser Asp Pro
1 5 10 15

Asn Glu Arg Cys Val Val Leu Asn Phe His His Lys Ser Pro Lys Arg
20 25 30

Trp Gly Trp Asn Asp Val Asn Cys Leu Gly Pro Gln Arg Ser Val Cys
35 40 45

Glu Met Met Lys
50

<210> 697
<211> 52
<212> PRT
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<220>
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<400> 697
Gln Trp Val Asp Gln Thr Pro Tyr Asn Glu Asn Val Thr Phe Trp His
1 5 10 15

Ser Gly Glu Pro Asn Asn Leu Asp Glu Leu Leu Cys Ala Ile Ile Asn
20 25 30

Phe Arg Ser Ser Glu Glu Trp Gly Trp Asn Asp Ile His Cys His Val
35 40 45

Pro Gln Lys Ser
50

<210> 698
<211> 52
<212> PRT
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<400> 698
Glu Gly Pro Ala Gly Asp Ser Met Asp Ala Glu Gly Pro Ala Gly Arg
1 5 10 15

Ala Arg Arg Val Ser Gly Glu Pro Gln Glu Glu Ser Gly Asp Gly Ser
20 25 30

Leu Ser Pro Gln Ala Glu Ala Ile Glu Val Ala Ala Gly Glu Ser Ala
35 40 45

Gly Arg Ser Pro
50

<210> 699
<211> 37
<212> PRT
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<220>
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多肽"

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<400> 699
Ala Ala Lys Lys His Glu Glu Glu Lys Lys Glu Leu Glu Arg Lys Leu
1 5 10 15

Ser Asp Leu Glu Lys Lys Met Glu Thr Lys Pro Gln Pro Val Ser Gly
20 25 30

Ala Glu Ser Gln Val
35

<210> 700
<211> 52
<212> PRT
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多肽"

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<400> 700
Cys Lys Pro His His Gln Phe Lys Glu Ser Asp Cys His Tyr Leu Glu
1 5 10 15

Ala Arg Ser Leu Asn Glu Arg Asp Tyr Leu Leu Asp Arg Arg Tyr Val
20 25 30

Asp Glu Tyr Arg Asn Asp Tyr Cys Glu Gly Tyr Val Pro Arg His Tyr
35 40 45

His Arg Asp Ile
50

<210> 701
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 701
Ile Ser Trp Trp Ser Ser Gly Thr Gly Gly Ala Gly Leu Leu Gly Ala
1 5 10 15

Leu Ser Tyr Leu Gly Leu Thr Gln Ala Ser Ser Leu Ser Pro Gln Gln
20 25 30

Thr Leu Leu Ser Met Leu Gly Ile Pro Ala Leu Leu Leu Ala Ser Tyr
35 40 45

Phe Leu Leu Leu
50

<210> 702
<211> 52
<212> PRT
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多肽"

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<400> 702
Leu Glu Gly Glu Asp Leu Gly Glu Leu Asp Lys Ala Met Gln His Ile
1 5 10 15

Ser Tyr Leu Asn Ser Arg Gln Phe Pro Met Met Pro Gly Ile Arg Arg
20 25 30

Leu Lys Ile Thr Ser Thr Ile Lys Cys Phe Asn Glu Ala Thr Cys Ile
35 40 45

Ser Val Pro Pro
50

<210> 703
<211> 52
<212> PRT
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多肽"

<220>
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<400> 703
Tyr Ser Ile Tyr Gly Val Gly Ser Met Ser Arg Tyr Glu Gln Val Leu
1 5 10 15

His His Ile Arg Tyr Arg Asn Trp Arg Leu Leu Ala Ser Leu Glu Ala
20 25 30

Arg Arg Phe Arg Ile Lys Cys Ser Glu Leu Asn Gly Arg Tyr Thr Ser
35 40 45

Asn Glu Phe Asn
50

<210> 704
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 704
Ser Glu Leu Ala Asn Gln Ala Pro Glu Thr Glu Ile Ile Phe Asn Ser
1 5 10 15

Ile Gln Val Val Pro Arg Ile His Glu Arg Arg Asn Ile Ser Lys Gln
20 25 30

Asp Glu Thr Met Met Thr Asp Leu Ser Ile Leu Pro Ser Ser Asn Phe
35 40 45

Thr Leu Lys Ile
50

<210> 705
<211> 52
<212> PRT
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<220>
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<400> 705
Ile Arg Arg Asn Phe Val Leu Thr Ala Ala His Cys Ala Gly Arg Ser
1 5 10 15

Ile Thr Val Thr Leu Gly Ala His Asn Lys Lys Thr Glu Glu Glu Asp
20 25 30

Thr Trp Gln Lys Leu Glu Val Ile Lys Gln Phe Arg His Pro Lys Tyr
35 40 45

Asn Thr Ser Thr
50

<210> 706
<211> 52
<212> PRT
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多肽"

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<400> 706
Phe Gln Ser Val Trp Val Ser Thr Asp His Asp Glu Ile Glu Asn Val
1 5 10 15

Ala Lys Gln Phe Gly Ala Gln Val His Gln Gln Arg Ser Ser Glu Val
20 25 30

Ser Lys Asp Ser Ser Thr Ser Leu Asp Ala Ile Ile Glu Phe Leu Asn
35 40 45

Tyr His Asn Glu
50

<210> 707
<211> 52
<212> PRT
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<220>
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<223> /注釋="p.A230T"

<400> 707
Glu Ile Val Ser Lys Leu Leu Ser Glu Asn Thr Asn Leu Thr Thr Gln
1 5 10 15

Glu His Glu Asn Ile Ile Val Ala Ile Thr Thr Pro Leu Leu Glu Asn
20 25 30

Asn His Pro Pro Pro Asp Leu Cys Glu Phe Phe Cys Lys His Cys Arg
35 40 45

Glu Arg Pro Arg
50

<210> 708
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 708
Met Glu Glu Pro Gln Arg Ala Arg Ser His Thr Val Thr Thr Thr Ala
1 5 10 15

Ser Ser Phe Ala Glu Asn Phe Ser Thr Thr Thr Ser Ser Ser Phe Ala
20 25 30

Tyr Asp Arg Glu Phe Leu Arg Thr Leu Pro Gly Phe Leu Ile Val Ala
35 40 45

Glu Ile Val Leu
50

<210> 709
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 709
Arg Ser Ile Ile Gly Phe Val Lys Leu Arg Ser Asn Lys Val Lys Arg
1 5 10 15

Ser Gln Lys Leu Val Tyr Met Gly Lys Pro Pro Lys Glu Lys Glu Ser
20 25 30

Phe Gly Glu Ile Ser Val Leu Leu Gln Val Pro Phe Thr Cys Thr Ile
35 40 45

Ile Thr Lys Lys
50

<210> 710
<211> 52
<212> PRT
<213> 人工序列

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多肽"

<220>
<221> 來源
<223> /注釋="p.K510T"

<400> 710
Ala Glu Ile Ala Leu Gln Glu Ala Thr Glu Ser Arg Leu Arg Gly Leu
1 5 10 15

Asp Gln Gln Leu Asp Asp Leu Gln Thr Thr Thr Phe Ala Arg Leu Leu
20 25 30

Ala Glu Leu Glu Ser Ser Ala Leu Lys Ile Ala Tyr Arg Ile Glu Arg
35 40 45

Leu Glu Trp Gln
50

<210> 711
<211> 52
<212> PRT
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<220>
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多肽"

<220>
<221> 來源
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<400> 711
Ser Glu Gly Leu Gly Met Tyr Ile Lys Ser Thr Tyr Asp Gly Leu His
1 5 10 15

Val Ile Thr Gly Thr Thr Glu Asn Ser Leu Leu Ala Asp Arg Cys Lys
20 25 30

Lys Ile His Ala Gly Asp Glu Val Ile Gln Val Asn His Gln Thr Val
35 40 45

Val Gly Trp Gln
50

<210> 712
<211> 46
<212> PRT
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多肽"

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<221> 來源
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<400> 712
Met Ala Asp Lys Arg Lys Leu Gln Gly Glu Ile Asp Arg Cys Leu Lys
1 5 10 15

Lys Val Ser Lys Lys Gly Val Glu Gln Phe Glu Asp Ile Trp Gln Lys
20 25 30

Leu His Asn Ala Ala Asn Ala Asn Gln Lys Glu Lys Tyr Glu
35 40 45

<210> 713
<211> 26
<212> PRT
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肽"

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<400> 713
Gln Glu Ile Leu Ser Cys Asn Ala Asp Ile Val Ser Leu Gln Glu Val
1 5 10 15

Glu Thr Glu Gln Tyr Tyr Ser Phe Phe Trp
20 25

<210> 714
<211> 52
<212> PRT
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多肽"

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<223> /注釋="p.R102W"

<400> 714
Glu Pro Asp Gly Asp Arg Val Val Tyr Thr Gly Thr Tyr Asp Thr Glu
1 5 10 15

Gly Val Thr Pro Thr Lys Ser Gly Glu Trp Trp Gln Pro Ile Gln Ile
20 25 30

Thr Met Pro Phe Thr Asp Ile Gly Thr Phe Glu Thr Val Trp Gln Val
35 40 45

Lys Phe Tyr Asn
50

<210> 715
<211> 52
<212> PRT
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多肽"

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<400> 715
Gln Thr Pro Ser Thr Trp Pro Asp Pro Glu Ser Phe Pro Leu Lys Phe
1 5 10 15

Phe Leu Arg Tyr Arg Pro Leu Ile Leu Tyr Tyr Gln Trp Gln His Val
20 25 30

Glu Leu Ser Asp Gly Thr Ala His Thr Ile Thr Asp Ala Tyr Ala Gly
35 40 45

Lys Glu Tyr Ile
50

<210> 716
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 716
Leu Glu Ile Pro Asn Val Gln Leu Asp Asp Ala Gly Ile Tyr Glu Cys
1 5 10 15

Arg Ala Glu Asn Ser Arg Gly Lys Asn Phe Phe Phe Arg Gly Gln Leu
20 25 30

Gln Val Tyr Thr Tyr Pro His Trp Val Glu Lys Leu Asn Asp Thr Gln
35 40 45

Leu Asp Ser Gly
50

<210> 717
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 717
Ile Asp Gly Thr Phe Ile Ile Ser Asn Pro Ser Glu Ala Lys Asp Ser
1 5 10 15

Gly His Tyr Gln Cys Leu Ala Thr Asn Asn Asn Val Gly Ser Ile Leu
20 25 30

Ser Arg Glu Ala Thr Leu Gln Phe Ala Tyr Leu Gly Asn Phe Ser Gly
35 40 45

Arg Thr Arg Ser
50

<210> 718
<211> 52
<212> PRT

<213> 人工序列

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多肽"

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<400> 718
Asn Asn Glu Gly Glu Gly Ser Leu Ser Thr Val Thr Ile Val Tyr Ser
1 5 10 15

Gly Glu Asp Glu Pro Gln Leu Ala Pro Met Met Gly Thr Ser Leu Gln
20 25 30

Ser Phe Ser Ala Ser Glu Met Glu Val Ser Trp Asn Ala Ile Ala Trp
35 40 45

Asn Arg Asn Thr
50

<210> 719
<211> 52
<212> PRT
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多肽"

<220>
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<400> 719
Glu Pro Gly Thr Trp Met Arg Tyr Asn Leu Gln Ser Ala Leu Arg Ser
1 5 10 15

Ala Ala Arg Glu Phe Ser His Met Leu Ile Ile Arg Pro Val Pro Gly
20 25 30

Tyr Glu Pro Gly Tyr Ile Pro Gly Tyr Asp Thr Pro Gly Tyr Val Pro
35 40 45

Gly Tyr His Gly
50

<210> 720
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 720
Glu Pro Tyr Thr Val Pro Val Phe Phe Asn Ala Thr Ser Tyr Leu Glu
1 5 10 15

Val Pro Gly Arg Leu Asn Gln Asp Leu Leu Leu Ser Val Ser Phe Gln
20 25 30

Phe Arg Thr Trp Asn Pro Asn Gly Leu Leu Val Phe Ser His Phe Ala
35 40 45

Asp Asn Leu Gly
50

<210> 721
<211> 52
<212> PRT
<213> 人工序列

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多肽"

<220>
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<400> 721
Leu Phe Ser Glu Leu Gln Leu Ile Ser Gly Gly Ile Leu Leu Phe Leu
1 5 10 15

Ser Asp Gly Lys Leu Lys Ser Asn Leu Ser Ser Gln Pro Gly Lys Leu
20 25 30

Pro Ser Asp Ile Thr Ala Gly Val Glu Leu Asn Asp Gly Gln Trp His
35 40 45

Ser Val Ser Leu
50

<210> 722
<211> 38
<212> PRT
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<220>
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多肽"

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<400> 722
Met Leu Leu Phe Tyr Leu Leu Val Val Leu Ser Phe Phe Asp Ser Thr
1 5 10 15

Lys Ala Ser Ala Leu Thr Asn Pro Asn Val Ala Leu Phe Leu Leu Ala
20 25 30

Asp Asp Cys Asp Asp Pro
35

<210> 723
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 723
Ser Lys Ile Glu Gly Ile Glu Asn Met Cys Asn Leu Gln Lys Leu Asn
1 5 10 15

Leu Ala Gly Asn Glu Ile Glu His Ile Ser Ser Val Trp Leu Gly Lys
20 25 30

Lys Leu Lys Ser Leu Arg Val Leu Asn Leu Lys Gly Asn Lys Ile Ser
35 40 45

Ser Leu Gln Asp
50

<210> 724
<211> 49
<212> PRT
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多肽"

<220>
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<400> 724
Pro Lys Thr Glu Lys Pro Pro Ala Arg Lys Lys Ser Gly His Pro Ala
1 5 10 15

Pro Ser Ser Met Arg Ser Arg Gly Gly Ser Leu Glu Met Ser Pro Pro
20 25 30

Thr Leu Ser Pro Leu Cys Ser Leu Ile Val Val Ile Leu Ile Asn Ala
35 40 45

His

<210> 725
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 725
Asp Pro Leu Thr Val Lys Asp Pro Ile Cys Ala His Gly Asn Asp Asp
1 5 10 15

Leu Leu Pro Pro Val Asp Arg Ile Asp Asn Asn Asn Ser Thr Ala Ser
20 25 30

Tyr Leu Lys Asn Tyr Pro Leu Tyr Arg Gln Asp Tyr Asn Pro Lys Pro
35 40 45

Lys Pro Ser Asn
50

<210> 726
<211> 52
<212> PRT

<213> 人工序列

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多肽"

<220>
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<400> 726
Thr Lys Val Val Ser Ser Gln Ser Ser Phe Pro Leu Ala Ala Glu Gln
1 5 10 15

Thr Ile Ile Ser Ala Leu Lys Ala Ile Arg Arg Ala Leu Met Glu Asn
20 25 30

Ala Val Gln Pro Leu Leu Thr Ser Val Gly Asp Ala Ile Glu Ala Ile
35 40 45

Ile Ile Thr Met
50

<210> 727
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 727
Ser Thr Val Gly Ala Leu Asn Lys Ile Gly Thr Asp Gly Thr Gln Val
1 5 10 15

Ala Met Val Gln Phe Thr Asp Asp Pro Ile Ile Thr Glu Phe Lys Leu
20 25 30

Asn Ala Tyr Lys Thr Lys Glu Thr Leu Leu Asp Ala Ile Lys His Ile
35 40 45

Ser Tyr Lys Gly
50

<210> 728
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.K708R"

<400> 728
Ala Arg Gly Pro Asn Gly Ser Val Gly Glu Lys Gly Asp Pro Gly Asn
1 5 10 15

Arg Gly Leu Pro Gly Pro Pro Gly Lys Arg Arg Gly Gln Ala Gly Pro
20 25 30

Pro Gly Val Met Gly Pro Pro Gly Pro Pro Gly Pro Pro Gly Pro Pro
35 40 45

Gly Pro Gly Cys
50

<210> 729
<211> 41
<212> PRT
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多肽"

<220>
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<400> 729
Asp Arg Gly Ser Arg Gly Glu Lys Gly Asp Pro Gly Lys Asp Gly Val
1 5 10 15

Gly Gln Pro Gly Leu Pro Gly Pro Pro Asp Pro Arg Asp Leu Trp Ser
20 25 30

Thr Cys Arg Ser Arg Thr Asp Pro Ser
35 40

<210> 730
<211> 52
<212> PRT
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多肽"

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<400> 730
Gly Pro Pro Gly Leu Ile Gly Ser Pro Gly Leu Lys Gly Gln Gln Gly
1 5 10 15

Ser Ala Gly Ser Met Gly Pro Arg Gly Gln Gln Pro Gly Asp Val Gly
20 25 30

Leu Pro Gly Glu His Gly Ile Pro Gly Lys Gln Gly Ile Lys Gly Glu
35 40 45

Lys Gly Asp Pro
50

<210> 731
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 731
Gly Pro Ala Gly Ala Pro Gly Leu Val Gly Pro Leu Gly Pro Ser Gly
1 5 10 15

Pro Lys Gly Lys Lys Gly Glu Pro Ile Ile Ile Ser Thr Ile Gln Gly
20 25 30

Met Pro Gly Asp Arg Gly Asp Ser Gly Ser Gln Gly Phe Arg Gly Val
35 40 45

Ile Gly Glu Pro
50

<210> 732
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.G516W"

<400> 732
Gln Gly Pro Ile Gly Pro Pro Gly Glu Glu Gly Lys Arg Gly Pro Arg
1 5 10 15

Gly Asp Pro Gly Thr Val Gly Pro Pro Trp Trp Pro Val Gly Glu Arg
20 25 30

Gly Ala Pro Gly Asn Arg Gly Phe Pro Gly Ser Asp Gly Leu Pro Gly
35 40 45

Pro Lys Gly Ala
50

<210> 733
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 733
Leu Gly Pro Leu Gly Ala Pro Gly Glu Asp Gly Arg Pro Gly Pro Pro
1 5 10 15

Gly Ser Ile Gly Ile Arg Gly Gln Pro Trp Trp Ser Met Gly Leu Pro
20 25 30

Gly Pro Lys Gly Ser Ser Gly Asp Pro Gly Lys Pro Gly Glu Ala Gly
35 40 45

Asn Ala Gly Val
50

<210> 734
<211> 52
<212> PRT

<213> 人工序列

<220>
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多肽"

<220>
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<400> 734
Gly Gln Lys Gly Asp Pro Gly Tyr Pro Gly Pro Ala Gly Pro Lys Gly
1 5 10 15

Asn Arg Gly Asp Ser Ile Asp Gln Cys Asp Asp Leu Ile Gln Ser Ile
20 25 30

Lys Asp Lys Cys Pro Cys Cys Tyr Gly Pro Leu Glu Cys Pro Val Phe
35 40 45

Pro Thr Glu Leu
50

<210> 735
<211> 52
<212> PRT
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 735
Tyr Phe Phe Val Val Leu Gly Ile Gly Arg Lys Val Asn Ile Lys Glu
1 5 10 15

Val Tyr Thr Phe Ala Ser Glu Pro Asn Asn Asn Val Phe Phe Lys Leu
20 25 30

Val Asp Lys Ser Thr Glu Leu Asn Glu Glu Pro Leu Met Arg Phe Gly
35 40 45

Arg Leu Leu Pro
50

<210> 736
<211> 52
<212> PRT
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多肽"

<220>
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<400> 736
Gln Glu Asp Phe Leu Gly Gly Asn Gly Phe Ile Gly Gln Glu Leu Asn
1 5 10 15

Ser Gly Arg Glu Ser Pro Phe Val Lys Met Met Glu Asp Asn Gly Ser
20 25 30

Asp Tyr Leu Val Tyr Leu Pro Ser Gln Met Phe Glu Pro Gln Lys Leu
35 40 45

Met Ile Asn Tyr
50

<210> 737
<211> 52
<212> PRT
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多肽"

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<400> 737
Gly Val Glu Arg Ser Ser Ala Thr Leu Phe Val Asp Cys Asn Arg Ile
1 5 10 15

Glu Ser Leu Pro Ile Lys Pro Arg Gly Gln Gln Ile Asp Ile Asp Gly
20 25 30

Phe Ala Val Leu Gly Lys Leu Ala Asp Asn Pro Gln Val Ser Val Pro
35 40 45

Phe Glu Leu Gln
50

<210> 738
<211> 69
<212> PRT
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<400> 738
Arg Ile Thr Pro Ser Gln Thr Thr Asp Glu Arg Gly Pro Pro Gly Glu
1 5 10 15

Gln Gly Pro Pro Gly Pro Pro Gly Pro Leu Glu Phe Gln Ala Ser Met
20 25 30

Ala Ser Thr Val Thr Glu Val Leu Arg Ala Pro Arg Ala Pro Arg Val
35 40 45

Leu Gln Val Asn Arg Glu Ser Gln Glu Leu Gln Ala Ser Leu Ala His
50 55 60

Leu Ala Leu Met Asp
65

<210> 739
<211> 52
<212> PRT
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多肽"

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<400> 739
Asn Val Ile Pro Val Leu Met Glu Phe Leu Ser Asp Asn Asn Glu Ala
1 5 10 15

Ala Ala Ala Asp Val Leu Glu Phe Val Cys Cys Glu Ala Ile Gln Arg
20 25 30

Phe Asp Asn Leu Arg Met Leu Ile Val Glu Lys Met Leu Glu Val Phe
35 40 45

His Ala Ile Lys
50

<210> 740
<211> 52
<212> PRT
<213> 人工序列

<220>
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<400> 740
Ser Phe Ala Leu Ala Arg Ala Ala Gly Ala Pro His Gly Gly Asp Leu
1 5 10 15

Gln Pro Pro Ala Cys Pro Glu Pro Arg Leu Trp Arg Gln Leu Ser Leu
20 25 30

Ser Ala Ala Ala Val Val Asp Ser Ala Pro Arg Pro Leu Gln Pro Tyr
35 40 45

Leu Arg Leu Met
50

<210> 741
<211> 46
<212> PRT
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<220>
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多肽"

<220>
<221> 來源
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<400> 741
Leu Thr Gln Arg Glu Val Gln Ala Lys Gln Leu Glu Leu Glu Ile Lys
1 5 10 15

Asn Leu Arg Met Gly Ser Glu Gln Leu Arg Arg Ala Glu Thr Ser Ala
20 25 30

Leu Leu Thr Leu Arg Asp Thr Thr Arg Leu His Gly Glu Val
35 40 45

<210> 742
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<400> 742
Pro Ser Lys Ala Ala Glu Arg Val Val Gly Arg Trp Leu Leu Val Cys
1 5 10 15

Ser Gly Thr Val Ala Gly Ala Val Ile Ile Ile Gly Gly Val Thr Arg
20 25 30

Leu Thr Glu Ser Gly Leu Ser Met Val Asp Trp His Leu Ile Lys Glu
35 40 45

Met Lys Pro Pro
50

<210> 743
<211> 34
<212> PRT
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<220>
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多肽"

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<400> 743
Met Ala Val Val Gly Val Ser Leu Leu Val Ser Arg Leu Leu Gly Arg
1 5 10 15

Ser Arg Pro Gln Leu Gly Arg Pro Met Ser Ser Gly Ala His Gly Glu
20 25 30

Glu Gly

<210> 744
<211> 56
<212> PRT
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<220>
<221> 來源
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多肽"

<220>
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<400> 744
Thr Asp Glu Ala Val Pro Ala Phe Gln Pro His Thr Gly Ser Leu Val
1 5 10 15

Ala Val Ala Pro Ser Arg His Pro Pro Glu Gln Arg Arg Glu Lys Gly
20 25 30

Leu Ser Ser Pro Lys His Gly Phe Gly Ile Val Ser Thr Ser Val Thr
35 40 45

His Leu Val Arg Gly His Ser Val
50 55

<210> 745
<211> 52
<212> PRT
<213> 人工序列

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<400> 745
Ser Ala His Glu Tyr Ser Ser Ser Pro Asp Asp Ala Ile Phe Gln Ser
1 5 10 15

Leu Ala Arg Ala Tyr Ser Ser Phe Asn Gln Gln Ala Met Ser Asp Pro
20 25 30

Asn Arg Pro Pro Cys Arg Lys Asn Asp Asp Asp Ser Ser Phe Val Asp
35 40 45

Gly Thr Thr Asn
50

<210> 746
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 746
Ser Lys Ser Pro Asn Leu Ser Lys His Asp Phe Leu Gly Gln Val Phe
1 5 10 15

Cys Thr Leu Gly Glu Ile Val Gly Ser His His Gly Ser Arg Leu Glu
20 25 30

Lys Pro Ile Val Gly Ile Pro Gly Lys Lys Cys Gly Thr Ile Ile Leu
35 40 45

Thr Ala Glu Glu
50

<210> 747
<211> 52
<212> PRT
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<220>
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多肽"

<220>
<221> 來源
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<400> 747
Thr Pro Arg Leu Pro Met Asn Lys Glu Trp Pro Ser Asn Leu Asp Leu
1 5 10 15

Arg Lys Glu Leu Ser Glu Pro Ser Ser Lys Lys Arg Ile Tyr Ala Ile
20 25 30

Ala Lys Ala Ile Asp Asp Asn Met Ser Leu Asp Glu Ile Glu Lys Leu
35 40 45

Thr Tyr Ile Asp
50

<210> 748
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
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<400> 748
Asn Pro Pro Leu Gln Arg Ser Ser Ser Leu Ile Gln Leu Thr Ser Gln
1 5 10 15

Asn Ser Ser Pro Asn Gln Gln Arg Thr Gln Gln Gln Val Ile Gly Val
20 25 30

Met Gln Ser Gln Asn Ser Ser Ala Gly Asn Arg Gly Pro Arg Pro Leu
35 40 45

Glu Gln Val Thr
50

<210> 749
<211> 47
<212> PRT
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多肽"

<220>
<221> 來源
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<400> 749
Pro Ile Gly Thr Tyr Leu Asn Tyr Glu Cys Arg Pro Gly Tyr Ser Gly
1 5 10 15

Arg Pro Phe Ser Ile Ile Cys Leu Lys Thr Gln Ser Gly Gln Val Leu
20 25 30

Arg Thr Ser Ala Asn Val Asn His Val Val Ile Leu Gln Ile Leu
35 40 45

<210> 750
<211> 34
<212> PRT

<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 750
Glu Ser Gly Tyr Leu Leu Val Gly Glu Lys Ile Ile Asn Cys Leu Ser
1 5 10 15

Ser Gly Lys Trp Ser Ala Val Pro Pro His Val Lys Arg His Ala Val
20 25 30

Asn Leu

<210> 751
<211> 36
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 751
Ser Ile Cys Ala Phe Gln Asn Ser Phe Leu Gly Gly Leu Pro Val Gly
1 5 10 15

Met Thr Ser Asn Gly Val Ala Leu Leu Thr Ser Ile Ile Cys His Pro
20 25 30

His Leu Arg Leu
35

<210> 752
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<223> /注釋="p.F630V"

<400> 752
Ile Cys Ala Phe Gln Asn Ser Phe Leu Gly Gly Leu Pro Val Gly Met
1 5 10 15

Thr Ser Asn Gly Val Ala Leu Leu Asn Val Val Tyr Asn Met Pro Ser
20 25 30

Thr Pro Ser Phe Val Gly Cys Leu Gln Asp Ile Lys Ile Asp Trp Asn
35 40 45

His Ile Thr Leu
50

<210> 753
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.T1110M"

<400> 753
Gly Trp Glu Gly Pro Arg Cys Glu Ala His Val Asp Pro Cys His Ser
1 5 10 15

Ala Pro Cys Ala Arg Gly Arg Cys His Met Met His Pro Asp Gly Arg
20 25 30

Phe Glu Cys Arg Cys Pro Pro Gly Phe Gly Gly Pro Arg Cys Arg Leu
35 40 45

Pro Val Pro Ser
50

<210> 754
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 754
Phe Gly Met His Val Gln Glu Tyr Gly Ser Asp Cys Pro Pro Pro Asn
1 5 10 15

Thr Arg Arg Val Tyr Ile Ser Tyr Leu His His Ser Ile His Phe Phe
20 25 30

Arg Pro Arg Cys Leu Arg Thr Ala Val Tyr His Glu Ile Leu Ile Gly
35 40 45

Tyr Leu Glu Tyr
50

<210> 755
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R1446H"

<400> 755
Cys Pro Pro Pro Asn Thr Arg Arg Val Tyr Ile Ser Tyr Leu Asp Ser
1 5 10 15

Ile His Phe Phe Arg Pro Arg Cys Leu His His Thr Ala Val Tyr His
20 25 30

Glu Ile Leu Ile Gly Tyr Leu Glu Tyr Val Lys Lys Leu Gly Tyr Val
35 40 45

Thr Gly His Ile
50

<210> 756
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 756
Asp Leu Leu Arg Thr Leu Lys Ser Pro Ser Ser Pro Gln Gln Gln Gln
1 5 10 15

Gln Val Leu Asn Ile Leu Lys Ser Asn Leu Leu Gln Leu Met Ala Ala
20 25 30

Phe Ile Lys Gln Arg Thr Ala Lys Tyr Val Ala Asn Gln Pro Gly Met
35 40 45

Gln Pro Gln Pro
50

<210> 757
<211> 167
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 757
Pro Ala Cys Ser Cys Ala His Val Glu Cys Pro Pro Ala His Thr Cys
1 5 10 15

Arg Cys Gly Val Pro Ala Cys Ser His Thr Cys Pro Cys Gly Val Pro
20 25 30

Ala Cys Ser His Val Pro Met Trp Ser Ala Arg Leu Leu Thr His Val
35 40 45

Ser Met Trp Ser Ala His Leu Leu Met Cys Pro Cys Gly Val Pro Thr
50 55 60

Cys Ser His Val Pro Met Trp Ser Ala Thr Cys Ser His Thr Cys Pro
65 70 75 80

Cys Gly Val Pro Ala Cys Ser Arg Ala His Val Glu Cys Pro Pro Ala
85 90 95

His Thr Cys Arg Cys Gly Val Pro Ala Cys Ser His Val Pro Met Arg
100 105 110

Ser Ala Arg Leu Leu Thr Arg Ala His Ala Glu Cys Pro Pro Ala His
115 120 125

Thr Cys Pro Cys Gly Val Pro Ala Cys Ser His Val Pro Thr Trp Ser
130 135 140

Ala Arg Leu Leu Thr Arg Ala His Val Glu Cys Pro Pro Ala His Thr
145 150 155 160

Cys Gln Arg Gly Val Pro Ala
165

<210> 758
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.C143R"

<400> 758
Ser His Val Pro Met Arg Ser Ala Arg Leu Leu Thr Arg Ala His Ala
1 5 10 15

Glu Cys Pro Pro Ala His Thr Cys Pro Arg Arg Gly Val Pro Ala Cys
20 25 30

Ser His Val Pro Met Arg Ser Ala Arg Leu Leu Thr Arg Ala Asp Val
35 40 45

Glu Cys Pro Pro
50

<210> 759
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.C174R"

<400> 759
Ser His Val Pro Met Arg Ser Ala Arg Leu Leu Thr Arg Ala Asp Val
1 5 10 15

Glu Cys Pro Pro Ala His Thr Cys Pro Arg Arg Gly Val Pro Ala Cys
20 25 30

Ser His Val Pro Thr Trp Ser Ala Arg Leu Ile Thr Arg Ala His Val
35 40 45

Glu Cys Ser Pro
50

<210> 760
<211> 259
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.S180fs"

<400> 760

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Leu Thr Arg Ala Asp Val Glu Cys Pro Pro Ala His Thr Cys Pro Cys
1               5                  10                  15

Gly Val Pro Ala Cys Ser His Val Pro Met Trp Ser Ala Arg Leu Leu
            20                  25                  30

Thr Arg Ala Asp Val Glu Cys Leu Pro Ala His Thr Cys Pro Cys Gly
        35                  40                  45

Val Phe Ala Cys Ser His Val Pro Met Arg Ser Ala Arg Leu Leu Thr
    50                  55                  60

Arg Ala Asp Ala Glu Cys Pro Pro Ala His Thr Cys Pro Cys Gly Val
65                  70                  75                  80

Pro Ala Cys Ser Arg Ala Asp Val Glu Cys Pro Pro Ala His Thr Cys
                85                  90                  95

Pro Cys Gly Val Pro Ala Cys Ser Arg Ala Asp Val Gly Cys Pro Pro
            100                 105                 110

Ala His Met Cys Arg Cys Gly Val Pro Ala Cys Ser His Val Pro Met
        115                 120                 125

Trp Ser Ala Arg Leu Leu Thr Arg Ala Asp Val Glu Cys Pro Pro Ala
    130                 135                 140

His Val Pro Ile Trp Ser Ala Arg Leu Leu Thr Arg Ala Ile Val Glu
145                 150                 155                 160

Cys Pro Pro Ala His Thr His Ala Asp Val Glu Cys Pro Pro Ala His
                165                 170                 175

Thr Cys Pro Cys Gly Val Pro Ala Cys Ser His Val Pro Met Trp Ser
            180                 185                 190

Ala Arg Leu Leu Thr His Val Pro Met Trp Ser Ala Arg Leu Leu Thr
        195                 200                 205

Arg Ala His Val Glu Cys Leu Pro Ala His Thr Arg Ala His Val Glu
    210                 215                 220

Cys Pro Pro Ala His Thr Lys Pro Trp His Gly Gly Ser Val Gly Phe
225                 230                 235                 240

Leu Ser Cys Arg Pro Ser Gln Thr Leu Leu Pro Tyr Ile Leu Leu Met
                245                 250                 255

Val Ala Phe
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<210> 761
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<400> 761
Glu Cys Pro Pro Ala His Thr Cys Pro Cys Gly Val Pro Ala Cys Ser
1 5 10 15

His Val Pro Thr Trp Ser Ala Arg Leu Leu Leu Thr Arg Ala His Val
20 25 30

Glu Cys Ser Pro Ala His Thr Cys Arg Cys Gly Val Pro Ala Cys Ser
35 40 45

His Val Pro Met
50

<210> 762
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R222W"

<400> 762
Pro Lys Ala Val Tyr Leu Val Cys Asn Tyr Ser Pro Lys Gly Asn Trp
1 5 10 15

Trp Gly His Ala Pro Tyr Lys His Gly Trp Trp Pro Cys Ser Ala Cys
20 25 30

Pro Pro Ser Phe Gly Gly Gly Cys Arg Glu Asn Leu Cys Tyr Lys Glu
35 40 45

Gly Ser Asp Arg
50

<210> 763
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.A355P"

<400> 763
Arg Thr Ser Arg Ala Val Gln Glu Ala Gly Leu Gly Leu Ser Thr Gly
1 5 10 15

Leu Arg Leu Ala Glu Ser Arg Ala Glu Pro Pro Ala Leu Glu Lys Gln
20 25 30

Ala Leu Leu Gln Ala Gln Leu Glu Glu Gln Leu Arg Asp Lys Val Leu
35 40 45

Arg Glu Lys Asp
50

<210> 764
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.Q580H"

<400> 764
Asp Pro Leu Phe Ser Lys Ser Gly Gly Gly Gly Asn Phe Val Leu Ser
1 5 10 15

Thr Ser Leu Val Gly Tyr Leu Arg Val His His Gly Val Val Val Pro
20 25 30

Met Val His Asn Gly Tyr Gly Phe Phe Tyr His Ile Arg Asp Asp Arg
35 40 45

Phe Val Val Ala
50

<210> 765
<211> 37
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

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<223> /注釋="p.L32fs"

<400> 765
Thr Glu Glu Arg Thr Phe Gln Tyr Gln Asp Ser Leu Pro Ser Leu Pro
1 5 10 15

Val Pro Ser Leu Glu Glu Ser Leu Lys Asn Thr Leu Asn Gln Ser Pro
20 25 30

Glu His Ala Thr Arg
35

<210> 766
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<400> 766
Asn Lys Thr Val Leu Ser Ser Ser Leu Asn Asn His Pro Gln Thr Ser
1   5   10   15

Val Pro Asn Ala Ser Ala Leu His Pro Leu Leu Leu Arg Leu Phe Ser
            20   25   30

Leu Ser Asn Pro Ser Leu Ser Thr Thr Asn Leu Ser Gly Pro Ser Arg
        35   40   45

Arg Arg Gln Pro
    50

<210> 767
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<223> /注釋="p.R143G"

<400> 767
His Leu Thr Glu Ile His Ser Leu Asn Val Leu Glu Gly Ser Trp Ile
1   5   10   15

Leu Tyr Glu Met Pro Asn Tyr Arg Gly Gly Gly Gln Tyr Leu Leu Arg
            20   25   30

Pro Gly Glu Tyr Arg Arg Phe Leu Asp Trp Gly Ala Pro Asn Ala Lys
        35   40   45

Val Gly Ser Leu
    50

<210> 768
<211> 33
<212> PRT
<213> 人工序列

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<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

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<221> 來源
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<400> 768
Tyr Glu Met Pro Asn Tyr Arg Gly Arg Gln Tyr Leu Leu Arg Pro Gly
1   5   10   15

Asp Tyr Arg Arg Tyr His Asp Trp Gly Val Gln Met Pro Lys Ser Ala
            20   25   30

Leu

<210> 769
<211> 31
<212> PRT

<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
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<400> 769
Phe Lys Ser Leu Gly Met Ala Val Glu Asp Thr Val Ala Ala Lys Leu
1 5 10 15

Ile Tyr Asp Ser Trp Ser Ser Gly Lys Lys Lys Asn Lys Gly Thr
20 25 30

<210> 770
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
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<400> 770
Asn Val Gln Leu Glu Thr Gly Asp Lys Ile Asn Phe Val Ile Asp Asn
1 5 10 15

Asn Lys His Thr Gly Ala Val Ser Ala Cys Cys Asn Ile Met Leu Leu
20 25 30

Lys Lys Lys Gln Ala Arg Cys Gln Gly Val Val Cys Ala Met Lys Glu
35 40 45

Ala Phe Gly Phe
50

<210> 771
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
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<400> 771
Ser Phe Gly Leu Phe Tyr Lys Pro Ser Pro Asp Ala Gly Glu Glu Glu
1 5 10 15

Cys Ser Pro Val Leu Arg Glu Gly Leu Ser Ser Ser Leu His Thr Arg
20 25 30

His His Cys Gln Ile Pro Val Pro Asp Pro Ala Thr His Gly Gln Tyr
35 40 45

Ile Val Ser Val
50

<210> 772
<211> 46
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P468fs"

<400> 772
Ser Leu Trp Val Gly Trp Glu Pro Pro Asn Pro Trp Pro Gln Gly Tyr
1 5 10 15

Val Ile Glu Trp Gly Leu Gly Pro Pro Ala Arg Ala Ile Ala Thr Arg
20 25 30

Pro Gly Gly Trp Asn Arg Met Gly Glu Pro Arg Gly Phe Cys
35 40 45

<210> 773
<211> 52
<212> PRT
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 773
Val Ser Leu Asn Glu Glu Phe Asn Arg Gly Arg Gly Leu Asn Val Gly
1 5 10 15

Ala Arg Ala Trp Asp Lys Gly Glu Val Phe Phe Met Phe Phe Cys Asp
20 25 30

Val Asp Ile Tyr Phe Ser Ala Glu Phe Leu Asn Ser Cys Arg Leu Asn
35 40 45

Ala Glu Pro Gly
50

<210> 774
<211> 52
<212> PRT
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<400> 774
Ser Ser Asn Met Glu Glu Thr Gln Gln Lys Ser Asn Leu Glu Leu Leu
1 5 10 15

His Ile Ser Leu Leu Leu Ile Glu Ser Gln Gln Leu Glu Pro Val Arg
20 25 30

Phe Leu Arg Ser Thr Phe Thr Asn Asn Leu Val Tyr Asp Thr Ser Asp
35 40 45

Ser Asp Asp Tyr
50

<210> 775
<211> 52
<212> PRT
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<400> 775
Pro Thr Cys Val Val Pro Cys Gly Gly Asn Leu Thr Glu Arg Arg Gly
1 5 10 15

Thr Ile Leu Ser Pro Gly Phe Pro Glu Gln Gln Tyr Leu Asn Ser Leu
20 25 30

Asn Cys Val Trp Lys Ile Val Val Pro Glu Gly Ala Gly Ile Gln Ile
35 40 45

Gln Val Val Ser
50

<210> 776
<211> 52
<212> PRT
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<220>
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<400> 776
Asp Pro Gly Thr Pro Leu Tyr Gly Ile Arg Glu Gly Asp Gly Phe Ser
1 5 10 15

Asn Arg Asp Val Leu Arg Phe Glu Cys Lys Lys Phe Gly Phe Glu Leu
20 25 30

Ile Gly Glu Lys Ser Ile Val Cys Gln Glu Asn Asn Gln Trp Ser Ala
35 40 45

Asn Ile Pro Ile
50

<210> 777
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 777
Ala Glu Pro Gly His Ser Ile Lys Ile Thr Phe Glu Arg Phe Gln Thr
1 5 10 15

Glu Leu Asn Tyr Asp Val Leu Glu Val Tyr Tyr Asp Gly Pro Asn Leu
20 25 30

Leu Ser Pro Leu Leu Gly Ser Tyr Asn Gly Thr Gln Val Pro Gln Phe
35 40 45

Leu Phe Ser Ser
50

<210> 778
<211> 52
<212> PRT
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<220>
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<400> 778
Gly Asp Val Arg Gly Pro Ser Gly Thr Ile Leu Ser Pro Gly Tyr Pro
1 5 10 15

Glu Phe Tyr Pro Asn Ser Leu Asn Cys Lys Lys Trp Thr Val Asp Val
20 25 30

Thr His Gly Lys Gly Val Gln Phe Asn Phe His Thr Phe His Leu Glu
35 40 45

Asp His His Asp
50

<210> 779
<211> 52
<212> PRT
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<220>
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<400> 779
Ser Thr Lys Ser Val Phe Ser Leu Arg Leu Thr Ser Asp Phe Ala Val
1 5 10 15

Ser Ala His Gly Phe Lys Val Tyr Tyr Lys Lys Glu Leu Gln Ser Ser
20 25 30

Ser Cys Gly Asn Pro Gly Val Pro Pro Lys Gly Val Leu Tyr Gly Thr
35 40 45

Arg Phe Asp Val
50

<210> 780
<211> 52
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多肽"

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<400> 780
Ser Val Phe Ser Leu Arg Leu Thr Ser Asp Phe Ala Val Ser Ala His
1 5 10 15

Gly Phe Lys Val Tyr Tyr Glu Glu Leu His His Ser Ser Ser Cys Gly
20 25 30

Asn Pro Gly Val Pro Pro Lys Gly Val Leu Tyr Gly Thr Arg Phe Asp
35 40 45

Val Gly Asp Lys
50

<210> 781
<211> 46
<212> PRT
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多肽"

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<400> 781
Leu Glu Ser Val Tyr Ser Thr Ser Asn Gln Ile Leu Ile Lys Phe His
1 5 10 15

Ser Asp Phe Thr Thr Ser Gly Phe Phe Cys Ala Gln Leu Ser Arg Leu
20 25 30

Ser Thr Lys Gly Val Pro Thr Ser Thr Thr Cys Ala Gln Cys
35 40 45

<210> 782
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.P2727T"

<400> 782
Leu Glu His Gly Arg Trp Arg Ile Val Asn Gly Ser His Tyr Glu Tyr
1 5 10 15

Lys Thr Lys Val Val Phe Ser Cys Asp Thr Thr Gly Tyr His Gly Leu
20 25 30

Gly Pro Ala Ser Ile Glu Cys Leu Pro Asn Gly Thr Trp Ser Trp Arg
35 40 45

Asn Glu Arg Pro
50

<210> 783
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

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<223> /注釋="p.T2810N"

<400> 783
Cys Asp Leu Gly Phe Met Leu Val Gly Ser Ala Val Arg Glu Cys Leu
1 5 10 15

Ser Ser Gly Leu Trp Ser Glu Ser Glu Asn Asn Arg Cys Leu Ala Gly
20 25 30

His Cys Gly Ile Pro Glu Leu Ile Val Asn Gly Gln Val Ile Gly Glu
35 40 45

Asn Tyr Gly Tyr
50

<210> 784
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<223> /注釋="p.D119N"

<400> 784
Ala Val Thr Gly Thr Ala Trp Leu Glu Ala Asp Ser Pro Gly Leu Gly
1 5 10 15

Gly Val Thr Ala Glu Ala Gly Ser Gly Asn Asn Ala Gln Ala Leu Pro
20 25 30

Ala Thr Leu Gln Ala Pro His Glu Val Leu Gly Gln Ser Ile Met Pro
35 40 45

Pro Ala Ile Pro
50

<210> 785
<211> 78
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 785
Asp Leu Ala Glu Met Ala Arg Glu Pro Ala Glu Glu Ala Ala Asp Glu
1 5 10 15

Lys Pro Pro Glu Glu Ala Ala Glu Glu Glu Pro Ala Ala Glu Glu Pro
20 25 30

Thr Ser Glu Glu Ala Val Ala Pro Glu Glu Val Thr Lys Ser Gln Pro
35 40 45

Glu Lys Trp Asp Glu Glu Ala Gln Asp Ala Ala Gly Glu Glu Glu Lys
50 55 60

Glu Gln Glu Lys Glu Lys Asp Val Glu Asn Lys Val Lys Asn
65 70 75

<210> 786
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<221> 來源
<223> /注釋="p.A364V"

<400> 786
Ile Ile Gln Leu Ser Glu Val Asp Lys Thr Lys Glu Glu Leu Thr Glu
1 5 10 15

His Ile Lys Asn Leu Gln Thr Gln Gln Val Val Ser Leu Gln Ser Glu
20 25 30

Asn Ile Tyr Phe Glu Ser Glu Asn Gln Lys Leu Gln Gln Lys Leu Lys
35 40 45

Ile Met Thr Glu
50

<210> 787
<211> 43
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 787
Glu Gln Gly Glu Leu Pro Pro Gln Glu Asp Pro Ser Trp Gln Lys Asp
1 5 10 15

Pro Asp Tyr Gln Pro Pro Ala Lys Lys Lys Gln Arg Lys Pro Lys Arg
20 25 30

Ala Asn Cys Val Ile Gln Arg Arg Ala Lys Met
35 40

<210> 788
<211> 42
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.K202fs"

<400> 788
Glu Gln Gly Glu Leu Pro Pro Gln Glu Asp Pro Ser Trp Gln Lys Asp
1 5 10 15

Pro Asp Tyr Gln Pro Pro Ala Lys Lys Gln Arg Lys Pro Lys Arg Ala
20 25 30

Asn Cys Val Ile Gln Arg Arg Ala Lys Met
35 40

<210> 789
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<223> /注釋="p.E423K"

<400> 789
Tyr Glu Cys His Ile Cys His Thr Arg Phe Thr Gln Ser Gly Thr Met
1 5 10 15

Lys Ile His Ile Leu Gln Lys His Gly Lys Lys Asn Val Pro Lys Tyr
20 25 30

Gln Cys Pro His Cys Ala Thr Ile Ile Ala Arg Lys Ser Asp Leu Arg
35 40 45

Val His Met Arg
50

<210> 790
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.E126K"

<400> 790
Lys His Pro Val Arg Phe Phe Val His Lys Arg Pro His Val Asp Phe
1 5 10 15

Phe Leu Glu Val Val Ser Gln Trp Tyr Lys Lys Leu Val Val Phe Thr
20 25 30

Ala Ser Met Glu Ile Tyr Gly Ser Ala Val Ala Asp Lys Leu Asp Asn
35 40 45

Ser Arg Ser Ile
50

<210> 791
<211> 27
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
肽"

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<223> /注釋="p.K856fs"

<400> 791
Ile Ile Arg Ile Gln Ser Pro Ala Gly Pro Arg His Pro Val Val Met
1 5 10 15

Trp Arg Met Lys Ala Pro Ala Lys Lys Asn Pro
20 25

<210> 792
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 792
Glu Ser Lys Leu Ile Ile Leu Ala Ser Gly Gly Pro Gln Ala Leu Val
1 5 10 15

Asn Ile Met Arg Thr Tyr Thr Tyr Glu Ile Ile Leu Leu Trp Thr Thr
20 25 30

Ser Arg Val Leu Lys Val Leu Ser Val Cys Ser Ser Asn Lys Pro Ala
35 40 45

Ile Val Glu Ala
50

<210> 793
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 793
Glu Leu Asp Met Ala Met Glu Pro Asp Arg Lys Ala Ala Val Ser His
1 5 10 15

Trp Gln Gln Gln Ser Tyr Leu Asp Ser Arg Arg Ile His Ser Gly Ala
20 25 30

Thr Thr Thr Ala Pro Ser Leu Ser Gly Lys Gly Asn Pro Glu Glu Glu
35 40 45

Asp Val Asp Thr
50

<210> 794
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 794
Glu Leu Asp Met Ala Met Glu Pro Asp Arg Lys Ala Ala Val Ser His
1 5 10 15

Trp Gln Gln Gln Ser Tyr Leu Asp Ser Val Val Ile His Ser Gly Ala
20 25 30

Thr Thr Thr Ala Pro Ser Leu Ser Gly Lys Gly Asn Pro Glu Glu Glu
35 40 45

Asp Val Asp Thr
50

<210> 795
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 795
Asp Met Ala Met Glu Pro Asp Arg Lys Ala Ala Val Ser His Trp Gln
1 5 10 15

Gln Gln Ser Tyr Leu Asp Ser Gly Ile Pro Pro Ser Gly Ala Thr Thr
20 25 30

Thr Ala Pro Ser Leu Ser Gly Lys Gly Asn Pro Glu Glu Glu Asp Val
35 40 45

Asp Thr Ser Gln
50

<210> 796
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S37A"

<400> 796
Met Ala Met Glu Pro Asp Arg Lys Ala Ala Val Ser His Trp Gln Gln
1 5 10 15

Gln Ser Tyr Leu Asp Ser Gly Ile His Ala Ala Gly Ala Thr Thr Thr
20 25 30

Ala Pro Ser Leu Ser Gly Lys Gly Asn Pro Glu Glu Glu Asp Val Asp
35 40 45

Thr Ser Gln Val
50

<210> 797
<211> 52
<212> PRT
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多肽"

<220>
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<400> 797
Met Ala Met Glu Pro Asp Arg Lys Ala Ala Val Ser His Trp Gln Gln
1 5 10 15

Gln Ser Tyr Leu Asp Ser Gly Ile His Cys Cys Gly Ala Thr Thr Thr
20 25 30

Ala Pro Ser Leu Ser Gly Lys Gly Asn Pro Glu Glu Glu Asp Val Asp
35 40 45

Thr Ser Gln Val
50

<210> 798
<211> 52
<212> PRT
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多肽"

<220>
<221> 來源
<223> /注釋="p.S37F"

<400> 798
Met Ala Met Glu Pro Asp Arg Lys Ala Ala Val Ser His Trp Gln Gln
1 5 10 15

Gln Ser Tyr Leu Asp Ser Gly Ile His Phe Phe Gly Ala Thr Thr Thr
20 25 30

Ala Pro Ser Leu Ser Gly Lys Gly Asn Pro Glu Glu Glu Asp Val Asp
35 40 45

Thr Ser Gln Val
50

<210> 799
<211> 52
<212> PRT
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多肽"

<220>
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<400> 799
Gly Met Gln Ala Leu Gly Leu His Leu Thr Asp Pro Ser Gln Arg Leu
1 5 10 15

Val Gln Asn Cys Leu Trp Thr Leu Arg Lys Lys Leu Ser Asp Ala Ala
20 25 30

Thr Lys Gln Glu Gly Met Glu Gly Leu Leu Gly Thr Leu Val Gln Leu
35 40 45

Leu Gly Ser Asp
50

<210> 800
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<223> /注釋="p.T41A"

<400> 800
Pro Asp Arg Lys Ala Ala Val Ser His Trp Gln Gln Gln Ser Tyr Leu
1 5 10 15

Asp Ser Gly Ile His Ser Gly Ala Thr Ala Ala Thr Ala Pro Ser Leu
20 25 30

Ser Gly Lys Gly Asn Pro Glu Glu Glu Asp Val Asp Thr Ser Gln Val
35 40 45

Leu Tyr Glu Trp
50

<210> 801
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T41I"

<400> 801
Pro Asp Arg Lys Ala Ala Val Ser His Trp Gln Gln Gln Ser Tyr Leu
1 5 10 15

Asp Ser Gly Ile His Ser Gly Ala Thr Ile Ile Thr Ala Pro Ser Leu
20 25 30

Ser Gly Lys Gly Asn Pro Glu Glu Glu Asp Val Asp Thr Ser Gln Val
35 40 45

Leu Tyr Glu Trp
50

<210> 802
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.S45P"

<400> 802
Ala Ala Val Ser His Trp Gln Gln Gln Ser Tyr Leu Asp Ser Gly Ile
1 5 10 15

His Ser Gly Ala Thr Thr Thr Ala Pro Pro Pro Leu Ser Gly Lys Gly
20 25 30

Asn Pro Glu Glu Glu Asp Val Asp Thr Ser Gln Val Leu Tyr Glu Trp
35 40 45

Glu Gln Gly Phe
50

<210> 803
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.D32N"

<400> 803
Leu Met Glu Leu Asp Met Ala Met Glu Pro Asp Arg Lys Ala Ala Val
1 5 10 15

Ser His Trp Gln Gln Gln Ser Tyr Leu Asn Asn Ser Gly Ile His Ser
20 25 30

Gly Ala Thr Thr Thr Ala Pro Ser Leu Ser Gly Lys Gly Asn Pro Glu
35 40 45

Glu Glu Asp Val
50

<210> 804
<211> 52
<212> PRT

<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.D32Y"

<400> 804
Leu Met Glu Leu Asp Met Ala Met Glu Pro Asp Arg Lys Ala Ala Val
1 5 10 15

Ser His Trp Gln Gln Gln Ser Tyr Leu Tyr Tyr Ser Gly Ile His Ser
20 25 30

Gly Ala Thr Thr Thr Ala Pro Ser Leu Ser Gly Lys Gly Asn Pro Glu
35 40 45

Glu Glu Asp Val
50

<210> 805
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D32G"

<400> 805
Leu Met Glu Leu Asp Met Ala Met Glu Pro Asp Arg Lys Ala Ala Val
1 5 10 15

Ser His Trp Gln Gln Gln Ser Tyr Leu Gly Gly Ser Gly Ile His Ser
20 25 30

Gly Ala Thr Thr Thr Ala Pro Ser Leu Ser Gly Lys Gly Asn Pro Glu
35 40 45

Glu Glu Asp Val
50

<210> 806
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.D32V"

<400> 806
Leu Met Glu Leu Asp Met Ala Met Glu Pro Asp Arg Lys Ala Ala Val
1 5 10 15

Ser His Trp Gln Gln Gln Ser Tyr Leu Val Val Ser Gly Ile His Ser
20 25 30

Gly Ala Thr Thr Thr Ala Pro Ser Leu Ser Gly Lys Gly Asn Pro Glu
35 40 45

Glu Glu Asp Val
50

<210> 807
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S33P"

<400> 807
Met Glu Leu Asp Met Ala Met Glu Pro Asp Arg Lys Ala Ala Val Ser
1 5 10 15

His Trp Gln Gln Gln Ser Tyr Leu Asp Pro Pro Gly Ile His Ser Gly
20 25 30

Ala Thr Thr Thr Ala Pro Ser Leu Ser Gly Lys Gly Asn Pro Glu Glu
35 40 45

Glu Asp Val Asp
50

<210> 808
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S33Y"

<400> 808
Met Glu Leu Asp Met Ala Met Glu Pro Asp Arg Lys Ala Ala Val Ser
1 5 10 15

His Trp Gln Gln Gln Ser Tyr Leu Asp Tyr Tyr Gly Ile His Ser Gly
20 25 30

Ala Thr Thr Thr Ala Pro Ser Leu Ser Gly Lys Gly Asn Pro Glu Glu
35 40 45

Glu Asp Val Asp
50

<210> 809
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S33C"

<400> 809
Met Glu Leu Asp Met Ala Met Glu Pro Asp Arg Lys Ala Ala Val Ser
1 5 10 15

His Trp Gln Gln Gln Ser Tyr Leu Asp Cys Cys Gly Ile His Ser Gly
20 25 30

Ala Thr Thr Thr Ala Pro Ser Leu Ser Gly Lys Gly Asn Pro Glu Glu
35 40 45

Glu Asp Val Asp
50

<210> 810
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S33F"

<400> 810
Met Glu Leu Asp Met Ala Met Glu Pro Asp Arg Lys Ala Ala Val Ser
1 5 10 15

His Trp Gln Gln Gln Ser Tyr Leu Asp Phe Phe Gly Ile His Ser Gly
20 25 30

Ala Thr Thr Thr Ala Pro Ser Leu Ser Gly Lys Gly Asn Pro Glu Glu
35 40 45

Glu Asp Val Asp
50

<210> 811
<211> 73
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.I447fs"

<400> 811
Val His Leu Gly Ala Cys Gly Ala Leu Lys Asn Ile Ser Phe Gly Arg
1 5 10 15

Asp Gln Asp Asn Lys Ile Ala Ile Lys Thr Val Met Val Cys Leu Pro
20 25 30

Leu Cys Asp Cys Phe Glu Arg Leu Val Ile Trp Thr Leu Leu Lys Leu
35 40 45

Leu Pro Glu Pro Cys Gly Ile Phe His Pro Met Thr Gln Ser Lys Trp
50 55 60

Arg Leu Trp Thr Met His Cys Met Pro
65 70

<210> 812
<211> 34
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F105fs"

<400> 812
Asn Ser Gly His Phe Thr Ile Ile Tyr Asn Gln Gly Phe Glu Ile Val
1 5 10 15

Leu Asn Asp Tyr Lys Trp Phe Ala Phe Leu Ser Ile Lys Lys Arg Ala
20 25 30

Ala Arg

<210> 813
<211> 74
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<400> 813
Gly Pro Ile Pro Glu Val Leu Lys Asn Tyr Met Asp Ala Gln Tyr Tyr
1 5 10 15

Gly Glu Ile Gly Ile Gly Thr Pro Pro Pro Val Leu His Ser Arg Leu
20 25 30

Arg His Gly Leu Leu Gln Pro Val Gly Pro Leu His Pro Leu Gln Thr
35 40 45

Ala Gly His Arg Leu Leu Asp Pro Pro Gln Val Gln Gln Arg Gln Val
50 55 60

Gln His Leu Arg Glu Glu Trp Tyr Leu Val
65 70

<210> 814
<211> 52
<212> PRT
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多肽"

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<400> 814
Thr Ser Ser Thr Pro Pro Leu Pro Ser Asn Ala Ala Pro Pro Thr Ala
1 5 10 15

Gln Thr Pro Gly Ile Ala Pro Gln Asn Leu Leu Gln Ala Pro Pro Met
20 25 30

His Ser Leu His Ser Pro Cys Ala Asn Thr Ser Leu His Pro Gly Leu
35 40 45

Asn Pro Arg Ile
50

<210> 815
<211> 52
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<220>
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多肽"

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<400> 815
Leu Glu Met Glu Lys Leu Gln Leu Gln Ala Leu Glu Gln Glu His Lys
1 5 10 15

Lys Leu Ala Ala Arg Leu Glu Glu Glu Cys Cys Gly Lys Asn Lys Gln
20 25 30

Val Val Leu Met Leu Val Lys Glu Cys Lys Gln Leu Ser Gly Lys Val
35 40 45

Ile Glu Glu Ala
50

<210> 816
<211> 52
<212> PRT
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多肽"

<220>
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<400> 816
Glu His Leu Arg Asn Gly Arg Gly Phe Thr Val Arg Trp Glu Thr Gln
1 5 10 15

Gln Pro Glu Cys Gly Gly Ile Leu Thr Cys Cys Pro Tyr Gly Ser Ile
20 25 30

Lys Ser Pro Gly Tyr Pro Gly Asn Tyr Pro Pro Gly Arg Asp Cys Val
35 40 45

Trp Ile Val Val
50

<210> 817
<211> 52
<212> PRT

<213> 人工序列

<220>
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多肽"

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<400> 817
Gly Gly Gly Phe Tyr Ala Thr Trp Asn Thr Gln Thr Leu Gly Cys Gly
1 5 10 15

Gly Ile Phe His Ser Asp Asn Gly Thr Met Met Arg Ser Pro His Trp
20 25 30

Pro Gln Asn Phe Pro Glu Asn Ser Arg Cys Ser Trp Thr Ala Ile Thr
35 40 45

His Lys Ser Lys
50

<210> 818
<211> 52
<212> PRT
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<220>
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多肽"

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<223> /注釋="p.E485K"

<400> 818
Asp Val Phe Gln Lys Phe Tyr Ala Lys Met Leu Ala Lys Arg Leu Val
1 5 10 15

His Gln Asn Ser Ala Ser Asp Asp Ala Lys Lys Ala Ser Met Ile Ser
20 25 30

Lys Leu Lys Gln Ala Cys Gly Phe Glu Tyr Thr Ser Lys Leu Gln Arg
35 40 45

Met Phe Gln Asp
50

<210> 819
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<223> /注釋="p.L371F"

<400> 819
Gln Ala Gln Pro Ser Phe Arg Arg Ser Arg Arg Phe Arg Pro Arg Ser
1 5 10 15

Glu Phe Ala Ser Gly Asn Thr Tyr Ala Phe Phe Tyr Val Arg Asp Thr
20 25 30

Leu Gln Pro Gly Met Arg Val Arg Met Leu Asp Asp Tyr Glu Glu Ile
35 40 45

Ser Ala Gly Asp
50

<210> 820
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<400> 820
Ser Pro Arg Cys Trp Pro Val Ser Pro Leu Cys Tyr Leu Tyr His Pro
1 5 10 15

Arg Lys Cys Leu Pro Thr Glu Phe Cys Glu Glu Ala Leu Asp Arg Phe
20 25 30

Ser Ser Phe Tyr Ser Gln Ser Gln Asn His Pro Val Leu Asp Met Gly
35 40 45

Pro His Arg Arg
50

<210> 821
<211> 40
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.A439fs"

<400> 821
Leu Ser Gly Ser Ala Arg Arg Lys Gly Lys Asp Gln Pro Glu Ser Arg
1 5 10 15

Arg Pro Gly Ser Leu Pro Ala Pro Pro Ser Phe Ser Val Ala Pro Gln
20 25 30

Pro Gly Gly Ala Gly Phe Gln Tyr
35 40

<210> 822
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.K364E"

<400> 822
Glu Glu Leu Glu Arg Lys Arg Gln Glu Met Met Glu Asn Ala Lys Trp
1 5 10 15

Arg Glu Glu Glu Arg Leu Asn Ile Leu Glu Glu Arg His Ala Lys Asp
20 25 30

Glu Glu Arg Glu Gln Arg Leu Glu Lys Leu Asp Ser Arg Asp Gly Lys
35 40 45

Phe Ile His Arg
50

<210> 823
<211> 30
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.K122N"

<400> 823
Lys Lys Gln Lys Asn Gly Lys Lys His Gln Lys Lys Lys Val Leu Lys
1 5 10 15

Val Arg Lys Ser Gln Arg Ser Arg Gln Asn Asn Lys Thr Thr
20 25 30

<210> 824
<211> 34
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 824
Val Ser Arg Gly Ser Ser Leu Lys Ile Leu Ser Lys Gly Lys Arg Gly
1 5 10 15

Gly His Ser Ser Val Ser Thr Glu Ser Gln Gln Ser Ser Ser Phe His
20 25 30

Ser Ser

<210> 825
<211> 52
<212> PRT
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<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.Q156H"

<400> 825
Met Leu Ala Arg Gly Ser Ala Ser Pro His Lys Ser Ser Pro Gln Pro
1 5 10 15

Leu Val Ala Thr Pro Ser Gln His His His His Gln Gln Gln Gln Gln
20 25 30

Ile Lys Arg Ser Ala Arg Met Cys Gly Glu Cys Glu Ala Cys Arg Arg
35 40 45

Thr Glu Asp Cys
50

<210> 826
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.V43I"

<400> 826
Gln Thr Pro Ser Thr Ser Ser Thr Lys Gly Arg Lys Lys Gly Lys Thr
1 5 10 15

Pro Arg Gln Arg Arg Ser Arg Ser Gly Ile Ile Lys Gly Leu Lys Thr
20 25 30

Thr Arg Lys Ala Lys Arg Pro Leu Arg Gly Ser Ser Ser Gln Lys Ala
35 40 45

Gly Glu Thr Asn
50

<210> 827
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R198M"

<400> 827
Leu Leu His Leu Ser Gly Lys Met Pro Pro Gly Ile Asn Ser Ser Gln
1 5 10 15

Ser Leu Pro Val Asp Asn His Glu Lys Met Met Val Ile Gln Leu His
20 25 30

Leu Gln His Ser Ser Leu Leu Asp Phe Leu Asn Ala Gln Gly Gly Cys
35 40 45

Ile Ser His Val
50

<210> 828
<211> 52
<212> PRT

<213> 人工序列

<220>
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多肽"

<220>
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<400> 828
Leu Val Arg Val Phe Leu Tyr Ser Leu Gly Arg Asn Pro Ala Leu Phe
1 5 10 15

Pro Arg Pro Glu Arg Tyr Asn Pro Gln Gly Gly Trp Leu Asp Ile Arg
20 25 30

Gly Ser Gly Arg Asn Phe Tyr His Val Pro Phe Gly Phe Gly Met Arg
35 40 45

Gln Cys Leu Gly
50

<210> 829
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 829
Asp Val Ile Asp Gly Tyr Pro Val Lys Lys Gly Thr Asn Ile Ile Leu
1 5 10 15

Asn Ile Gly Arg Met His Arg Leu Glu Leu Leu Phe Pro Lys Pro Asn
20 25 30

Glu Phe Thr Leu Glu Asn Phe Ala Lys Asn Val Pro Tyr Arg Tyr Phe
35 40 45

Gln Pro Phe Gly
50

<210> 830
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S113I"

<400> 830
Trp Ile Ser Gly Glu Glu Thr Leu Ile Ile Ser Lys Ser Ser Ser Met
1 5 10 15

Phe His Ile Met Lys His Asn His Tyr Ile Ile Ser Arg Phe Gly Ser
20 25 30

Lys Leu Gly Leu Gln Cys Ile Gly Met His Glu Lys Gly Ile Ile Phe
35 40 45

Asn Asn Asn Pro
50

<210> 831
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.V483M"

<400> 831
Cys Ile Gly Glu Val Leu Ala Lys Trp Glu Ile Phe Leu Phe Leu Ala
1 5 10 15

Ile Leu Leu Gln Gln Leu Glu Phe Ser Met Met Pro Pro Gly Val Lys
20 25 30

Val Asp Leu Thr Pro Ile Tyr Gly Leu Thr Met Lys His Ala Arg Cys
35 40 45

Glu His Val Gln
50

<210> 832
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.P112Q"

<400> 832
Leu Tyr Lys Ala Lys Tyr Gly Pro Met Trp Met Ser Tyr Leu Gly Pro
1 5 10 15

Gln Met His Val Asn Leu Ala Ser Ala Gln Gln Leu Leu Glu Gln Val
20 25 30

Met Arg Gln Glu Gly Lys Tyr Pro Val Arg Asn Asp Met Glu Leu Trp
35 40 45

Lys Glu His Arg
50

<210> 833
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 833
Ala Leu Lys Lys Thr Glu Ala Phe Ile Pro Phe Ser Leu Gly Lys Arg
1   5   10   15

Ile Cys Leu Gly Glu Gly Ile Ala Arg Glu Glu Glu Leu Phe Leu Phe
            20   25   30

Phe Thr Thr Ile Leu Gln Asn Phe Ser Met Ala Ser Pro Val Ala Pro
        35   40   45

Glu Asp Ile Asp
    50

<210> 834
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 834
Val Gln Arg Arg Val Gln Gln Glu Ile Asp Asp Val Ile Gly Gln Val
1   5   10   15

Arg Arg Pro Glu Met Gly Asp Gln Ala Arg Arg Met Pro Tyr Thr Thr
            20   25   30

Ala Val Ile His Glu Val Gln Arg Phe Gly Asp Ile Val Pro Leu Gly
        35   40   45

Val Thr His Met
    50

<210> 835
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.V185F"

<400> 835
Gly Leu Met Ala Asp Ser Val Arg Val Met Leu Asp Lys Trp Glu Glu
1   5   10   15

Leu Leu Gly Gln Asp Ser Pro Leu Glu Phe Phe Phe Gln His Val Ser
            20   25   30

Leu Met Thr Leu Asp Thr Ile Met Lys Cys Ala Phe Ser His Gln Gly
        35   40   45

Ser Ile Gln Val
    50

<210> 836
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 836
His Ile Tyr Ala Leu His Arg Asn Ser Ala Val Trp Pro Asp Pro Glu
1 5 10 15

Val Phe Asp Ser Leu Arg Phe Ser Thr Asp Asp Asn Ala Ser Lys Arg
20 25 30

His Pro Phe Ala Phe Met Pro Phe Ser Ala Gly Pro Arg Asn Cys Ile
35 40 45

Gly Gln Gln Phe
50

<210> 837
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K332T"

<400> 837
Tyr Leu Leu Arg His Pro Glu Ala Met Ala Ala Val Arg Asp Glu Ile
1 5 10 15

Asp Arg Leu Leu Gln Ser Thr Gly Gln Thr Thr Lys Gly Ser Gly Phe
20 25 30

Pro Ile His Leu Thr Arg Glu Gln Leu Asp Ser Leu Ile Cys Leu Glu
35 40 45

Ser Ser Ile Phe
50

<210> 838
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<223> /注釋="p.E161K"

<400> 838
Ile Leu Gly Gln Asp Tyr Cys Phe Glu Val Thr Thr Ser Ser Gly Ser
1 5 10 15

Lys Cys Phe Ser Cys Arg Ser Ala Ala Lys Lys Arg Asp Lys Trp Met
20 25 30

Glu Asn Leu Arg Arg Ala Val His Pro Asn Lys Asp Asn Ser Arg Arg
35 40 45

Val Glu His Ile
50

<210> 839
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 839
Thr Met Gln Lys Arg Leu Lys Lys Glu Lys Lys Thr Lys Arg Lys Leu
1 5 10 15

Gln Glu Ala Leu Glu Phe Glu Ser Lys Cys Cys Arg Glu Gln Val Glu
20 25 30

Gln Ala Leu Lys Gln Ala Thr Thr Ser Asp Ser Gly Leu Arg Met Leu
35 40 45

Lys Asp Thr Gly
50

<210> 840
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 840
Thr Met Gln Lys Arg Leu Lys Lys Glu Lys Lys Thr Lys Arg Lys Leu
1 5 10 15

Gln Glu Ala Leu Glu Phe Glu Ser Lys Leu Leu Arg Glu Gln Val Glu
20 25 30

Gln Ala Leu Lys Gln Ala Thr Thr Ser Asp Ser Gly Leu Arg Met Leu
35 40 45

Lys Asp Thr Gly
50

<210> 841
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.V216I"

<400> 841
Ala Ile Lys Val Thr Glu Thr Arg Thr Gly Pro Leu Gly Cys Asn Ser
1 5 10 15

Tyr Asp Asn Leu Asp Ser Val Ser Ser Ile Ile Leu Leu Gln Ser Thr
20 25 30

Glu Ser Lys Leu His Leu Gln Gly Leu Gln Ile Ile Phe Pro Gln Tyr
35 40 45

Leu Gln Glu Lys
50

<210> 842
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
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<400> 842
Pro Phe Leu Lys Ile Glu Asp Glu Ser Arg Lys Phe Arg Pro Phe His
1 5 10 15

His Gln Phe Lys Ser Phe Pro Glu Ile Tyr Tyr Phe Leu Gly Pro Lys
20 25 30

Asp Ala Ser Pro Phe Glu Ala Pro Thr Thr Leu Gly Ser Met His His
35 40 45

Thr Arg Glu Ser
50

<210> 843
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R246H"

<400> 843
Arg Met Asp Pro Asp Met Phe Asn Gly Ser Ile Ala Trp His Ser Glu
1 5 10 15

Val Gly Leu Pro Val Tyr Ala His Ile His His Pro Arg Asp Val Glu
20 25 30

Ala Ile Pro Arg Ala Ser Thr Asn Pro Ser Asn Arg Lys Val Arg Ala
35 40 45

Leu Ala Phe Ser
50

<210> 844
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R446H"

<400> 844
Ala Ile Pro Ser Ser Ser Val Leu Pro Ser Ala Pro Arg Asp Val Val
1 5 10 15

Pro Val Leu Val Ser Ser Arg Phe Val His His Leu Ser Trp Arg Pro
20 25 30

Pro Ala Glu Ala Lys Gly Asn Ile Gln Thr Phe Thr Val Phe Phe Ser
35 40 45

Arg Glu Gly Asp
50

<210> 845
<211> 30
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.R235fs"

<400> 845
Leu Asp Arg Glu Asn Arg Ser His Tyr Met Leu Gln Leu Glu Ala Tyr
1 5 10 15

Asp Gly Gly Ser Pro Pro Arg Arg Ala Arg Pro Cys Trp Thr
20 25 30

<210> 846
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.F2149L"

<400> 846
Thr Arg Glu Asn Thr Tyr Val Glu Tyr Ser Ile Ile Ser Gly Asn Ser
1 5 10 15

Gln Asn Asn Phe His Val Glu Thr Lys Leu Leu Phe His Ser Glu Tyr
20 25 30

Pro Tyr Lys Gln Val Gly Tyr Leu Val Leu Leu His Ser Leu Asp Arg
35 40 45

Glu Ala Ser Ala
50

<210> 847
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S549Y"

<400> 847
His Gly Leu Ser Ile Val His Arg Asp Ile Lys Pro Glu Asn Leu Leu
1 5 10 15

Val Cys Glu Tyr Pro Asp Gly Thr Lys Tyr Tyr Leu Lys Leu Gly Asp
20 25 30

Phe Gly Leu Ala Thr Val Val Glu Gly Pro Leu Tyr Thr Val Cys Gly
35 40 45

Thr Pro Thr Tyr
50

<210> 848
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.F28I"

<400> 848
Gly Val Leu Ile Pro His Thr Pro Ile Ala Val Asp Phe Trp Ser Leu
1 5 10 15

Arg Arg Ala Gly Thr Ala Arg Leu Phe Ile Ile Leu Ser His Met His
20 25 30

Ser Asp His Thr Val Gly Leu Ser Ser Thr Trp Ala Arg Pro Leu Tyr
35 40 45

Cys Ser Pro Ile
50

<210> 849
<211> 47
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.R532Q"

<400> 849
Leu Val Val Met Gly Thr Leu Val Ala Leu Val Gly Leu Phe Val Leu
1 5 10 15

Leu Ala Phe Leu Gln Tyr Arg Arg Leu Gln Gln Lys Gly Tyr Thr Pro
20 25 30

Leu Met Glu Thr His Leu Ser Ser Lys Arg Tyr Thr Glu Glu Ala
35 40 45

<210> 850
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L275P"

<400> 850
Glu Lys Asp Gln Arg Ser Leu Asp Ile Asn Thr Ala Lys Cys Met Leu
1 5 10 15

Gly Leu Leu Leu Gly Lys Ile Trp Pro Pro Pro Phe Pro Val Phe His
20 25 30

Gln Phe Leu Glu Gln Ser Lys Tyr Lys Val Ile Asn Lys Asp Gln Trp
35 40 45

Cys Asn Val Leu
50

<210> 851
<211> 122
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.I433fs"

<400> 851
Leu Val Cys Phe Arg Leu Lys Gly Ser Asn Lys Val Asn Glu Ala Leu
1 5 10 15

Leu Gln Arg Ile Asn Ser Ala Lys Lys Ser Thr Trp Phe His Val Thr
20 25 30

Ser Gly Thr Ser Leu Ser Cys Ala Leu Pro Ser Val Leu Ala Arg Trp
35 40 45

Asn Leu Pro Met Cys Ser Gly Pro Gly Asn Thr Ser Lys Ser Trp Arg
50 55 60

Pro Thr Cys Cys Glu Gln Arg Gly Ser Arg Ser Glu Ala Ser Cys Arg
65 70 75 80

Asn Gln Lys Leu Lys Arg Asp Ile Ser Glu Asn Trp Asn Lys Lys Gln
85 90 95

Ile Asn Ile Ile Leu Pro Ser Trp Asn Ser Ala Val Cys Gly Phe Pro
100 105 110

Cys Leu Ser Pro Lys Leu Ser Arg Gly Leu
115 120

<210> 852
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<223> /注釋="p.R275Q"

<400> 852
Val Asn Gly His Pro Leu Lys Ala Phe Val Asp Ser Gly Ala Gln Met
1 5 10 15

Thr Ile Met Ser Gln Ala Cys Ala Glu Gln Gln Cys Asn Ile Met Arg
20 25 30

Leu Val Asp Arg Arg Trp Ala Gly Val Ala Lys Gly Val Gly Thr Gln
35 40 45

Arg Ile Ile Gly
50

<210> 853
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.A376T"

<400> 853
Pro Tyr Tyr Gly Ser Arg Leu Ala Ile Pro Ala Ala Gln Leu Val Val
1 5 10 15

Leu Pro Tyr Gln Met Leu Leu His Ala Thr Thr Thr Arg Gln Ala Ala
20 25 30

Gly Ile Arg Leu Gln Asp Gln Val Val Ile Ile Asp Glu Ala His Asn
35 40 45

Leu Ile Asp Thr
50

<210> 854
<211> 42
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K208fs"

<400> 854
Ala Glu Arg Leu Glu Gln Leu Glu Ser Gly Glu Glu Glu Leu Val Leu
1 5 10 15

Ala Glu Tyr Glu Ser Asp Glu Glu Lys Arg Trp Arg Ala Glu Trp Met
20 25 30

Arg Met Arg Met Thr Trp Arg Lys Asn Thr
35 40

<210> 855
<211> 28
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.*128Q"

<400> 855
Cys Leu Phe Leu Ser Leu Glu Pro Pro Pro Pro Arg Asp His Ile Ser
1 5 10 15

His Cys Leu Leu Ser Ala Gln Phe His Gln Gln Lys
20 25

<210> 856
<211> 44
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G163fs"

<400> 856
His Pro Glu Val Ala Arg Leu Thr Pro Tyr Glu Val Asp Glu Leu Arg
1 5 10 15

Arg Lys Lys Glu Ile Thr Val Arg Gly Glu Met Phe Val Leu Asn Pro
20 25 30

Cys Leu Pro Ser Ile Met Leu Thr Ser His Asn Met
35 40

<210> 857
<211> 33
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F149fs"

<400> 857
Leu Ala Phe Gln Ile Ser Lys Glu Tyr Glu Arg Phe Ser Lys Tyr Met
1 5 10 15

Pro Asn Val Lys Val Ala Val Phe Phe Trp Trp Ser Val Tyr Gln Glu
20 25 30

Gly

<210> 858
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R329L"

<400> 858
Phe Asn Gln Gly Phe Tyr Asp Cys Val Ile Ala Thr Asp Ala Glu Val
1 5 10 15

Leu Gly Ala Pro Val Lys Gly Lys Arg Leu Leu Gly Arg Gly Pro Lys
20 25 30

Gly Asp Lys Ala Ser Asp Pro Glu Ala Gly Val Ala Arg Gly Ile Asp
35 40 45

Phe His His Val
50

<210> 859
<211> 31
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.W90C"

<400> 859
Asp Cys Tyr Cys Arg Ile Pro Ala Cys Ile Ala Gly Glu Arg Arg Tyr
1 5 10 15

Gly Thr Cys Ile Tyr Gln Gly Arg Leu Cys Cys Ala Phe Cys Cys
20 25 30

<210> 860
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R499L"

<400> 860
Gly Arg Lys Lys Arg Lys Ile Pro Lys Leu Val Leu Arg Ile Asn Ala
1 5 10 15

Ile Tyr Glu Val Arg Arg Gly Lys Lys Leu Leu Val Lys Arg Leu Ser
20 25 30

Gln Ser Met Glu Ser Asn Ser Gly Lys Val Thr Asp Glu Asn Ser Glu
35 40 45

Ser Asp Ser Asp
50

<210> 861
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R688Q"

<400> 861
Glu Val Tyr Cys Ile Val Ser Arg Leu Gly Cys Phe Ser Leu Phe Ser
1 5 10 15

Arg Ile Leu Asp Glu Val Glu Lys Arg Gln Gln Gly Ile Ser Pro Ala
20 25 30

Leu Val Gln Pro Leu Met Arg Ser Val Met Glu Ala Pro Phe Pro Ala
35 40 45

Leu Gly Lys Thr
50

<210> 862
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P357H"

<400> 862
Leu Tyr Arg Tyr Ser Ile Ser Gly Pro His Val Leu Pro Ile Glu Lys
1 5 10 15

His Ile Ser His Phe Met His Lys Val His His Phe Pro Ser Pro Gln
20 25 30

Arg Pro Arg Ile Leu Val Gln Leu Ser Pro His Asp Asn Leu Ile Leu
35 40 45

Ser Gln Pro Val
50

<210> 863
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R1081Q"

<400> 863
Glu Ser Glu Lys Ser Ser Pro Ala Val Ser Arg Ser Lys Thr Phe Thr
1 5 10 15

Gly Arg Phe Lys Gln Gln Thr Pro Ser Gln Gln Thr His Lys Glu Arg
20 25 30

Ser Thr Ser Leu Ser Ala Leu Val Arg Ser Ser Pro His Gly Ser Leu
35 40 45

Gly Ser Val Val
50

<210> 864
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G1023E"

<400> 864
Gly Glu Leu Gly Asp Thr Gly Val Met Gln Ile Pro Lys Asn Leu Leu
1 5 10 15

Glu Met Thr Phe Glu Cys Gln Asn Leu Glu Glu Lys Leu Thr Thr Val
20 25 30

Gln Ile Gly His Asp Asn Ser Gly Leu Leu Ala Lys Trp Leu Val Asp
35 40 45

Cys Val Met Val
50

<210> 865
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E518K"

<400> 865
Ser Val Gln Asp Ala Pro Thr Lys Lys Glu Phe Val Ile Asn Pro Asn
1 5 10 15

Gly Lys Ser Glu Val Cys Ile Leu His Lys Lys Tyr Met Gln Arg Val
20 25 30

Leu Lys Val Arg Pro Val Tyr Asn Phe Phe Glu Cys Glu Asn Pro Ser
35 40 45

Glu Pro Phe Gly
50

<210> 866
<211> 39
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S13L"

<400> 866
Met Thr Asn Gln Glu Lys Trp Ala His Leu Ser Pro Leu Leu Glu Phe
1 5 10 15

Ser Gln Leu Gln Lys Tyr Ala Glu Tyr Ser Thr Lys Lys Leu Lys Asp
20 25 30

Val Leu Glu Glu Phe His Gly
35

<210> 867
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F49L"

<400> 867
Leu Pro Pro Glu Ser Thr Gln Val Arg Gly Tyr Asp Phe Asn Arg Gly
1 5 10 15

Val Asn Tyr Arg Ala Leu Leu Glu Ala Leu Leu Gly Thr Thr Gly Phe
20 25 30

Gln Ala Thr Asn Phe Gly Arg Ala Val Gln Gln Val Asn Ala Met Ile
35 40 45

Glu Lys Lys Leu
50

<210> 868
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.I218T"

<400> 868
Leu Gly Leu Asn Lys Thr Leu Ala Ile Glu Leu Ala Pro Arg Asn Ile
1 5 10 15

Arg Val Asn Cys Leu Ala Pro Gly Leu Thr Thr Lys Thr Ser Phe Ser
20 25 30

Arg Met Leu Trp Met Asp Lys Glu Lys Glu Glu Ser Met Lys Glu Thr
35 40 45

Leu Arg Ile Arg
50

<210> 869
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R410Q"

<400> 869
Asp Ile Gly Lys Leu Val Gly Cys Ala Ile Ile His Val Asn Gly Asp
1 5 10 15

Ser Pro Glu Glu Val Val Arg Ala Thr Gln Gln Leu Ala Phe Glu Tyr
20 25 30

Gln Arg Gln Phe Arg Lys Asp Val Ile Ile Asp Leu Leu Cys Tyr Arg
35 40 45

Gln Trp Gly His
50

<210> 870
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V40G"

<400> 870
Arg Lys Met Thr Pro Ser Tyr Glu Ile Arg Ala Val Gly Asn Lys Asn
1 5 10 15

Arg Gln Lys Phe Met Cys Glu Val Gln Gly Gly Glu Gly Tyr Asn Tyr
20 25 30

Thr Gly Met Gly Asn Ser Thr Asn Lys Lys Asp Ala Gln Ser Asn Ala
35 40 45

Ala Arg Asp Phe
50

<210> 871
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E121K"

<400> 871
Glu Arg Ser Leu Asn Leu Ser Glu Lys Glu Val Leu Asp Leu Phe Glu
1 5 10 15

Lys Met Met Glu Asp Met Asn Leu Asn Lys Lys Glu Lys Lys Ala Pro
20 25 30

Leu Arg Asn Lys Asp Phe Thr Thr Lys Arg Glu Met Val Val Gln Tyr
35 40 45

Ile Ser Ala Thr
50

<210> 872
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E1705K"

<400> 872
Lys Ala Tyr Leu Leu Gln Ala Phe Thr His Ala Ser Tyr His Tyr Asn
1 5 10 15

Thr Ile Thr Asp Cys Tyr Gln Arg Leu Lys Lys Phe Leu Gly Asp Ala
20 25 30

Ile Leu Asp Tyr Leu Ile Thr Lys His Leu Tyr Glu Asp Pro Arg Gln
35 40 45

His Ser Pro Gly
50

<210> 873
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.G79C"

<400> 873
Val Cys Thr Leu Gln Ile Thr Asp Thr Thr Gly Ser His Gln Phe Pro
1 5 10 15

Ala Met Gln Arg Leu Ser Ile Ser Lys Cys Cys His Ala Phe Ile Leu
20 25 30

Val Phe Ser Val Thr Ser Lys Gln Ser Leu Glu Glu Leu Gly Pro Ile
35 40 45

Tyr Lys Leu Ile
50

<210> 874
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R780K"

<400> 874
Cys Ser Gly Met Asp Asn Asp Phe His His Tyr Gly Leu Ala Ser Pro
1 5 10 15

Ile Tyr Thr His Phe Thr Ser Pro Ile Lys Lys Arg Tyr Ala Asp Val
20 25 30

Ile Val His Arg Leu Leu Ala Val Ala Ile Gly Ala Asp Cys Thr Tyr
35 40 45

Pro Glu Leu Thr
50

<210> 875
<211> 53
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G732L"

<400> 875
Glu Lys Val Leu Pro Cys Ile Val Ile Lys Phe Arg Tyr Leu Trp Leu
1 5 10 15

Phe Trp Phe Leu Ala Leu Thr Val Gly Leu Leu Ala Tyr Ile Val Cys
20 25 30

Ile Asn Pro Lys Met Lys Leu Pro Ser Leu Glu Leu Ser Glu Phe Gln
35 40 45

Val Phe Arg Ser Ser
50

<210> 876
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R763C"

<400> 876
Ile Asn Pro Lys Met Lys Leu Pro Ser Leu Glu Leu Ser Glu Phe Gln
1 5 10 15

Val Phe Arg Ser Ser His Pro Phe Glu Cys Cys Tyr Asp Ala Glu Tyr
20 25 30

Lys Lys Leu Phe Met Phe Glu Arg Val His His Gly Glu Glu Leu His
35 40 45

Met Pro Ile Thr
50

<210> 877
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F1021S"

<400> 877
Val Ala Gly Thr Val Leu Leu Thr Val Gly Leu Leu Val Leu Leu Glu
1 5 10 15

Trp Gln Leu Asn Thr Ala Glu Ala Leu Ser Ser Leu Ser Ala Ser Val
20 25 30

Gly Leu Ser Val Asp Phe Thr Val Asn Tyr Cys Ile Ser Tyr His Leu
35 40 45

Cys Pro His Pro
50

<210> 878
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R230H"

<400> 878
Lys Pro Val Leu His Gln Gly Glu Val Cys Thr Lys Gln Arg Lys Lys
1 5 10 15

Gly Ser His Gly Leu Glu Ile Phe Gln His His Cys Asp Cys Ala Lys
20 25 30

Gly Leu Ser Cys Lys Val Trp Lys Asp Ala Thr Tyr Ser Ser Lys Ala
35 40 45

Arg Leu His Val
50

<210> 879
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A350V"

<400> 879
Leu Ala Thr Gln Glu Pro Thr Asp Asn Gln Val Arg Leu Arg Lys Arg
1 5 10 15

Lys Glu Ile Arg Glu Asp Arg Asp Arg Val Val Arg Leu Asp Ser Met
20 25 30

Val Leu Leu Ile Met Lys Leu Asp Gln Leu Asp Gln Asp Ile Glu Asn
35 40 45

Ala Leu Ser Thr
50

<210> 880
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S741T"

<400> 880
Ile Ser Ala Leu Asn Gly Asn Arg Ile Asn Val Pro Met Val Arg Lys
1 5 10 15

Arg Ser Val Ser Asn Ser Thr Gln Thr Thr Thr Ser Ser Ser Ser Gln
20 25 30

Ser Glu Thr Ser Ser Ala Val Ser Thr Pro Ser Pro Val Thr Arg Thr
35 40 45

Arg Ser Leu Ser
50

<210> 881
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E222D"

<400> 881
Ile Ser Leu Ser Glu Ile Lys Asp Ala Pro Lys Val Asn Ala Val Asp
1 5 10 15

Thr Leu Asn Val Lys Asp Ile Ala Pro Asp Asp Lys Gln Leu Leu Asn
20 25 30

Ser Ala Val Ile Ala Gln Gln Arg Arg Lys Pro Asp Pro Pro Lys Asp
35 40 45

Glu Asn Glu Arg
50

<210> 882
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A83V"

<400> 882
Arg Ala Arg Pro Gly Pro Gly Arg Glu Glu Arg Gly Gly Gly Val Gly
1 5 10 15

Thr Arg Ser Arg Arg Thr Ala Ala Arg Val Val Asn Ser Pro Glu Glu
20 25 30

Glu Val Val Arg Gly Ala Glu Gly Gly Ala Glu Leu Leu Pro Phe Pro
35 40 45

Arg Asp Arg Gly
50

<210> 883
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S624L"

<400> 883
Lys Arg Arg Val Glu Arg Lys Glu Arg Ala Arg Leu Lys Thr Val Lys
1 5 10 15

Phe Asn Ala Lys Pro Gly Val Ile Asp Leu Leu Lys Gly Ser Phe Asn
20 25 30

Asp Lys Arg Lys Lys Ser Phe Ile Phe Ser Arg Lys Phe Pro Phe Tyr
35 40 45

Lys Asn Lys Glu
50

<210> 884
<211> 115
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G377fs"

<400> 884
Gly Leu Leu Gly Pro Glu Thr Lys Ala Lys Ala Arg Thr Tyr His Tyr
1 5 10 15

Leu Gln Val Pro Gln Asp Asp Trp Gly Val Thr Pro Pro Val Ala Arg
20 25 30

Met Gly Arg Ser Pro Ala Ala Gly Cys Gly Ala Ala Ala Thr Ser Lys
35 40 45

Pro Trp Gly Met Arg Arg Ala Glu Thr Gln Thr Ala Ala Pro Arg His
50 55 60

Leu Pro Lys Gln Ser Pro Asp Ala Ser Pro Pro Val Ala Pro Pro Ala
65 70 75 80

Trp Thr Arg Pro Gly Ser Thr Ala Val Ser His Pro Gly Ser Thr Pro
85 90 95

Gly Ala Pro Ser Leu Ala Thr Ala Val Pro Ser Pro Leu Asp Ser Ser
100 105 110

Ala Met Ser
115

<210> 885
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D318H"

<400> 885
Pro Arg Ser Phe Glu Cys Thr Cys Pro Arg Gly Phe Tyr Gly Leu Arg
1 5 10 15

Cys Glu Val Ser Gly Val Thr Cys Ala His His Gly Pro Cys Phe Asn
20 25 30

Gly Gly Leu Cys Val Gly Gly Ala Asp Pro Asp Ser Ala Tyr Ile Cys
35 40 45

His Cys Pro Pro
50

<210> 886
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R1521L"

<400> 886
Ser Arg Ala Ser Thr Ala Gly Ser Glu Ser Thr Leu Ala Leu Arg Leu
1 5 10 15

Val Asn Gly Gly Asp Arg Cys Arg Gly Leu Leu Val Glu Val Leu Tyr
20 25 30

Gln Gly Ser Trp Gly Thr Val Cys Asp Asp Tyr Trp Asp Thr Asn Asp
35 40 45

Ala Asn Val Val
50

<210> 887
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K1772N"

<400> 887
Asp His Cys Arg Lys Leu Val Glu Pro Gln Ile Ser Glu Leu Asn His
1 5 10 15

Arg Phe Ala Ala Ile Ser His Arg Ile Asn Asn Thr Gly Lys Ala Ser
20 25 30

Ile Pro Leu Lys Glu Leu Glu Gln Phe Asn Ser Asp Ile Gln Lys Leu
35 40 45

Leu Glu Pro Leu
50

<210> 888
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R3195H"

<400> 888
Asn Val Pro Leu Cys Val Asp Met Cys Leu Asn Trp Leu Leu Asn Val
1 5 10 15

Tyr Asp Thr Gly Arg Thr Gly Arg Ile His His Val Leu Ser Phe Lys
20 25 30

Thr Gly Ile Ile Ser Leu Cys Lys Ala His Leu Glu Asp Lys Tyr Arg
35 40 45

Tyr Leu Phe Lys
50

<210> 889
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R44H"

<400> 889
Ala Gly Val Gly Pro Gly Leu Pro Gly Ala Gly Ala Pro Ala Arg Pro
1 5 10 15

Ser Pro Gly Arg Pro Pro Gly Ala Gly His His Leu Arg Thr Gly Pro
20 25 30

Gly Gln Val Arg Gly Arg Leu Leu Ala Val Gly Pro Lys Ser Arg Val
35 40 45

Phe Gln Ser Val
50

<210> 890
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S45T"

<400> 890
Pro Gly Val Pro Pro Gln Gly Arg Ala Gly Gly Phe Gly Lys Ala Ser
1 5 10 15

Gly Ala Leu Val Gly Ala Ala Ser Gly Thr Thr Ser Ala Gly Gly Ser
20 25 30

Ser Arg Gly Gly Gly Ser Gly Ser Gly Ala Ser Asp Leu Gly Ala Gly
35 40 45

Ser Lys Lys Ser
50

<210> 891
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T106S"

<400> 891
Arg Gly Gly Pro Gln Pro Arg Pro Pro Leu Ala Pro Gln Ala Ser Pro
1 5 10 15

Ala Gly Thr Gly Pro Arg Glu Arg Cys Ser Ser Pro Ala Gly Gly Gly
20 25 30

Ala Glu Pro Arg Lys Leu Ser Arg Thr Pro Lys Cys Ala Arg Cys Arg
35 40 45

Asn His Gly Val
50

<210> 892
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D2412E"

<400> 892
Gly Gly Gly Val Lys Leu Val Val Lys Pro Arg Arg Gln Ser Glu Asn
1 5 10 15

Ile Ser Ala Pro Pro Val Leu Ser Glu Glu Glu Ile Asp Lys His Arg
20 25 30

Arg Arg Phe Asn Met Arg Met Leu Val Pro Gly Arg Pro Val Lys Asp
35 40 45

Ala Thr Pro Pro
50

<210> 893
<211> 52
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<400> 893
Gly Ala Pro Ala Gly Pro Ala Gly Thr Gly Lys Thr Glu Thr Thr Lys
1 5 10 15

Asp Leu Ala Lys Ala Leu Gly Leu Leu Phe Phe Val Val Thr Asn Cys
20 25 30

Gly Glu Gly Met Asp Tyr Arg Ala Val Gly Lys Ile Phe Ser Gly Leu
35 40 45

Ala Gln Cys Gly
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<210> 894
<211> 52
<212> PRT

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<400> 894
Asp Tyr Arg Ala Val Gly Lys Ile Phe Ser Gly Leu Ala Gln Cys Gly
1 5 10 15

Ala Trp Gly Cys Phe Asp Glu Phe Asn Gln Gln Ile Asp Ala Ser Val
20 25 30

Leu Ser Val Ile Ser Ser Gln Ile Gln Thr Ile Arg Asn Ala Leu Ile
35 40 45

His Gln Leu Thr
50

<210> 895
<211> 52
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<400> 895
Gln Asp Ile Gly Pro Pro Ala Val Lys Met Leu Ile Ser Ala Glu Gly
1 5 10 15

Glu Gly Leu Val Leu Pro Lys Lys Ile Cys Cys Val Arg Ser Ala Val
20 25 30

Glu Gln Trp Leu Val Asn Val Glu Lys Ser Met Phe Asp Val Leu Lys
35 40 45

Lys Glu Arg Tyr
50

<210> 896
<211> 52
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<400> 896
Leu Asn Leu Arg Ile Lys Tyr Ile Ile Asp His Phe Thr Leu Ser Ile
1 5 10 15

Tyr Asn Asn Val Cys Arg Ser Leu Phe Gln Gln Lys Asp Lys Leu Leu
20 25 30

Phe Ser Leu Leu Leu Thr Ile Gly Ile Met Lys Gln Lys Lys Glu Ile
35 40 45

Thr Glu Glu Val
50

<210> 897
<211> 52
<212> PRT
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<400> 897
Gln Lys Leu Glu Ile Ser Ala Glu Thr Glu Val Gln Ile Asn Ser Ala
1 5 10 15

Arg Glu Glu Tyr Arg Pro Val Ala Thr Leu Leu Gly Ser Ile Leu Tyr
20 25 30

Phe Leu Ile Thr Glu Met Arg Leu Val Asn Glu Met Tyr Gln Thr Ser
35 40 45

Leu Arg Gln Phe
50

<210> 898
<211> 52
<212> PRT
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<400> 898
Leu Phe Arg Glu Thr Glu Cys Met Ala Gln Met Gly Leu Glu Val Ser
1 5 10 15

Pro Leu Ala Thr Ser Leu Phe Gln Lys Gln Gln Asp Arg Tyr Lys Arg
20 25 30

Asn Phe Ser Asn Met Lys Met Met Leu Ala Glu Tyr Gln Arg Val Lys
35 40 45

Ser Lys Ile Pro
50

<210> 899
<211> 52
<212> PRT
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<400> 899
Glu Leu Leu Ser His Phe Asn His Gln Asn Met Asp Ala Leu Leu Lys
1 5 10 15

Val Thr Arg Asn Thr Leu Glu Ala Ile His His Lys Arg Ile His Ser
20 25 30

Ser His Thr Ile Asn Phe Arg Asp Ser Asn Ser Ala Ser Asn Met Lys
35 40 45

Gln Asn Ser Leu
50

<210> 900
<211> 52
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<220>
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多肽"

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<400> 900
Thr Ile Glu Leu Asp Lys Pro Val Met Ala Glu Gly Asn Val Glu Val
1 5 10 15

Trp Leu Asn Ser Leu Leu Glu Glu Ser Glu Glu Ser Ser Leu His Leu
20 25 30

Val Ile Arg Gln Ala Ala Ala Asn Ile Gln Glu Thr Gly Phe Gln Leu
35 40 45

Thr Glu Phe Leu
50

<210> 901
<211> 52
<212> PRT
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多肽"

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<400> 901
Phe Leu Ser Ser Leu Glu Gly Phe Val Asn Val Leu Ser Gly Ala Gln
1 5 10 15

Glu Ser Leu Lys Glu Lys Val Asn Leu Gln Gln Lys Cys Asp Ile Leu
20 25 30

Glu Leu Lys Thr Leu Lys Glu Pro Thr Asp Tyr Leu Thr Leu Ala Asn
35 40 45

Asn Pro Glu Thr
50

<210> 902
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 902
His Val Thr Pro Lys Ser Tyr Leu Ser Phe Ile Gln Gly Tyr Lys Phe
1 5 10 15

Ile Tyr Gly Glu Lys His Val Glu Val Gln Gln Thr Leu Ala Asn Arg
20 25 30

Met Asn Thr Gly Leu Glu Lys Leu Lys Glu Ala Ser Glu Ser Val Ala
35 40 45

Ala Leu Ser Lys
50

<210> 903
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 903
Lys Glu Ala Ser Glu Ser Val Ala Ala Leu Ser Lys Glu Leu Glu Ala
1 5 10 15

Lys Glu Lys Glu Leu Gln Val Ala Asn Asn Asn Lys Ala Asp Met Val
20 25 30

Leu Lys Glu Val Thr Met Lys Ala Gln Ala Ala Glu Lys Val Lys Ala
35 40 45

Glu Val Gln Lys
50

<210> 904
<211> 52
<212> PRT
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多肽"

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<400> 904
Leu Cys Lys Gly Arg Asp Ile Pro Cys Ser Asp Asp Cys Ser Leu Met
1 5 10 15

Gly Thr Leu Gly Glu Ala Val Thr Ile Gln Gln Thr Trp Asn Ile Ala
20 25 30

Gly Leu Pro Ser Asp Ser Phe Ser Ile Asp Asn Gly Ile Ile Ile Met
35 40 45

Asn Ala Arg Arg
50

<210> 905
<211> 52
<212> PRT
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多肽"

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<400> 905
Leu Glu Ser Ile Phe Thr Gly Ser Glu Asp Ile Arg Ala Gln Leu Pro
1 5 10 15

Gln Asp Ser Lys Arg Phe Glu Gly Ile Asn Asn Ile Asp Phe Lys Glu
20 25 30

Leu Ala Tyr Asp Ala Gln Lys Ile Pro Asn Val Val Gln Thr Thr Asn
35 40 45

Lys Pro Gly Leu
50

<210> 906
<211> 52
<212> PRT
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多肽"

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<400> 906
Lys Phe Pro Ala Ile Val Asn Cys Thr Ala Ile His Trp Phe His Glu
1 5 10 15

Trp Pro Gln Gln Ala Leu Glu Ser Val Arg Arg Leu Arg Phe Leu Gln
20 25 30

Asn Thr Glu Gly Ile Glu Pro Thr Val Lys Gln Ser Ile Ser Lys Phe
35 40 45

Met Ala Phe Val
50

<210> 907
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 907
Pro Asn Lys Pro Glu Leu Ala Leu Lys Pro Ser Ser Pro Leu Val Thr
1 5 10 15

Leu Glu Phe Asn Pro Lys Asp Ser His Leu Leu Leu Leu Gly Gly Cys
20 25 30

Tyr Asn Gly Gln Ile Ala Cys Trp Asp Thr Arg Lys Gly Ser Leu Val
35 40 45

Ala Glu Leu Ser
50

<210> 908
<211> 46
<212> PRT
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多肽"

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<400> 908
Ala Val Val Trp Ser Ile Tyr Leu Glu Lys Gln Leu Asp Glu Leu Leu
1 5 10 15

Ser Arg Lys Lys Arg Glu Lys Lys Lys Arg Leu Ala Ala Arg Val Trp
20 25 30

Met Tyr Gln Asn Ser Val Leu Gln Lys Lys Met Lys Asp Cys
35 40 45

<210> 909
<211> 52
<212> PRT
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多肽"

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<400> 909
Phe Lys Lys Leu Ala Leu Lys Leu His Pro Asp Lys Asn Pro Asn Asn
1 5 10 15

Pro Asn Ala His Gly Asp Phe Leu Lys Lys Lys Asn Arg Ala Tyr Glu
20 25 30

Val Leu Lys Asp Glu Asp Leu Arg Lys Lys Tyr Asp Lys Tyr Gly Glu
35 40 45

Lys Gly Leu Glu
50

<210> 910
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 910
Asp Leu Met Leu Glu Glu Ser Asp Lys Thr His Thr Thr Lys Met Glu
1 5 10 15

Asn Glu Glu Cys Asn Glu Gln Arg Glu Lys Lys Lys Lys Glu Glu Leu
20 25 30

Ala Ser Thr Ala Glu Lys Thr Glu Gln Lys Glu Pro Lys Pro Leu Glu
35 40 45

Lys Ser Val Ser
50

<210> 911
<211> 52
<212> PRT
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多肽"

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<400> 911
Thr Pro Arg Leu Gln Ser Asn Thr Arg Ala Leu Tyr Gln Tyr Cys Pro
1 5 10 15

Ile Pro Ile Ile Asn Tyr Pro Gln Leu Lys Lys Asn Glu Leu Phe Cys
20 25 30

Asn Ile Tyr Tyr Leu Lys Gln Leu Cys Asp Thr Leu Arg Phe Pro Asp
35 40 45

Trp Pro Ile Lys
50

<210> 912
<211> 52
<212> PRT
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多肽"

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<400> 912
Leu Met Tyr His Pro Asp Lys Gln Ser Thr Asp Val Pro Ala Gly Thr
1 5 10 15

Val Glu Glu Cys Val Gln Lys Phe Ile Lys Lys Ile Asp Gln Ala Trp
20 25 30

Lys Ile Leu Gly Asn Glu Glu Thr Lys Arg Glu Tyr Asp Leu Gln Arg
35 40 45

Cys Glu Asp Asp
50

<210> 913
<211> 52
<212> PRT
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多肽"

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<400> 913
Cys Ala Ser Leu Thr Lys Lys Arg Leu Asp Lys Leu Glu Leu Arg Thr
1 5 10 15

Glu Pro Gly Phe His Trp Val Ile Ala Asn Asn Gly Glu Asp Thr Thr
20 25 30

Val Arg Ala Ser Thr His Cys Thr Tyr Asp Arg Val Val Leu His Gly
35 40 45

Glu Arg Cys Arg
50

<210> 914
<211> 52
<212> PRT
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多肽"

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<400> 914
Thr Leu Glu Leu Ser Gly Gly Ala Arg Ile Asn Arg Ile Phe His Glu
1 5 10 15

Arg Phe Pro Phe Glu Leu Val Lys Met Asp Asp Phe Asp Glu Lys Asp
20 25 30

Leu Arg Arg Glu Ile Ser Tyr Ala Ile Lys Asn Ile His Gly Val Arg
35 40 45

Thr Gly Leu Phe
50

<210> 915
<211> 55
<212> PRT
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<400> 915
Gln Arg Arg Pro Val Ser Ser Ile His Pro Pro Gly Arg Pro Pro Ala
1 5 10 15

Val Arg Gly Pro Thr Pro Gly Pro Pro Pro Asp Ser Cys Ser Arg Gly
20 25 30

Gly Ser Ser Leu Leu Leu Gly Ala Pro Asn Pro Ile Pro Ala Trp Thr
35 40 45

Pro Glu Arg Val Cys Gln Gln
50 55

<210> 916
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 916
Ser Ser Phe Val Glu Ile Val Thr Ile Pro Ser Leu Lys Glu Gly Glu
1 5 10 15

Arg Leu Phe Val Cys Ile Cys Glu Phe Pro Pro Ser Gln Glu Leu Asp
20 25 30

Asn Leu Pro Leu His Arg Gly Asp Leu Val Ile Leu Asp Gly Ile Pro
35 40 45

Thr Ala Gly Trp
50

<210> 917
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 917
Leu Thr Cys Phe Ser Val Tyr Cys Lys His Gly His Leu Cys Pro Ile
1 5 10 15

Asp Thr Gly Leu Ile Glu Lys Asn Ile Lys Lys Leu Phe Phe Ser Gly
20 25 30

Ser Ala Lys Pro Ile Tyr Asp Asp Asp Pro Ser Leu Glu Gly Gly Val
35 40 45

Asn Gly Lys Asn
50

<210> 918
<211> 52
<212> PRT
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多肽"

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<400> 918
Arg Arg Leu Lys Asp Leu Glu Arg Asp Ser Leu Thr Glu Lys Glu Cys
1 5 10 15

Val Lys Glu Lys Leu Asn Leu Leu His Lys Lys Phe Leu Gln Thr Glu
20 25 30

Ile Lys Asn Gln Leu Cys Asp Leu Glu Thr Lys Leu Arg Lys Glu Glu
35 40 45

Leu Ser Glu Glu
50

<210> 919
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<400> 919
Pro Glu His Tyr Arg Lys Tyr Ser Asp Tyr Ile Lys Gly Ser Asn Leu
1 5 10 15

Asp Ala Pro Glu Pro Tyr Arg Ile Gly Gln Gln Ile Lys Glu Ile Phe
20 25 30

Cys Pro Lys Lys Ser Asn Gly Arg Pro Asn Glu Thr Asp Ile Lys Ile
35 40 45

Arg Val Asn Lys
50

<210> 920
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<400> 920
Arg His Asn His Trp Ala Gly Leu Tyr Gly Arg Leu Glu Trp Asp Gly
1 5 10 15

Phe Phe Ser Thr Thr Val Thr Asn Pro Gln Gln Pro Met Gly Lys Gln
20 25 30

Gly Arg Val Leu His Pro Glu Gln His Arg Val Val Ser Val Arg Glu
35 40 45

Cys Ala Arg Ser
50

<210> 921
<211> 52
<212> PRT
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<400> 921
Asn Asp Leu Ser Ile Val Asn Pro Ala Arg Lys Gly Leu Tyr Glu Gly
1 5 10 15

Thr Gly Arg Leu Phe Phe Glu Phe Tyr His His Leu Leu His Asp Ala
20 25 30

Arg Pro Lys Glu Gly Asp Asp Arg Pro Phe Phe Trp Leu Phe Glu Asn
35 40 45

Val Val Ala Met
50

<210> 922
<211> 52
<212> PRT
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<400> 922
Asp Ile Leu Trp Cys Thr Glu Met Glu Arg Val Phe Gly Phe Pro Val
1 5 10 15

His Tyr Thr Asp Val Ser Asn Met Ser Cys Cys Leu Ala Arg Gln Arg
20 25 30

Leu Leu Gly Arg Ser Trp Ser Val Pro Val Ile Arg His Leu Phe Ala
35 40 45

Pro Leu Lys Glu
50

<210> 923
<211> 52
<212> PRT

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多肽"

<220>
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<400> 923
Asp Ile Leu Trp Cys Thr Glu Met Glu Arg Val Phe Gly Phe Pro Val
1 5 10 15

His Tyr Thr Asp Val Ser Asn Met Ser His His Leu Ala Arg Gln Arg
20 25 30

Leu Leu Gly Arg Ser Trp Ser Val Pro Val Ile Arg His Leu Phe Ala
35 40 45

Pro Leu Lys Glu
50

<210> 924
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<220>
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<400> 924
Thr Gln Asp Leu Thr Gly Asp Gly Asp Gly Glu Asp Gly Asp Gly Ser
1 5 10 15

Asp Thr Pro Val Met Pro Lys Leu Phe Trp Trp Glu Thr Arg Thr Arg
20 25 30

Ser Glu Ser Pro Ala Val Arg Thr Arg Asn Asn Asn Ser Val Ser Ser
35 40 45

Arg Glu Arg His
50

<210> 925
<211> 52
<212> PRT
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多肽"

<220>
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<400> 925
Ser Lys Met Phe Thr Glu Phe Ile Leu Asn Val Pro Met Gly Leu Leu
1 5 10 15

Thr Ile Gln Lys Leu Tyr Cys Leu Ile Lys Lys Ile Val His Ser Asp
20 25 30

Leu Phe Thr Gln His Asp Cys Arg Glu Ile Leu Leu Pro Met Met Thr
35 40 45

Asp Gln Leu Lys
50

<210> 926
<211> 52
<212> PRT
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多肽"

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<400> 926
Asn Glu Asn Ile Leu Val Glu Gln Leu Tyr Met Cys Val Glu Phe Leu
1 5 10 15

Trp Lys Ser Glu Arg Tyr Glu Leu Ile Val Val Asp Val Asn Lys Pro
20 25 30

Ile Ile Ala Val Phe Glu Lys Gln Arg Asp Phe Lys Lys Leu Ser Asp
35 40 45

Leu Tyr Tyr Asp
50

<210> 927
<211> 52
<212> PRT
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多肽"

<220>
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<400> 927
Phe Glu Ile Asp Glu Asp Cys Glu Lys Asp Glu Asp Ser Ser Ser Leu
1 5 10 15

Cys Ser Gln Lys Gly Gly Val Ile Lys Glu Glu Gly Trp Leu His Lys
20 25 30

Ala Asn Val Asn Ser Thr Ile Thr Val Thr Met Lys Val Phe Lys Arg
35 40 45

Arg Tyr Phe Tyr
50

<210> 928
<211> 52
<212> PRT
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多肽"

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<400> 928
Glu Leu Phe Ser Leu Leu Thr Gln Leu Phe Gly Pro Tyr Pro Ser Leu
1 5 10 15

Leu Glu Lys Val Glu Gln Glu Thr Trp Cys Cys Glu Thr Gly Ile Ser
20 25 30

Phe Val Thr Ser Val Thr Arg Leu Met Glu Arg Leu Leu Asp Tyr Arg
35 40 45

Asp Cys Met Lys
50

<210> 929
<211> 52
<212> PRT
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多肽"

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<400> 929
Ile Asp His Gly Asn Arg Met Leu Gly Leu Asp Leu Val Val Arg Asp
1 5 10 15

Asp Asn Gly Asn Ile Leu Asp Pro Asp Lys Lys Thr Ser Thr Ile Ala
20 25 30

Leu Phe Lys Ala His Glu Val Ala Ser Lys Arg Ile Glu Glu Lys Ile
35 40 45

Gln Glu Glu Lys
50

<210> 930
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<212> PRT
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肽"

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<400> 930
Thr Leu Ile Ser Met Arg Leu Glu Phe Leu Arg Ile Leu Cys Ser His
1 5 10 15

Glu His Tyr Leu Asn Leu Asn Leu Phe Leu
20 25

<210> 931
<211> 43
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A177fs"

<400> 931
His Lys Thr Leu Pro Lys Gln Thr Phe Glu Ser Glu Thr Leu Glu Cys
1 5 10 15

Ser Glu Pro Ala Ala Gln Ala Gly Pro Pro Pro Leu Lys Arg Ala Val
20 25 30

Arg Arg Val Trp Glu Arg Pro Arg His Cys Leu
35 40

<210> 932
<211> 52
<212> PRT
<213> 人工序列

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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 932
Lys Met Ser Glu Arg Ala Ala Ser Leu Ser Thr Met Val Pro Leu Pro
1 5 10 15

Arg Ser Ala Tyr Trp Gln His Ile Thr Trp Trp Gln His Ser Thr Gly
20 25 30

Gln Leu Tyr Arg Leu Gln Asp Val Ser Ser Pro Leu Lys Leu His Arg
35 40 45

Thr Glu Thr Phe
50

<210> 933
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 933
Gly Gln Thr Ser Ala Gly Cys Pro Ser Gly Trp Leu Gly Thr Arg Arg
1 5 10 15

Arg Gly Leu Val Met Glu Ala Pro Gln Asp Asp Ser Glu Ala Thr Leu
20 25 30

Pro Gly Pro Ala Pro Gly Glu Pro Trp Glu Ala Gly Gly Pro His Ala
35 40 45

Gly Pro Pro Pro
50

<210> 934
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 934
Lys Ala Gly Ala Lys Leu Ser Leu Val Arg Val Asp Ser Asp Lys Thr
1 5 10 15

Gln Ala Ser Glu Ser Phe Ser Ser Asp Lys Lys Glu Ala Asp Leu Glu
20 25 30

Leu Gln Ala Leu Thr Thr Ser Arg Leu Leu Lys Gln Gln Arg Glu Arg
35 40 45

Gln Glu Ala Val
50

<210> 935
<211> 52
<212> PRT
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多肽"

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<400> 935
Phe Glu Gln Lys Ala Met Leu Leu Lys Arg Gln Ala Phe Ala Val Phe
1 5 10 15

Ser Gly Glu Leu Asp Gln Tyr His Leu Ser Ser Leu Pro Leu Ile Gln
20 25 30

Glu Arg Leu Thr Asp Asn Leu Arg Val Gly Gln Thr Ser Ile Val Ala
35 40 45

Ala Gln Met Phe
50

<210> 936
<211> 53
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.L768del"

<400> 936
Asn Arg Glu Arg Thr Ala Asn Glu Asn Thr Thr Pro Ser Pro Ala Gln
1 5 10 15

Pro Thr Glu Asn Gly Asp Arg Thr Pro Ala Asn Glu Lys Thr Thr Pro
20 25 30

Ser Leu Ala Glu Pro Thr Glu Asn Gly Lys Arg Thr Pro Phe Ala Asn
35 40 45

Glu Lys Thr Thr Ser
50

<210> 937
<211> 37
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 937
Met Trp Ser Gly Trp Trp Leu Trp Pro Leu Leu Leu Ala Val Cys Thr
1 5 10 15

Ala Asp Phe Phe Arg Asp Glu Ala Glu Arg Ile Met Arg Asp Ser Pro
20 25 30

Val Ile Asp Gly His
35

<210> 938
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 938
Thr Ala Ser Tyr Val Ile Tyr Asn Ile His Thr Arg Glu Val Trp Glu
1 5 10 15

Leu Asn Pro Pro Glu Val Glu Asp Ser Ile Ile Leu Gln Tyr Ala Ala
20 25 30

Trp Gly Val Gln Gly Gln Gln Leu Ile Tyr Ile Phe Glu Asn Asn Ile
35 40 45

Tyr Tyr Gln Pro
50

<210> 939
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 939
Thr Phe Thr Cys Gly Ser Ala Leu Ser Pro Ile Thr Asp Phe Lys Leu
1 5 10 15

Tyr Ala Ser Ala Phe Ser Glu Arg Tyr Phe Phe Gly Leu His Gly Leu
20 25 30

Asp Asn Arg Ala Tyr Glu Met Thr Lys Val Ala His Arg Val Ser Ala
35 40 45

Leu Glu Glu Gln
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<210> 940
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 940
Gln Ala Thr Leu Asp Tyr Gly Met Tyr Ser Arg Glu Glu Glu Leu Leu
1 5 10 15

Arg Glu Arg Lys Arg Ile Gly Thr Val Arg Arg Ile Ala Ser Tyr Asp
20 25 30

Tyr His Gln Gly Ser Gly Thr Phe Leu Phe Gln Ala Gly Ser Gly Ile
35 40 45

Tyr His Val Lys
50

<210> 941
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 941
Ile Leu Lys Tyr Leu Thr Ser Lys Ile Phe Gly Ile Ala Asp Asp Ala
1 5 10 15

His Ile Gly Asn Leu Leu Thr Ser Lys Leu Leu Phe Ser Tyr Lys Asp
20 25 30

Phe Asp Thr Leu Leu Tyr Thr Cys Ala Ala Glu Phe Asp Phe Met Glu
35 40 45

Lys Glu Thr Pro
50

<210> 942
<211> 52
<212> PRT
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<220>
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多肽"

<220>
<221> 來源
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<400> 942
Met Leu Leu Val Thr His Ile Leu Arg Ala Thr Lys Leu Tyr Arg Gly
1 5 10 15

Ser Leu Ile Ala Leu Cys Ile Ser Asn Leu Leu Phe Phe Met Leu Pro
20 25 30

Trp Gln Phe Ala Gln Phe Val Leu Leu Thr Gln Ile Ala Ser Leu Phe
35 40 45

Ala Val Tyr Val
50

<210> 943
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.M210V"

<400> 943
Ile Asn Ala Ile Lys Arg Phe His Leu Tyr Pro Glu Val Ile Ile Ala
1 5 10 15

Ser Trp Tyr Cys Thr Phe Met Gly Ile Val Val Asn Leu Phe Gly Leu
20 25 30

Glu Thr Lys Thr Cys Trp Asn Val Thr Arg Ile Glu Pro Leu Asn Glu
35 40 45

Val Gln Ser Cys
50

<210> 944
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 944
Ala Ser Cys Glu Phe Asp Cys Val Asp Glu Met Leu Thr Leu Ala Ala
1 5 10 15

Met Leu Thr Ala Ala Pro Gly Phe Thr His His Pro Pro Leu Ser Ala
20 25 30

Glu Glu Ala Ala Leu Arg Arg Ala Leu Glu His Thr Asp Gly Asp His
35 40 45

Ser Ser Leu Ile
50

<210> 945
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.S275R"

<400> 945
Arg Ile Ala Gln Val Gln Ile Arg Arg Ile Ser Ser Leu Glu Arg Ala
1 5 10 15

Ala Glu His Ala Gln Ser Cys Arg Ser Arg Arg Ala Ala Cys Ala Pro
20 25 30

Asp Thr Ser Leu Arg Ala Ser Ile Lys Lys Glu Thr Lys Val Leu Lys
35 40 45

Thr Leu Ser Val
50

<210> 946
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.R128L"

<400> 946
Asn Pro Arg Thr Gly Glu Ile Asn Ile Thr Ser Val Val Asp Arg Glu
1 5 10 15

Ile Thr Pro Leu Phe Leu Ile Tyr Cys Leu Leu Ala Leu Asn Ser Arg
20 25 30

Gly Glu Asp Leu Glu Arg Pro Leu Glu Leu Arg Val Lys Val Met Asp
35 40 45

Ile Asn Asp Asn
50

<210> 947
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R160G"

<400> 947
Cys Asp Ala Tyr Gln Lys Arg Leu Leu Gln Leu Gln Glu Gln Met Arg
1 5 10 15

Ala Leu Tyr Lys Ala Ile Ser Val Pro Gly Gly Val Arg Arg Ala Ser
20 25 30

Ser Lys Gly Gly Gly Gly Tyr Thr Cys Gln Ser Gly Ser Gly Trp Asp
35 40 45

Glu Phe Thr Lys
50

<210> 948
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<223> /注釋="p.A4410S"

<400> 948
Thr Ile Cys Gly Lys Ser Val Glu Arg Gln Asn Lys Leu Glu Glu Ala
1 5 10 15

Leu Leu Phe Ser Gly Gln Phe Thr Asp Ser Ser Leu Gln Ala Leu Ile
20 25 30

Asp Trp Leu Tyr Arg Val Glu Pro Gln Leu Ala Glu Asp Gln Pro Val
35 40 45

His Gly Asp Ile
50

<210> 949
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<223> /注釋="p.S1767Y"

<400> 949
Ile Thr Leu Thr Arg Ser Leu Ser Val Gln Asp Gly Leu Asp Glu Met
1 5 10 15

Leu Asp Trp Met Gly Asn Val Glu Ser Tyr Tyr Leu Lys Glu Gln Gly
20 25 30

Gln Val Pro Leu Asn Ser Thr Ala Leu Gln Asp Ile Ile Ser Lys Asn
35 40 45

Ile Met Leu Glu
50

<210> 950
<211> 36
<212> PRT
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<220>
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多肽"

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<400> 950
Lys Asp Cys Arg Tyr Ala Leu Tyr Asp Ala Ser Phe Glu Thr Lys Glu
1 5 10 15

Ser Arg Lys Glu Glu Leu Met Phe Phe Phe Val Gly Thr Arg Thr Ser
20 25 30

Thr Ser Glu Lys
35

<210> 951
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 951
Ser Pro Glu Asp Lys Ser Arg Leu Met Phe Thr Met Tyr Asp Leu Asp
1 5 10 15

Glu Asn Gly Phe Leu Ser Lys Asp Glu Leu Leu Phe Thr Met Met Arg
20 25 30

Ser Phe Ile Glu Ile Ser Asn Asn Cys Leu Ser Lys Ala Gln Leu Ala
35 40 45

Glu Val Val Glu
50

<210> 952
<211> 104
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.A601fs"

<400> 952
Tyr Gly Gly Gly Ser Ala Ser Ser Gln His Ser Glu Gly Ser Arg Ser
1 5 10 15

Ser Gly Ser Thr Arg Ser Asp Gly Gly Gln Gly Ala Arg Gly Gly Pro
20 25 30

Arg Ser Gly Pro Pro Ser Pro Ser Pro Ala Val Ala Val Ser Leu Ser
35 40 45

Pro Pro Ala Glu Gly Ala Ala Phe Gly Gly Val Gly Lys Gln Val Gly
50 55 60

Leu Ala Met Gly Ala Leu Leu His Pro Glu Ala Gln Leu Gly Val Pro
65 70 75 80

Leu Ile Ser Glu Pro Thr Gln Gly Ser Ile Pro Met Asp Arg Pro Leu
85 90 95

Ala Trp Pro Ser Pro Thr Thr Pro
100

<210> 953
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 953
Gly Asp Phe Lys Ser Val Leu Gln Arg Pro Ala Gly Ala Lys Tyr Phe
1 5 10 15

Phe Lys Ser Met Asp Gln Asp Phe Gly Gly Gly Val Lys Glu Glu Ile
20 25 30

Ser Asp Asp Asn Ala Arg Leu Pro Cys Phe Asn Gly Arg Val Val Ser
35 40 45

Trp Leu Val Ser
50

<210> 954
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

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<223> /注釋="p.E883D"

<400> 954
Lys Glu Trp Ile Val Ile Gly Gln Val Asp Met Glu Ala Leu Val Glu
1 5 10 15

Lys His Leu Phe Thr Val His Asp Trp Asp Asp Lys Asn Phe Lys Ala
20 25 30

Leu Lys Ile Lys Gly Lys Glu Val Glu Arg Leu Pro Ser Ala Val Lys
35 40 45

Val Asp Cys Leu
50

<210> 955
<211> 43
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 955
Asp Val Pro His Lys Thr His Gln Ala Pro Ala Ser Ala Ser Ser Leu
1 5 10 15

Pro Gly Thr Gly Ala Gln Leu Pro Pro Ser Pro Asp Thr Leu Val Val
20 25 30

Pro His His Gln Pro His His His Pro Arg Ser
35 40

<210> 956
<211> 36
<212> PRT
<213> 人工序列

<220>
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多肽"

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<223> /注釋="p.K468fs"

<400> 956
Thr Ala Ser Arg Arg Gln Thr Phe Phe Asp Ser Lys Gly Phe Pro Lys
1 5 10 15

Asn Ile Thr Asn Asn Arg Gly Lys Lys Asp Thr Gln Ile Pro Arg Thr
20 25 30

Ser Arg Trp Cys
35

<210> 957
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.M322L"

<400> 957
Asn Leu Lys Tyr Pro Gly Glu Asn Asp Gln Ser Phe Ser Gly Lys Lys
1 5 10 15

Cys Leu Lys Glu Gly Cys Thr Gly Asp Leu Leu Val Arg Met Leu Gln
20 25 30

Cys Asp Val Pro Gly Ile Val Lys Ile Leu Phe Glu Val Val Arg Lys
35 40 45

Asp Glu Tyr Ile
50

<210> 958
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.I91S"

<400> 958
Pro Ile Thr Pro Val Lys Phe Val Asp Arg Gln Gln Ala Glu Pro Trp
1 5 10 15

Thr Pro Thr Ala Asn Leu Lys Met Leu Ser Ser Ser Ala Ala Ser Pro
20 25 30

Asp Ile Arg Asp Arg Glu Lys Lys Lys Gly Leu Phe Arg Pro Ile Glu
35 40 45

Asn Lys Asp Asp
50

<210> 959
<211> 54
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V109fs"

<400> 959
Cys Ile Leu Ile Ile Asn His Asp Thr Gly Glu Cys Arg Leu Glu Lys
1 5 10 15

Leu Ser Ser Asn Ile Thr Val Lys Lys Gln Glu Leu Lys Glu Ala Val
20 25 30

Lys Phe Ser Ile Val Lys Asn Asn Ser Asn Asn Lys Cys Gly Ile Gln
35 40 45

Pro Gly Leu Pro Ile Leu
50

<210> 960
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.E187K"

<400> 960
Glu Glu Asp Ala Ala Trp Gln Ala Glu Glu Val Leu Arg Gln Gln Lys
1 5 10 15

Leu Ala Asp Arg Glu Lys Arg Ala Ala Lys Lys Gln Gln Arg Lys Lys
20 25 30

Met Glu Lys Glu Ala Gln Arg Leu Met Lys Lys Glu Gln Asn Lys Ile
35 40 45

Gly Val Lys Leu
50

<210> 961
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D353G"

<400> 961
Ser Tyr Lys Ser Lys Gln Phe Cys Lys Gly Thr Pro Gly Arg Phe Ile
1 5 10 15

Tyr Thr Ala Leu Asn Glu Pro Thr Ile Gly Gly Tyr Gly Phe Gln Arg
20 25 30

Leu Gln Lys Val Ile Pro Arg His Pro Gly Asp Pro Glu Arg Leu Pro
35 40 45

Lys Glu Val Ile
50

<210> 962
<211> 44
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L189V"

<400> 962
Tyr Cys Trp Leu Tyr Leu Phe Phe Phe Asn Gly Val Trp Val Leu Ile
1 5 10 15

Pro Gly Leu Leu Leu Trp Gln Ser Trp Val Val Glu Leu Lys Lys Met
20 25 30

His Gln Lys Glu Thr Ser Ser Val Lys Lys Phe Gln
35 40

<210> 963
<211> 37
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q196P"

<400> 963
Phe Phe Asn Gly Val Trp Val Leu Ile Pro Gly Leu Leu Leu Trp Gln
1 5 10 15

Ser Trp Leu Glu Leu Lys Lys Met His Pro Pro Lys Glu Thr Ser Ser
20 25 30

Val Lys Lys Phe Gln
35

<210> 964
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D254N"

<400> 964
Asp Arg Gly Val Ser Pro Cys Glu Asp Phe Tyr Gln Phe Ser Cys Gly
1 5 10 15

Gly Trp Ile Arg Arg Asn Pro Leu Pro Asn Asn Gly Arg Ser Arg Trp
20 25 30

Asn Thr Phe Asn Ser Leu Trp Asp Gln Asn Gln Ala Ile Leu Lys His
35 40 45

Leu Leu Glu Asn
50

<210> 965
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K55R"

<400> 965
His Met Asn Arg Thr Ala Met Arg Ala Ser Gln Lys Asp Phe Glu Asn
1 5 10 15

Ser Met Asn Gln Val Lys Leu Leu Lys Arg Arg Asp Pro Gly Asn Glu
20 25 30

Val Lys Leu Lys Leu Tyr Ala Leu Tyr Lys Gln Ala Thr Glu Gly Pro
35 40 45

Cys Asn Met Pro
50

<210> 966
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E266K"

<400> 966
Glu Ile Gly Tyr Ser Arg Cys Cys His Cys Arg Ser His Thr Asn Arg
1 5 10 15

Leu Glu Cys Ala Lys Leu Val Trp Glu Lys Lys Ala Met Ser Arg Phe
20 25 30

Cys Glu Ala Glu Phe Ser Val Lys Thr Arg Pro His Trp Cys Cys Thr
35 40 45

Arg Gln Gly Glu
50

<210> 967
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L58F"

<400> 967
Arg Ala Gly Glu Gly Asn Ser Cys Leu Leu Phe Leu Gly Phe Phe Gly
1 5 10 15

Leu Ser Leu Ala Leu His Leu Leu Thr Phe Phe Cys Cys Tyr Leu Glu
20 25 30

Leu Arg Ser Glu Leu Arg Arg Glu Arg Gly Ala Glu Ser Arg Leu Gly
35 40 45

Gly Ser Gly Thr
50

<210> 968
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L450R"

<400> 968
Ser Arg Ile Leu Lys Leu Thr Leu Tyr Asn Gln Asn Asp Pro Asn Arg
1 5 10 15

Cys Glu Leu Leu Ser Phe Leu Leu Val Arg Trp Asp Tyr Ile Gly Ile
20 25 30

Asn Met Ala Ser Leu Asn Ser Cys Ile Asn Pro Ile Ala Leu Tyr Leu
35 40 45

Val Ser Lys Arg
50

<210> 969
<211> 32
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.N570fs"

<400> 969
Glu Arg Glu Asp Leu Tyr Ala Lys Ile Gln Ala Gly Glu Gly Glu Thr
1 5 10 15

Ala Val Leu Asn Gln Leu Gln Glu Lys Thr Ile His Tyr Arg Ser Lys
20 25 30

<210> 970
<211> 53
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<400> 970
Gly Lys Pro Met Cys Val Glu Ser Phe Ser Asp Tyr Pro Pro Leu Gly
1 5 10 15

Arg Phe Ala Val Arg Asp Met Arg Gln Leu Leu Val Ala Val Gly Val
20 25 30

Ile Lys Ala Val Asp Lys Lys Ala Ala Gly Ala Gly Lys Val Thr Lys
35 40 45

Ser Ala Gln Lys Ala
50

<210> 971
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
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<400> 971
Ser Leu Lys Ser Gly Asp Ala Ala Ile Val Glu Met Val Pro Gly Lys
1 5 10 15

Pro Met Cys Val Glu Ser Phe Ser Gln Ser Ser Pro Pro Leu Gly Arg
20 25 30

Phe Ala Val Arg Asp Met Arg Gln Thr Val Ala Val Gly Val Ile Lys
35 40 45

Asn Val Glu Lys
50

<210> 972
<211> 52
<212> PRT
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<400> 972
Tyr Leu Ala Asp Lys Ser Tyr Ile Glu Gly Tyr Val Pro Ser Gln Ala
1 5 10 15

Asp Val Ala Val Phe Glu Ala Val Ser Gly Gly Pro Pro Pro Ala Asp
20 25 30

Leu Cys His Ala Leu Arg Trp Tyr Asn His Ile Lys Ser Tyr Glu Lys
35 40 45

Glu Lys Ala Ser
50

<210> 973
<211> 52
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<400> 973
Thr Asp Cys Asp Glu Gly Gly Glu Tyr Asp Gly Met Gln Asp Glu Pro
1 5 10 15

Arg Tyr Met Met Leu Ala Arg Glu Ala Lys Lys Met Leu Phe Thr Gly
20 25 30

Gly Tyr Gly Leu Glu Lys Asp Pro Gln Arg Ser Gly Asp Leu Tyr Thr
35 40 45

Gln Ala Ala Glu
50

<210> 974
<211> 52
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<400> 974
Met Glu Gln Gln Ile Lys Ser Glu Lys Glu Gln Phe Leu Leu Lys Asp
1 5 10 15

Thr Glu Arg Phe Gln Ala Arg Ser Gln Gln Gln Leu Glu Gln Lys Leu
20 25 30

Leu Cys Lys Glu Gln Glu Leu Glu Gln Leu Thr Gln Lys Gln Lys Arg
35 40 45

Leu Glu Gly Gln
50

<210> 975
<211> 52
<212> PRT
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<400> 975
Asn Trp Lys Gln Phe Leu Thr Ser Phe His Glu Pro Gln Gly Leu Gln
1 5 10 15

Val Ser Ser Lys Gly Pro Leu Thr Lys Lys Lys Asn Ser Ile Asn Ser
20 25 30

Arg Asn Glu Ser His Lys Glu Asn Ile Ile Thr Lys Leu Phe Arg His
35 40 45

Thr Glu Asp His
50

<210> 976
<211> 52
<212> PRT
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<400> 976
Asp Gln Ser Lys Thr Asn Tyr Ile Ser Ile Cys Lys Met Gln Glu Val
1 5 10 15

Leu Glu Glu Cys Gly Cys Ser Leu Thr Lys Lys Gly Glu Leu Thr His
20 25 30

Leu Leu Asn Ser Trp Gly Val Ser Arg His Asp Asn Ala Ile Asn Tyr
35 40 45

Leu Asp Phe Leu
50

<210> 977
<211> 52
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<400> 977
Cys Thr Gly Arg Gly Pro Asp Asn Cys Ile Gln Cys Ala His Tyr Ile
1 5 10 15

Asp Gly Pro His Cys Val Lys Thr Cys Ser Ser Ala Gly Val Met Gly
20 25 30

Glu Asn Asn Thr Leu Val Trp Lys Tyr Ala Asp Ala Gly His Val Cys
35 40 45

His Leu Cys His
50

<210> 978
<211> 52
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<400> 978
Cys Thr Gly Arg Gly Pro Asp Asn Cys Ile Gln Cys Ala His Tyr Ile
1 5 10 15

Asp Gly Pro His Cys Val Lys Thr Cys Leu Leu Ala Gly Val Met Gly
20 25 30

Glu Asn Asn Thr Leu Val Trp Lys Tyr Ala Asp Ala Gly His Val Cys
35 40 45

His Leu Cys His
50

<210> 979
<211> 52
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<400> 979
Gly Arg Gly Pro Asp Asn Cys Ile Gln Cys Ala His Tyr Ile Asp Gly
1 5 10 15

Pro His Cys Val Lys Thr Cys Pro Ala Ala Ala Val Met Gly Glu Asn
20 25 30

Asn Thr Leu Val Trp Lys Tyr Ala Asp Ala Gly His Val Cys His Leu
35 40 45

Cys His Pro Asn
50

<210> 980
<211> 52
<212> PRT
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多肽"

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<400> 980
Gly Arg Gly Pro Asp Asn Cys Ile Gln Cys Ala His Tyr Ile Asp Gly
1 5 10 15

Pro His Cys Val Lys Thr Cys Pro Ala Val Val Val Met Gly Glu Asn
20 25 30

Asn Thr Leu Val Trp Lys Tyr Ala Asp Ala Gly His Val Cys His Leu
35 40 45

Cys His Pro Asn
50

<210> 981
<211> 52
<212> PRT
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多肽"

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<400> 981
Lys Leu Thr Gln Leu Gly Thr Phe Glu Asp His Phe Leu Ser Leu Gln
1 5 10 15

Arg Met Phe Asn Asn Cys Glu Val Val Arg Arg Gly Asn Leu Glu Ile
20 25 30

Thr Tyr Val Gln Arg Asn Tyr Asp Leu Ser Phe Leu Lys Thr Ile Gln
35 40 45

Glu Val Ala Gly
50

<210> 982
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成多肽"

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<223> /注釋="p.E709K"

<400> 982
Gln Glu Arg Glu Leu Val Glu Pro Leu Thr Pro Ser Gly Glu Ala Pro
1 5 10 15

Asn Gln Ala Leu Leu Arg Ile Leu Lys Lys Lys Thr Glu Phe Lys Lys
20 25 30

Ile Lys Val Leu Gly Ser Gly Ala Phe Gly Thr Val Tyr Lys Gly Leu
35 40 45

Trp Ile Pro Glu
50

<210> 983
<211> 52
<212> PRT
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<400> 983
Pro Ser Gly Glu Ala Pro Asn Gln Ala Leu Leu Arg Ile Leu Lys Glu
1 5 10 15

Thr Glu Phe Lys Lys Ile Lys Val Leu Ala Ala Ser Gly Ala Phe Gly
20 25 30

Thr Val Tyr Lys Gly Leu Trp Ile Pro Glu Gly Glu Lys Val Lys Ile
35 40 45

Pro Val Ala Ile
50

<210> 984
<211> 65
<212> PRT
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<400> 984
Gly Ala Phe Gly Thr Val Tyr Lys Gly Leu Trp Ile Pro Glu Gly Glu
1 5 10 15

Lys Val Lys Ile Pro Val Ala Ile Lys Thr Ser Pro Lys Ala Asn Lys
20 25 30

Glu Ile Leu Asp Glu Ala Tyr Val Met Ala Ser Val Asp Asn Pro His
35 40 45

Val Cys Arg Leu Leu Gly Ile Cys Leu Thr Ser Thr Val Gln Leu Ile
50 55 60

Thr
65

<210> 985
<211> 52
<212> PRT
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多肽"

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<400> 985
Ala Ile Lys Glu Leu Arg Glu Ala Thr Ser Pro Lys Ala Asn Lys Glu
1 5 10 15

Ile Leu Asp Glu Ala Tyr Val Met Ala Ile Ile Val Asp Asn Pro His
20 25 30

Val Cys Arg Leu Leu Gly Ile Cys Leu Thr Ser Thr Val Gln Leu Ile
35 40 45

Thr Gln Leu Met
50

<210> 986
<211> 52
<212> PRT
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多肽"

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<400> 986
Tyr Leu Leu Asn Trp Cys Val Gln Ile Ala Lys Gly Met Asn Tyr Leu
1 5 10 15

Glu Asp Arg Arg Leu Val His Arg Asp Met Met Ala Ala Arg Asn Val
20 25 30

Leu Val Lys Thr Pro Gln His Val Lys Ile Thr Asp Phe Gly Leu Ala
35 40 45

Lys Leu Leu Gly
50

<210> 987
<211> 52
<212> PRT
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多肽"

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<400> 987
Leu Val His Arg Asp Leu Ala Ala Arg Asn Val Leu Val Lys Thr Pro
1 5 10 15

Gln His Val Lys Ile Thr Asp Phe Gly Arg Arg Ala Lys Leu Leu Gly
20 25 30

Ala Glu Glu Lys Glu Tyr His Ala Glu Gly Gly Lys Val Pro Ile Lys
35 40 45

Trp Met Ala Leu
50

<210> 988
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 988
Arg Asp Leu Ala Ala Arg Asn Val Leu Val Lys Thr Pro Gln His Val
1 5 10 15

Lys Ile Thr Asp Phe Gly Leu Ala Lys Gln Gln Leu Gly Ala Glu Glu
20 25 30

Lys Glu Tyr His Ala Glu Gly Gly Lys Val Pro Ile Lys Trp Met Ala
35 40 45

Leu Glu Ser Ile
50

<210> 989
<211> 52
<212> PRT
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多肽"

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<400> 989
Gln Glu Val Ala Gly Tyr Val Leu Ile Ala Leu Asn Thr Val Glu Arg
1 5 10 15

Ile Pro Leu Glu Asn Leu Gln Ile Ile Lys Lys Gly Asn Met Tyr Tyr
20 25 30

Glu Asn Ser Tyr Ala Leu Ala Val Leu Ser Asn Tyr Asp Ala Asn Lys
35 40 45

Thr Gly Leu Lys
50

<210> 990
<211> 52
<212> PRT
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多肽"

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<400> 990
Ser Pro Ser Asp Cys Cys His Asn Gln Cys Ala Ala Gly Cys Thr Gly
1 5 10 15

Pro Arg Glu Ser Asp Cys Leu Val Cys Cys Cys Lys Phe Arg Asp Glu
20 25 30

Ala Thr Cys Lys Asp Thr Cys Pro Pro Leu Met Leu Tyr Asn Pro Thr
35 40 45

Thr Tyr Gln Met
50

<210> 991
<211> 52
<212> PRT
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多肽"

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<400> 991
Cys Pro Pro Leu Met Leu Tyr Asn Pro Thr Thr Tyr Gln Met Asp Val
1 5 10 15

Asn Pro Glu Gly Lys Tyr Ser Phe Gly Thr Thr Thr Cys Val Lys Lys
20 25 30

Cys Pro Arg Asn Tyr Val Val Thr Asp His Gly Ser Cys Val Arg Ala
35 40 45

Cys Gly Ala Asp
50

<210> 992
<211> 52
<212> PRT
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<223> /注釋="p.A289D"

<400> 992
Cys Pro Pro Leu Met Leu Tyr Asn Pro Thr Thr Tyr Gln Met Asp Val
1 5 10 15

Asn Pro Glu Gly Lys Tyr Ser Phe Gly Asp Asp Thr Cys Val Lys Lys
20 25 30

Cys Pro Arg Asn Tyr Val Val Thr Asp His Gly Ser Cys Val Arg Ala
35 40 45

Cys Gly Ala Asp
50

<210> 993
<211> 52
<212> PRT
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多肽"

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<223> /注釋="p.A289V"

<400> 993
Cys Pro Pro Leu Met Leu Tyr Asn Pro Thr Thr Tyr Gln Met Asp Val
1 5 10 15

Asn Pro Glu Gly Lys Tyr Ser Phe Gly Val Val Thr Cys Val Lys Lys
20 25 30

Cys Pro Arg Asn Tyr Val Val Thr Asp His Gly Ser Cys Val Arg Ala
35 40 45

Cys Gly Ala Asp
50

<210> 994
<211> 52
<212> PRT
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<223> /注釋="p.H304Y"

<400> 994
Val Asn Pro Glu Gly Lys Tyr Ser Phe Gly Ala Thr Cys Val Lys Lys
1 5 10 15

Cys Pro Arg Asn Tyr Val Val Thr Asp Tyr Tyr Gly Ser Cys Val Arg
20 25 30

Ala Cys Gly Ala Asp Ser Tyr Glu Met Glu Glu Asp Gly Val Arg Lys
35 40 45

Cys Lys Lys Cys
50

<210> 995
<211> 35
<212> PRT
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<400> 995
Met Ala Ala Ala Lys Ala Glu Met His His Leu Met Ser Pro Leu Gln
1 5 10 15

Ile Ser Asp Pro Phe Gly Ser Phe Pro His Ser Pro Thr Met Asp Asn
20 25 30

Tyr Pro Lys
35

<210> 996
<211> 222
<212> PRT
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多肽"

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<400> 996
Thr Ser Tyr Gln Ser Gln Leu Ile Lys Pro Ser Arg Met Arg Lys Tyr
1 5 10 15

Pro Asn Arg Pro Ser Lys Thr Pro Pro Thr Asn Ala Leu Thr Leu Ala
20 25 30

Gln Trp Ser Pro Val Ile Ala Ala Ser Pro Ala Pro Thr Ser Ser Pro
35 40 45

Ala Thr Ser Ala Ser Thr Gln Ala Arg Ser Pro Ser Ser Ala Ala Ser
50 55 60

Ala Cys Ala Thr Ser Ala Ala Ala Thr Thr Ser Pro Pro Thr Ser Ala
65 70 75 80

Pro Thr Gln Ala Lys Ser Pro Ser Pro Ala Thr Ser Val Glu Glu Ser
85 90 95

Leu Pro Gly Ala Met Asn Ala Arg Gly Ile Pro Arg Ser Thr Cys Gly
100 105 110

Arg Arg Thr Arg Lys Gln Thr Lys Val Leu Trp Pro Leu Arg Pro Pro
115 120 125

Pro Leu Ser Leu Pro Thr Arg Pro Arg Leu Leu Pro Leu Thr Arg Pro
130 135 140

Arg Leu Leu Pro Leu Ile His Pro Arg Pro Pro Pro His Thr His Pro
145 150 155 160

Leu Cys Pro Pro Pro Ser Pro Leu Pro Ala Pro Arg Pro Thr His Pro
165 170 175

Leu Cys Thr Val Ala Ser Pro Pro Arg Arg Trp Pro Pro Arg Thr Pro
180 185 190

Leu Phe Pro Leu Leu Ser Arg Pro Arg Ser Ala Ala Ser Leu Pro Gln
195 200 205

Leu Ser Pro Thr Pro Ser Ala Pro Pro Gln Gly Phe Arg Thr
210 215 220

<210> 997
<211> 52
<212> PRT
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多肽"

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<400> 997
Ser Lys Thr Pro Val His Glu Arg Pro Tyr Pro Cys Pro Ala Glu Gly
1 5 10 15

Cys Asp Arg Arg Phe Ser Arg Ser Asp Lys Lys Leu Thr Arg His Ile
20 25 30

Arg Ile His Thr Gly His Lys Pro Phe Gln Cys Arg Ile Cys Met Arg
35 40 45

Asn Phe Ser Arg
50

<210> 998
<211> 52
<212> PRT
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多肽"

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<400> 998
Ser Arg Ser Asp Glu Leu Thr Arg His Ile Arg Ile His Thr Gly His
1 5 10 15

Lys Pro Phe Gln Cys Arg Ile Cys Met His His Asn Phe Ser Arg Ser
20 25 30

Asp His Leu Thr Thr His Ile Arg Thr His Thr Gly Glu Lys Pro Phe
35 40 45

Ala Cys Asp Tyr
50

<210> 999
<211> 52
<212> PRT
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多肽"

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<400> 999
Arg His Ile Arg Ile His Thr Gly His Lys Pro Phe Gln Cys Arg Ile
1 5 10 15

Cys Met Arg Asn Phe Ser Arg Ser Asp Asn Asn Leu Thr Thr His Ile
20 25 30

Arg Thr His Thr Gly Glu Lys Pro Phe Ala Cys Asp Tyr Cys Gly Arg
35 40 45

Lys Phe Ala Arg
50

<210> 1000
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<212> PRT
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多肽"

<220>
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<400> 1000
Gln Thr Val Ser Glu Gly Leu Lys Lys Leu Tyr Lys Ser Lys Leu Leu
1 5 10 15

Pro Leu Glu Glu His Tyr Arg Phe His Lys Lys Phe His Ser Pro Ala
20 25 30

Leu Glu Asp Ala Asp Phe Asp Asn Lys Pro Met Val Leu Leu Val Gly
35 40 45

Gln Tyr Ser Thr
50

<210> 1001
<211> 46
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多肽"

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<400> 1001
Leu Gln Lys Tyr Tyr Arg Gln Asn Pro Asp Ile Pro Gln Leu Glu Pro
1 5 10 15

Ser Asp Tyr Leu Lys Lys Leu Ala Ser His His Gly Asn Pro Pro Leu
20 25 30

Lys Glu Trp Gln Ser Leu Ala Gly Ser Pro Ser Ser Lys Leu
35 40 45

<210> 1002
<211> 35
<212> PRT
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多肽"

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<223> /注釋="p.G9D"

<400> 1002
Met Pro Lys Asn Lys Gly Lys Gly Asp Asp Lys Asn Arg Arg Arg Gly
1 5 10 15

Lys Asn Glu Asn Glu Ser Glu Lys Arg Glu Leu Val Phe Lys Glu Asp
20 25 30

Gly Gln Glu
35

<210> 1003
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R139Q"

<400> 1003
Glu Val Thr Ile Pro Gly Glu Gly Lys Asp Arg Ile Phe Lys Val Ser
1 5 10 15

Ile Lys Trp Leu Ala Ile Val Ser Trp Gln Gln Met Leu His Glu Ala
20 25 30

Leu Val Ser Gly Gln Ile Pro Val Pro Leu Glu Ser Val Gln Ala Leu
35 40 45

Asp Val Ala Met
50

<210> 1004
<211> 34
<212> PRT
<213> 人工序列

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多肽"

<220>
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<223> /注釋="p.A8G"

<400> 1004
Met Ala Ala Ala Ala Ala Ala Gly Gly Gly Asp Ser Asp Ser Trp Asp
1 5 10 15

Ala Asp Ala Phe Ser Val Glu Asp Pro Val Arg Lys Val Gly Gly Gly
20 25 30

Gly Thr

<210> 1005
<211> 34
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R8H"

<400> 1005
Met Asn Ser Gln Pro Gln Thr His His Ser Pro Phe Phe Gln Arg Pro
1 5 10 15

Gln Ile Gln Pro Pro Arg Ala Thr Ile Pro Asn Ser Ser Pro Ser Ile
20 25 30

Arg Pro

<210> 1006
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 1006
Arg Leu Asp Asn Leu Leu Asn Met Ala Tyr Gly Val Lys Arg Phe Ser
1 5 10 15

Pro Met Thr Ile Asp Gly Met Thr Ser Phe Phe Ala Gly Ile Asn Ile
20 25 30

Pro Gly His Pro Gly Thr Gly Trp Cys Ile Phe Val Tyr Asn Leu Ala
35 40 45

Pro Asp Ala Asp
50

<210> 1007
<211> 43
<212> PRT
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多肽"

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<400> 1007
Asp Ile Leu Ile His Pro Glu Leu Asn Glu Gly Leu Met Lys Trp Glu
1 5 10 15

Asn Arg His Glu Gly Val Phe Lys Phe Cys Ala Pro Arg Leu Trp Pro
20 25 30

Asn Tyr Gly Ala Lys Arg Lys Arg Thr Ala Thr
35 40

<210> 1008
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.S415L"

<400> 1008
Lys Leu Thr Lys Ala Val Ser Ala Ser Ser Val Pro Ser Asn Ile His
1 5 10 15

Leu Gly Val Ala Pro Val Gly Ser Gly Leu Leu Ala Leu Thr Leu Gln
20 25 30

Thr Ile Pro Leu Thr Thr Val Leu Thr Asn Gly Pro Pro Ala Ser Thr
35 40 45

Thr Ala Pro Thr
50

<210> 1009
<211> 52
<212> PRT
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<220>
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多肽"

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<223> /注釋="p.T141M"

<400> 1009
Arg Lys Arg Pro Tyr Asp Ser Asp Asn Leu Gln His Glu Glu Leu Leu
1 5 10 15

Met Lys Leu Trp Asn Leu Leu Met Pro Met Met Lys Lys Leu Asn Ala
20 25 30

Arg Ile Ser Lys Gln Trp Ala Glu Ile Gly Phe Gln Gly Asp Asp Pro
35 40 45

Lys Thr Asp Phe
50

<210> 1010
<211> 27
<212> PRT

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<220>
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<223> /注釋="人工序列的說明書: 合成
肽"

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<223> /注釋="p.D570H"

<400> 1010
Ile Gly Pro Glu Leu Ser Arg Arg Ile Tyr Leu Gln Met Thr Thr Leu
1 5 10 15

Gln Pro His Leu Ser Leu Asp Ser Ala His His
20 25

<210> 1011
<211> 52
<212> PRT
<213> 人工序列

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多肽"

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<223> /注釋="p.R27G"

<400> 1011
Ala Pro Arg Thr Leu Trp Ser Cys Tyr Leu Cys Cys Leu Leu Thr Ala
1 5 10 15

Ala Ala Gly Ala Ala Ser Tyr Pro Pro Gly Gly Gly Phe Ser Leu Tyr
20 25 30

Thr Gly Ser Ser Gly Ala Leu Ser Pro Gly Gly Pro Gln Ala Gln Ile
35 40 45

Ala Pro Arg Pro
50

<210> 1012
<211> 52
<212> PRT
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 1012
Phe Ser Ala Asp Gly Lys Cys Leu Val Ser Val Gly Leu Asp Asp Phe
1 5 10 15

His Ser Ile Val Phe Trp Asp Trp Lys Arg Arg Gly Glu Lys Ile Ala
20 25 30

Thr Thr Arg Gly His Lys Asp Lys Ile Phe Val Val Lys Cys Asn Pro
35 40 45

His His Val Asp
50

<210> 1013
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1013
Glu Glu Ser Glu Ser Thr Glu Thr Thr Gly Val Ala Phe Val Ser Phe
1 5 10 15

Val Gly Met Glu Ser Val Leu Asn Glu His His Phe Phe Lys Asp His
20 25 30

Gln Ala Pro Leu Thr Thr Ser Glu Ile Lys Leu Lys Met Asn Ser Arg
35 40 45

Val Val Gly Gly
50

<210> 1014
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1014
Ser His Val Gly Ile Ile Ile Ser Leu Val Cys Leu Val Leu Ala Ile
1 5 10 15

Ala Thr Phe Leu Leu Cys Arg Ser Ile Gln Gln Asn His Asn Thr Tyr
20 25 30

Leu His Leu His Leu Cys Val Cys Leu Leu Leu Ala Lys Thr Leu Phe
35 40 45

Leu Ala Gly Ile
50

<210> 1015
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.S75L"

<400> 1015
Gly Phe Ser Ser Phe Ser Glu Ile Ile Thr Thr Pro Met Glu Thr Cys
1 5 10 15

Asp Asp Ile Asn Glu Cys Ala Thr Leu Leu Leu Lys Val Ser Cys Gly
20 25 30

Lys Phe Ser Asp Cys Trp Asn Thr Glu Gly Ser Tyr Asp Cys Val Cys
35 40 45

Ser Pro Gly Tyr
50

<210> 1016
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1016
Thr Pro Glu Pro Thr Arg Lys Pro Trp Glu Arg Thr Asn Thr Met Asn
1 5 10 15

Gly Ser Lys Ser Pro Val Ile Ser Arg Leu Leu Asp Ser Pro Arg Lys
20 25 30

Asn Gln Ile Val Phe Asp Asn Arg Ser Tyr Asp Ser Leu His Arg Pro
35 40 45

Lys Ser Thr Pro
50

<210> 1017
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.R373H"

<400> 1017
Pro Phe Tyr Arg Asn Gln Gln Val Gln Arg Gly Pro Arg Trp Asn Phe
1 5 10 15

Phe Ala Trp Glu Arg Lys Gln Val Ala His His Pro Gly Asn Pro Val
20 25 30

Tyr His Lys Ala Tyr Pro Pro Thr Ser Arg Gly Asn Tyr Pro Asn Tyr
35 40 45

Ala Gly Asn Pro
50

<210> 1018
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<400> 1018
Gln Phe Glu Gln Ile Val Ala Val Tyr His Ser Ala Ser Lys Gln Lys
1 5 10 15

Ala Trp Asp His Phe Thr Lys Ala Gln Trp Trp Lys Asn Ile Ser Val
20 25 30

Trp Cys Lys Gln Ala Glu Glu Ile Arg Asn Ile His Asn Asp Glu Leu
35 40 45

Met Gly Ile Arg
50

<210> 1019
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1019
Glu Glu Ser Val Asp Asp Lys Trp Thr Arg Thr Thr Phe Glu Lys Ser
1 5 10 15

Val Pro Met Ser Thr Tyr Leu Val Cys Cys Cys Ala Val His Gln Phe
20 25 30

Asp Ser Val Lys Arg Ile Ser Asn Ser Gly Lys Pro Leu Thr Ile Tyr
35 40 45

Val Gln Pro Glu
50

<210> 1020
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 1020
Tyr Gln Asp Phe Arg Ile Pro Leu Ser Pro Val His Lys Cys Ser Phe
1 5 10 15

Tyr Lys Asn Asn Thr Lys Val Ser Tyr Glu Glu Phe Leu Ser Pro Pro
20 25 30

Gln Leu Asn Lys Asn Ser Ser Gly Ile Tyr Ser Glu Ala Leu Leu Thr
35 40 45

Thr Asn Ile Val
50

<210> 1021
<211> 195
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書：合成多肽"

<220>
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<223> /注釋="p.G204fs"

<400> 1021
Asn Phe Ile Lys Tyr Gly Trp Val Gly Arg Trp Phe Arg Pro Arg Lys
1 5 10 15

Gly Thr Leu Gly Ala Met Asp Leu Gly Val Pro Leu Pro Arg Ser Leu
20 25 30

Leu Arg Gln Pro Val Gln Leu Arg Thr Glu Pro Ala Arg Ser Ser Cys
35 40 45

Ile Ser Thr Ala Ser Thr Thr Glu Ser Thr Pro Thr Ala Ser Ser Ala
50 55 60

Met Ala Val Thr Arg Ser Ser Arg Gly Cys Trp Pro Ala Pro Ser Arg
65 70 75 80

Pro Thr Ala Ser Thr Pro Ala Gly Arg Gly Ala Phe Pro Pro Lys Cys
85 90 95

Cys Ser Gly Met Cys Thr Ser His His Ala Pro Trp Pro Ser Gly Pro
100 105 110

Arg Thr Ser Thr Ala Val Pro Gly Ser Ala Cys Gln Gly Ala Val Thr
115 120 125

Pro Thr Ser Ala Glu Ile Trp Phe Leu Gly Ser Ser Ala Ser Pro Pro
130 135 140

Ala Pro Ser Pro Asp Ala Leu Ser Met Gly Ser Ser Ser Pro Gln Trp
145 150 155 160

Leu Gly Thr Leu Trp Pro Ser Leu Pro Ser Ser Thr Leu Trp Thr Phe
165 170 175

Cys Gly Leu Arg Trp Gly Cys Pro Trp Pro Pro Cys Ser Ser Trp Arg
180 185 190

Gln Pro Gln
195

<210> 1022
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書：合成多肽"

<220>
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<223> /注釋="p.E327K"

<400> 1022
His Thr Glu His Val Tyr Arg Val Tyr Val Thr Thr Phe Leu Gly Phe
1 5 10 15

Gly Gly Asn Phe Ala Arg Gln Arg Tyr Lys Lys Asp Leu Val Leu Asn
20 25 30

Glu Thr Leu Asn Lys Asn Arg Leu Leu Gly Gln Lys Thr Gly Leu Ser
35 40 45

Pro Asp Asn Pro
50

<210> 1023
<211> 28
<212> PRT
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<220>
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肽"

<220>
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<223> /注釋="p.G332fs"

<400> 1023
Leu Asn Pro Thr Ala His Tyr Asn Val Phe Val Glu Val Val Leu Ala
1 5 10 15

Asp Pro Asn His Trp Arg Phe Gln Gly Ala Asn Gly
20 25

<210> 1024
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.C1164Y"

<400> 1024
Tyr Lys Tyr Cys Ser Lys Leu Ser Glu Val Phe Glu Gln Glu Ile Asp
1 5 10 15

Pro Val Met Gln Ser Leu Gly Tyr Cys Tyr Tyr Gly Arg Lys Leu Glu
20 25 30

Phe Ser Pro Gln Thr Leu Cys Cys Tyr Gly Lys Gln Leu Cys Thr Ile
35 40 45

Pro Arg Asp Ala
50

<210> 1025
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 1025
Phe Gly Met His Val Gln Glu Tyr Gly Ser Asp Cys Pro Pro Pro Asn
1 5 10 15

Gln Arg Arg Val Tyr Ile Ser Tyr Leu Asn Asn Ser Val His Phe Phe
20 25 30

Arg Pro Lys Cys Leu Arg Thr Ala Val Tyr His Glu Ile Leu Ile Gly
35 40 45

Tyr Leu Glu Tyr
50

<210> 1026
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.A896S"

<400> 1026
Ser Tyr Ser Ala Gly Asp Ser Gly Asp Ala Ala Ala Gln Pro Ala Phe
1 5 10 15

Thr Gly Ile Lys Gly Lys Glu Gly Ser Ser Ser Leu Thr Glu Gly Ala
20 25 30

Lys Glu Glu Gly Gly Glu Glu Val Ala Lys Ala Val Leu Glu Gln Glu
35 40 45

Glu Thr Ala Ala
50

<210> 1027
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D369N"

<400> 1027
Lys Val Phe Ser Tyr His Arg Tyr Gln Arg Val Glu Met Asn Glu Asn
1 5 10 15

Ala Leu Val Glu Leu Lys Lys Leu Phe Asn Asn Ala Lys Ser Glu His
20 25 30

Leu His Gln Thr Leu Ala Leu His Ser Tyr Thr Ser Val Leu Ser Arg
35 40 45

Leu Gln Val Glu
50

<210> 1028
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成多肽"

<220>
<221> 來源
<223> /注釋="p.R2289L"

<400> 1028
Met Ala Leu Ser Ser Leu Phe Met Glu Val Leu Met Met Met Asn Asn
1 5 10 15

Ala Thr Ile Pro Thr Ala Glu Phe Leu Leu Leu Gly Ser Ile Arg Thr
20 25 30

Trp Ile Gly Gln Lys Met His Gly Leu Val Val Leu Pro Leu Leu Thr
35 40 45

Ala Ala Cys Gln
50

<210> 1029
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成多肽"

<220>
<221> 來源
<223> /注釋="p.G111V"

<400> 1029
Ile Tyr Arg Gly Glu Glu Ala Ser Arg Val His Val Glu Leu Gln Phe
1 5 10 15

Thr Val Arg Asp Cys Lys Ser Phe Pro Val Val Gly Ala Gly Pro Leu
20 25 30

Gly Cys Lys Glu Thr Phe Asn Leu Leu Tyr Met Glu Ser Asp Gln Asp
35 40 45

Val Gly Ile Gln
50

<210> 1030
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成多肽"

<220>
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<223> /注釋="p.A184T"

<400> 1030
Leu Val Ser Gly Ser Val Lys Leu Asn Val Glu Arg Cys Ser Leu Gly
1 5 10 15

Arg Leu Thr Arg Arg Gly Leu Tyr Leu Thr Thr Phe His Asn Pro Gly
20 25 30

Ala Cys Val Ala Leu Val Ser Val Arg Val Phe Tyr Gln Arg Cys Pro
35 40 45

Glu Thr Leu Asn
50

<210> 1031
<211> 34
<212> PRT
<213> 人工序列

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多肽"

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<400> 1031
Glu Arg Pro Tyr Trp Asp Met Ser Gly Gln Asp Val Ile Lys Ala Val
1 5 10 15

Glu Asp Gly Phe Arg Leu Pro Pro Pro Gly Thr Val Leu Thr Phe Cys
20 25 30

Thr Asp

<210> 1032
<211> 57
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.P460fs"

<400> 1032
Asn Gln Thr Glu Pro Pro Lys Val Arg Leu Glu Gly Arg Ser Thr Thr
1 5 10 15

Ser Leu Ser Val Ser Trp Ser Ile Pro Arg Arg Ser Arg Ala Glu Cys
20 25 30

Gly Ser Thr Arg Ser Leu Thr Ala Arg Arg Glu Thr Pro Thr Ala Thr
35 40 45

Met Cys Ala Ala Pro Arg Val Ser Pro
50 55

<210> 1033
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<400> 1033
Ala Ala Tyr Thr Thr Arg Gly Gly Lys Ile Pro Ile Arg Trp Thr Ser
1 5 10 15

Pro Glu Ala Ile Ala Tyr Arg Lys Phe Arg Arg Ser Ala Ser Asp Val
20 25 30

Trp Ser Tyr Gly Ile Val Leu Trp Glu Val Met Ser Tyr Gly Glu Arg
35 40 45

Pro Tyr Trp Glu
50

<210> 1034
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1034
Thr Thr Gly Gly Lys Ile Pro Ile Arg Trp Thr Ala Pro Glu Ala Ile
1 5 10 15

Ala Tyr Arg Lys Phe Ser Ser Ala Ser His His Ala Trp Ser Tyr Gly
20 25 30

Ile Val Met Trp Glu Val Met Ser Tyr Gly Glu Arg Pro Tyr Trp Glu
35 40 45

Met Ser Asn Gln
50

<210> 1035
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1035
Ser Gly Arg Gly Ala Cys Thr Arg Cys Gly Asp Asn Val Gln Tyr Ala
1 5 10 15

Pro Arg Gln Leu Gly Leu Thr Glu Pro His His Ile Tyr Ile Ser Asp
20 25 30

Leu Leu Ala His Thr Gln Tyr Thr Phe Glu Ile Gln Ala Val Asn Gly
35 40 45

Val Thr Asp Gln
50

<210> 1036
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R337H"

<400> 1036
Lys Ala Cys Gln Ala Cys Pro Arg Gly Leu Tyr Lys Ser Ser Ala Gly
1 5 10 15

Asn Ala Pro Cys Ser Pro Cys Pro Ala His His Ser His Ala Pro Asn
20 25 30

Pro Ala Ala Pro Val Cys Pro Cys Leu Glu Gly Phe Tyr Arg Ala Ser
35 40 45

Ser Asp Pro Pro
50

<210> 1037
<211> 28
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
肽"

<220>
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<223> /注釋="p.G54fs"

<400> 1037
Ala Leu Glu Glu Val Leu Leu Asp Thr Thr Gly Glu Thr Ser Glu Ile
1 5 10 15

Gly Trp Leu Thr Tyr Pro Pro Gly Gly Gly Thr Arg
20 25

<210> 1038
<211> 36
<212> PRT
<213> 人工序列

<220>
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多肽"

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<221> 來源
<223> /注釋="p.P132fs"

<400> 1038
Ile Leu Asn Arg Tyr Pro His Phe Lys Thr Lys Ile Glu Gly Leu Asp
1 5 10 15

Ile His Phe Ile His Val Lys Pro Pro Ser Cys Pro Gln Ala Ile Pro
20 25 30

Arg Ser Pro Cys
35

<210> 1039
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R282Q"

<400> 1039
Thr Thr Glu Asp Leu Glu Ala Tyr Ile Tyr Val Phe Ser Gln Pro Gly
1 5 10 15

Ala Leu Ser Gly Pro Ile Asn His Tyr Gln Gln Asn Ile Phe Ser Cys
20 25 30

Leu Pro Leu Lys His His Met Val Thr Thr Pro Thr Leu Leu Leu Trp
35 40 45

Gly Glu Asn Asp
50

<210> 1040
<211> 60
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G2015fs"

<400> 1040
Phe Gln Ala Met Gln Lys Gln Leu Ile Glu Lys Ala Glu Ala Leu Arg
1 5 10 15

Leu Leu Glu Val Gln Val Ala Thr Gly Val Ser Ser Thr His Ser Thr
20 25 30

Thr Thr Gly Ser His Trp Lys Gln Pro Thr Asp Gly Ala Val Cys Thr
35 40 45

Arg Thr Ser Met Arg Ser Phe Pro Thr Arg Ser Thr
50 55 60

<210> 1041
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.D2378H"

<400> 1041
His Ser His Arg Val Pro Val Asp Val Ala Tyr Arg Arg Gly Tyr Phe
1 5 10 15

Asp Glu Glu Met Asn Arg Val Leu Ala His His Pro Ser Asp Asp Thr
20 25 30

Lys Gly Phe Phe Asp Pro Asn Thr His Glu Asn Leu Thr Tyr Leu Gln
35 40 45

Leu Leu Gln Arg
50

<210> 1042
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V1151L"

<400> 1042
Met Tyr Pro Ala Tyr Ala Lys Trp Val Gln Ser His Arg Asp Leu Pro
1 5 10 15

Ile Lys Leu Asn Gln Trp Cys Asn Val Leu Leu Arg Trp Glu Phe Lys
20 25 30

His Pro Gln Pro Phe Leu Arg Thr Arg Glu Phe Leu Trp Gln Glu Gly
35 40 45

His Ser Ala Phe
50

<210> 1043
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L1335I"

<400> 1043
Gly Ile Thr Asn Ala Leu Ser Glu Glu Asp Lys Glu Ala Leu Ile Ala
1 5 10 15

Lys Cys Asn Asp Tyr Arg Arg Arg Leu Ile Ile Ser Val Asn Ile Arg
20 25 30

Val Arg Ala Asp Leu Arg Asp Asn Tyr Ser Pro Gly Trp Lys Phe Asn
35 40 45

His Trp Glu Leu
50

<210> 1044
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.L755S"

<400> 1044
Ala Phe Gly Thr Val Tyr Lys Gly Ile Trp Ile Pro Asp Gly Glu Asn
1 5 10 15

Val Lys Ile Pro Val Ala Ile Lys Val Ser Ser Arg Glu Asn Thr Ser
20 25 30

Pro Lys Ala Asn Lys Glu Ile Leu Asp Glu Ala Tyr Val Met Ala Gly
35 40 45

Val Gly Ser Pro
50

<210> 1045
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.D769Y"

<400> 1045
Glu Asn Val Lys Ile Pro Val Ala Ile Lys Val Leu Arg Glu Asn Thr
1 5 10 15

Ser Pro Lys Ala Asn Lys Glu Ile Leu Tyr Tyr Glu Ala Tyr Val Met
20 25 30

Ala Gly Val Gly Ser Pro Tyr Val Ser Arg Leu Leu Gly Ile Cys Leu
35 40 45

Thr Ser Thr Val
50

<210> 1046
<211> 66
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.774_775insAYVM"

<400> 1046
Ala Ile Lys Val Leu Arg Glu Asn Thr Ser Pro Lys Ala Asn Lys Glu
1 5 10 15

Ile Leu Asp Glu Ala Tyr Val Met Ala Ala Tyr Val Met Tyr Val Met
20 25 30

Ala Gly Val Gly Ser Pro Tyr Val Ser Arg Leu Leu Gly Ile Cys Leu
35 40 45

Thr Ser Thr Val Gln Leu Val Thr Gln Leu Met Pro Tyr Gly Cys Leu
50 55 60

Leu Asp
65

<210> 1047
<211> 55
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.776_776G>VC"

<400> 1047
Ala Ile Lys Val Leu Arg Glu Asn Thr Ser Pro Lys Ala Asn Lys Glu
1 5 10 15

Ile Leu Asp Glu Ala Tyr Val Met Ala Val Cys Val Cys Val Gly Ser
20 25 30

Pro Tyr Val Ser Arg Leu Leu Gly Ile Cys Leu Thr Ser Thr Val Gln
35 40 45

Leu Val Thr Gln Leu Met Pro
50 55

<210> 1048
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V842I"

<400> 1048
Leu Gly Ser Gln Asp Leu Leu Asn Trp Cys Met Gln Ile Ala Lys Gly
1 5 10 15

Met Ser Tyr Leu Glu Asp Val Arg Leu Ile Ile His Arg Asp Leu Ala
20 25 30

Ala Arg Asn Val Leu Val Lys Ser Pro Asn His Val Lys Ile Thr Asp
35 40 45

Phe Gly Leu Ala
50

<210> 1049
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.M916I"

<400> 1049
Leu Glu Ser Ile Leu Arg Arg Arg Phe Thr His Gln Ser Asp Val Trp
1 5 10 15

Ser Tyr Gly Val Thr Val Trp Glu Leu Ile Ile Thr Phe Gly Ala Lys
20 25 30

Pro Tyr Asp Gly Ile Pro Ala Arg Glu Ile Pro Asp Leu Leu Glu Lys
35 40 45

Gly Glu Arg Leu
50

<210> 1050
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S310Y"

<400> 1050
Pro Glu Gly Arg Tyr Thr Phe Gly Ala Ser Cys Val Thr Ala Cys Pro
1 5 10 15

Tyr Asn Tyr Leu Ser Thr Asp Val Gly Tyr Tyr Cys Thr Leu Val Cys
20 25 30

Pro Leu His Asn Gln Glu Val Thr Ala Glu Asp Gly Thr Gln Arg Cys
35 40 45

Glu Lys Cys Ser
50

<210> 1051
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S310F"

<400> 1051
Pro Glu Gly Arg Tyr Thr Phe Gly Ala Ser Cys Val Thr Ala Cys Pro
1 5 10 15

Tyr Asn Tyr Leu Ser Thr Asp Val Gly Phe Phe Cys Thr Leu Val Cys
20 25 30

Pro Leu His Asn Gln Glu Val Thr Ala Glu Asp Gly Thr Gln Arg Cys
35 40 45

Glu Lys Cys Ser
50

<210> 1052
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.M91I"

<400> 1052
Val Leu Thr Gly His Asn Ala Asp Leu Ser Phe Leu Gln Trp Ile Arg
1 5 10 15

Glu Val Thr Gly Tyr Val Leu Val Ala Ile Ile Asn Glu Phe Ser Thr
20 25 30

Leu Pro Leu Pro Asn Leu Arg Val Val Arg Gly Thr Gln Val Tyr Asp
35 40 45

Gly Lys Phe Ala
50

<210> 1053
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.V104M"

<400> 1053
Trp Ile Arg Glu Val Thr Gly Tyr Val Leu Val Ala Met Asn Glu Phe
1 5 10 15

Ser Thr Leu Pro Leu Pro Asn Leu Arg Met Met Val Arg Gly Thr Gln
20 25 30

Val Tyr Asp Gly Lys Phe Ala Ile Phe Val Met Leu Asn Tyr Asn Thr
35 40 45

Asn Ser Ser His
50

<210> 1054
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V104L"

<400> 1054
Trp Ile Arg Glu Val Thr Gly Tyr Val Leu Val Ala Met Asn Glu Phe
1 5 10 15

Ser Thr Leu Pro Leu Pro Asn Leu Arg Leu Leu Val Arg Gly Thr Gln
20 25 30

Val Tyr Asp Gly Lys Phe Ala Ile Phe Val Met Leu Asn Tyr Asn Thr
35 40 45

Asn Ser Ser His
50

<210> 1055
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.D297Y"

<400> 1055
Leu Glu Pro Asn Pro His Thr Lys Tyr Gln Tyr Gly Gly Val Cys Val
1 5 10 15

Ala Ser Cys Pro His Asn Phe Val Val Tyr Tyr Gln Thr Ser Cys Val
20 25 30

Arg Ala Cys Pro Pro Asp Lys Met Glu Val Asp Lys Asn Gly Leu Lys
35 40 45

Met Cys Glu Pro
50

<210> 1056
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K692R"

<400> 1056
Asp Leu Ser Glu Lys Glu Ala Ser Leu Leu Asp Leu Lys Glu His Ala
1 5 10 15

Ser Ser Leu Ala Ser Ser Gly Leu Lys Arg Arg Asp Ser Arg Leu Lys
20 25 30

Thr Leu Glu Ile Ala Leu Glu Gln Lys Lys Glu Glu Cys Leu Lys Met
35 40 45

Glu Ser Gln Leu
50

<210> 1057
<211> 40
<212> PRT

<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.Y14C"

<400> 1057
Met Lys Leu Asn Val Asp Gly Leu Leu Val Tyr Phe Pro Cys Cys Asp
1 5 10 15

Tyr Ile Tyr Pro Glu Gln Phe Ser Tyr Met Arg Glu Leu Lys Arg Thr
20 25 30

Leu Asp Ala Lys Gly His Gly Val
35 40

<210> 1058
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.N238S"

<400> 1058
Leu Asp Pro Lys Ile Ala Asp Leu Val Ser Lys Glu Leu Ala Arg Lys
1 5 10 15

Ala Val Val Val Phe Asp Glu Ala His Ser Ser Ile Asp Asn Val Cys
20 25 30

Ile Asp Ser Met Ser Val Asn Leu Thr Arg Arg Thr Leu Asp Arg Cys
35 40 45

Gln Gly Asn Leu
50

<210> 1059
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D312N"

<400> 1059
Arg Leu Val Glu Gly Leu Arg Glu Ala Ser Ala Ala Arg Glu Thr Asp
1 5 10 15

Ala His Leu Ala Asn Pro Val Leu Pro Asn Asn Glu Val Leu Gln Glu
20 25 30

Ala Val Pro Gly Ser Ile Arg Thr Ala Glu His Phe Leu Gly Phe Leu
35 40 45

Arg Arg Leu Leu
50

<210> 1060
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V780I"

<400> 1060
Ser Leu Pro Asp Lys Asn Glu Gln Val Leu Phe Cys Arg Leu Thr Asp
1 5 10 15

Glu Gln His Lys Val Tyr Gln Asn Phe Ile Ile Asp Ser Lys Glu Val
20 25 30

Tyr Arg Ile Leu Asn Gly Glu Met Gln Ile Phe Ser Gly Leu Ile Ala
35 40 45

Leu Arg Lys Ile
50

<210> 1061
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R505Q"

<400> 1061
Leu Val Phe Ser Gln Ser Arg Gln Ile Leu Asn Ile Ile Glu Arg Leu
1 5 10 15

Leu Lys Asn Arg His Phe Lys Thr Leu Gln Gln Ile Asp Gly Thr Val
20 25 30

Thr His Leu Leu Glu Arg Glu Lys Arg Ile Asn Leu Phe Gln Gln Asn
35 40 45

Lys Asp Tyr Ser
50

<210> 1062
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L445I"

<400> 1062
Leu Gly Asp Thr Ser Ile Leu Asp Asp Leu Phe Lys Ser His Gly Asn
1 5 10 15

Ser Pro Thr Gln Leu Pro Lys Lys Val Ile Ile Ser Gly Pro Met Glu
20 25 30

Lys Ala Lys Gln Arg Pro Lys Asp Phe Trp Asp Ile Leu Asn Glu Gln
35 40 45

Asn Asp Glu Ser
50

<210> 1063
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T295K"

<400> 1063
Thr Gln Asp Leu Gly Val Pro Val Met Gly Val Tyr Thr Trp His Gln
1 5 10 15

Asp Gly Leu Arg Gln Leu Pro His Leu Lys Lys Leu Ala Arg Asp Thr
20 25 30

Leu His Phe Leu Ala Leu Arg Trp Gly His Ile Arg Leu Pro Ala Ser
35 40 45

Gly Pro Arg Asp
50

<210> 1064
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A421T"

<400> 1064
Leu Leu Pro Glu Arg Pro Pro Tyr Leu Asp Lys Tyr Glu Lys Phe Phe
1 5 10 15

Arg Glu Ala Glu Glu Thr Asn Gly Gly Thr Thr Gln Ile Gln Pro Leu
20 25 30

Pro Ala Asp Cys Gly Ile Ser Ser Ala Thr Glu Lys Pro Asp Ser Lys
35 40 45

Thr Lys Met Asp
50

<210> 1065
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R300Q"

<400> 1065
Thr Leu Pro Lys Ser Pro Gln Pro Ser Val Pro Glu Gln Ser Asp Asn
1 5 10 15

Glu Leu Glu Gln Ala Gly Lys Ser Lys Gln Gln Gly Ser Ile Leu Gln
20 25 30

Leu Cys Glu Glu Ile Ala Gly Glu Ile Glu Ser Asp Asn Val Glu Val
35 40 45

Lys Lys Glu Ser
50

<210> 1066
<211> 36
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T99fs"

<400> 1066
Leu Ser Asp Ser Asp Ser Asn Leu Ser Gly Glu Asp Ser Lys Ala Leu
1 5 10 15

Ser Gln Lys Lys Ile Lys Lys Lys Lys Pro Arg Leu Lys Lys Lys Ser
20 25 30

Ile Gln Lys Ile
35

<210> 1067
<211> 113
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.PPPPPPSFPPPPPPPPGTQLPP430del"

<400> 1067
Gln Ser Tyr Met Asp Met Leu Asn Pro Glu Leu Gly Leu Pro Arg Gly
1 5 10 15

Thr Ile Gly Lys Pro Thr Pro Pro Pro Gly Tyr Pro Ala Pro Lys Pro
20 25 30

Pro Val Gly Pro Gln Ala Ala Asp Ile Tyr Met Gln Thr Lys Asn Lys
35 40 45

Leu Arg His Val Glu Thr Glu Ala Leu Lys Lys Glu Leu Ser Ser Cys
50 55 60

Asp Gly His Asp Gly Leu Arg Arg Gln Asp Ser Ser Arg Lys Pro Arg
65 70 75 80

Ala Phe Ser Lys Gln Pro Ser Thr Gly Asp Tyr Tyr Arg Gln Leu Gly
85 90 95

Arg Cys Pro Gly Glu Thr Leu Ala Ala Arg Pro Gly Met Ala His Ser
100 105 110

Glu

<210> 1068
<211> 33
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R627Q"

<400> 1068
Glu Glu Glu Gln Arg Trp Lys Glu Glu Glu Glu Ala Arg Leu Ala Ser
1 5 10 15

Met Pro Ala Trp Arg Trp Asp Leu Leu Gln Gln Lys Lys Leu Glu Glu
20 25 30

Glu

<210> 1069
<211> 91
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.H64fs"

<400> 1069
Pro Leu Tyr Leu Ala Cys Gln Glu Gly His Leu Glu Val Thr Gln Tyr
1 5 10 15

Leu Val Gln Glu Cys Gly Ala Asp Pro Arg Pro Arg Arg His Asp Pro
20 25 30

Thr Ala Arg Arg Gly Ala Asp Gly Pro Gln Pro Gly His Arg Val Val
35 40 45

Gly Glu Leu His Arg Arg Glu Pro Val Gly Ala Gly Gln Arg Arg Arg
50 55 60

His Arg His Ala Leu Arg Gly Glu Pro Arg Pro Gln Gln Gly Ala Gln
65 70 75 80

Leu Ala Ala Ala Ala Arg Arg Gly Asp Leu Gly
85 90

<210> 1070
<211> 114
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.296_317PPPPSFPPPPPPPPGTQLPPPPP>P"

<400> 1070
Gln Ser Tyr Met Asp Met Leu Asn Pro Glu Leu Gly Leu Pro Trp Gly
1 5 10 15

Thr Ile Gly Lys Pro Ile Pro Pro Pro Pro Ser Tyr Pro Ser Pro Lys
20 25 30

Pro Pro Val Gly Pro Gln Ala Ala Asp Ile Tyr Met Gln Thr Lys Asn
35 40 45

Lys Leu Arg His Val Glu Thr Glu Ala Leu Lys Lys Glu Pro Ser Ser
50 55 60

Cys Asp Gly His Asp Gly Leu Arg Arg Gln Asp Ser Ser Arg Lys Pro
65 70 75 80

Arg Ala Phe Ser Lys Gln Pro Ser Thr Gly Asp Tyr Tyr Arg Gln Leu
85 90 95

Gly Arg Cys Pro Gly Glu Thr Leu Val Ala Arg Pro Gly Met Ala His
100 105 110

Arg Glu

<210> 1071
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D219N"

<400> 1071
Val Asn Ala Leu Val Ser His Leu Leu Val Val Glu Pro Glu Lys Leu
1 5 10 15

Tyr Ala Met Pro Asp Pro Ala Gly Pro Asn Asn Gly His Leu Pro Ala
20 25 30

Val Ala Thr Leu Cys Asp Leu Phe Asp Arg Glu Ile Val Val Thr Ile
35 40 45

Ser Trp Ala Lys
50

<210> 1072
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R816W"

<400> 1072
Leu Gln Val Asn Ser Leu Ile Gln Thr Gln Lys Ser Ala Glu Leu Ala
1 5 10 15

Ala Ala Leu Leu Ser Ile Tyr Met Glu Trp Trp Ala Glu Asp Leu Pro
20 25 30

Leu Arg Lys Gly Thr Lys His Leu Ser Pro Tyr Ala Thr Leu Thr Val
35 40 45

Gly Asp Ser Ser
50

<210> 1073
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.S574F"

<400> 1073
Gln Ile Leu Pro Tyr Ala Asp Leu Thr Leu Glu Gln Arg Phe Gln Leu
1 5 10 15

Asp His Ser Gly Leu Asp Ser Leu Ile Phe Phe Met Arg Leu Val Leu
20 25 30

Arg Phe Leu Gln Val Glu Glu Arg Glu Leu Gly Ser Pro Tyr Thr Gly
35 40 45

Pro Glu Ala Leu
50

<210> 1074
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.I281F"

<400> 1074
Leu Tyr Lys Lys Phe Asp Leu Arg Ala Asn Cys Glu Pro Gln Thr Tyr
1 5 10 15

Gly Ile Gly Leu Lys Glu Leu Trp Val Phe Phe Asp Glu Lys Asn Trp
20 25 30

Lys Pro Gly Arg Val Asp His Thr Val Gly Trp Pro Leu Asp Arg His
35 40 45

Thr Tyr Gly Gly
50

<210> 1075
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R369W"

<400> 1075
Tyr Val Tyr Gln Leu Leu Ser Asp Ser Arg Tyr Glu Asn Phe Ile Arg
1 5 10 15

Trp Glu Asp Lys Glu Ser Lys Ile Phe Trp Trp Ile Val Asp Pro Asn
20 25 30

Gly Leu Ala Arg Leu Trp Gly Asn His Lys Asn Arg Thr Asn Met Thr
35 40 45

Tyr Glu Lys Met
50

<210> 1076
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R588C"

<400> 1076
Gln His Asn Cys Gly Thr Pro Leu Pro Val Ser Ser Glu Lys Asp Met
1 5 10 15

Ile Arg Gln Met Met Ile Lys Ile Phe Cys Cys Cys Ile Glu Pro Glu
20 25 30

Leu Asn Asn Leu Ile Ala Leu Gly Asp Lys Ile Asp Ser Phe Asn Ser
35 40 45

Leu Tyr Met Leu
50

<210> 1077
<211> 37
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R11P"

<400> 1077
Met Ala Met Glu Met Arg Leu Pro Val Ala Pro Pro Lys Pro Leu Ser
1 5 10 15

Glu Arg Leu Gly Arg Asp Thr Lys Lys His Leu Val Val Pro Gly Asp
20 25 30

Thr Ile Thr Thr Asp
35

<210> 1078
<211> 33
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L160fs"

<400> 1078
Cys Asp Leu Ile Cys Leu Asp Tyr Asp Gly Asn Ile Leu Asp Ala Cys
1 5 10 15

Thr Phe Ala Leu Leu Ala Ala Leu Lys Met Tyr Ser Cys Leu Lys Leu
20 25 30

Leu

<210> 1079
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K510R"

<400> 1079
Val Asp Thr Pro Pro Arg Lys Lys Lys Arg Lys His Arg Leu Trp Ala
1 5 10 15

Ala His Cys Arg Lys Ile Gln Leu Lys Arg Arg Asp Gly Ser Ser Asn
20 25 30

His Val Tyr Asn Tyr Gln Pro Cys Asp His Pro Arg Gln Pro Cys Asp
35 40 45

Ser Ser Cys Pro
50

<210> 1080
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Y641F"

<400> 1080
Leu Ala Pro Ser Asp Val Ala Gly Trp Gly Ile Phe Ile Lys Asp Pro
1 5 10 15

Val Gln Lys Asn Glu Phe Ile Ser Glu Phe Phe Cys Gly Glu Ile Ile
20 25 30

Ser Gln Asp Glu Ala Asp Arg Arg Gly Lys Val Tyr Asp Lys Tyr Met
35 40 45

Cys Ser Phe Leu
50

<210> 1081
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E117K"

<400> 1081
Thr Ser Pro Cys Gln Asn Gln Gly Lys Cys Lys Asp Gly Leu Gly Glu
1 5 10 15

Tyr Thr Cys Thr Cys Leu Glu Gly Phe Lys Lys Gly Lys Asn Cys Glu
20 25 30

Leu Phe Thr Arg Lys Leu Cys Ser Leu Asp Asn Gly Asp Cys Asp Gln
35 40 45

Phe Cys His Glu
50

<210> 1082
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q426L"

<400> 1082
Asp Glu Ser Phe Thr Lys His Thr Val Asn Pro Asn Met Lys Glu Asp
1 5 10 15

Gly Ile Leu Gly Pro Ile Ile Arg Ala Leu Leu Val Arg Asp Thr Leu
20 25 30

Lys Ile Val Phe Lys Asn Met Ala Ser Arg Pro Tyr Ser Ile Tyr Pro
35 40 45

His Gly Val Thr
50

<210> 1083
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L1332P"

<400> 1083
Leu Ser Gln Thr Asn Leu Ser Pro Ala Leu Gly Gln Met Pro Ile Ser
1 5 10 15

Pro Asp Leu Ser His Thr Thr Leu Ser Pro Pro Asp Phe Ser Gln Thr
20 25 30

Asn Leu Ser Pro Glu Leu Ser Gln Thr Asn Leu Ser Pro Ala Leu Gly
35 40 45

Gln Met Pro Leu
50

<210> 1084
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S2269Y"

<400> 1084
Asn Pro Lys Glu Trp Leu Gln Val Asp Phe Gln Lys Thr Met Lys Val
1 5 10 15

Thr Gly Val Thr Thr Gln Gly Val Lys Tyr Tyr Leu Leu Thr Ser Met
20 25 30

Tyr Val Lys Glu Phe Leu Ile Ser Ser Ser Gln Asp Gly His Gln Trp
35 40 45

Thr Leu Phe Phe
50

<210> 1085
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D75H"

<400> 1085
Ser Ser Ser Arg Ile Asn Ile Pro Glu Arg Ala Ser Gly Pro Glu Gly
1 5 10 15

Asn Leu Asn Gln Ile Val Thr Glu Pro His His Ala Asn Phe Pro Gln
20 25 30

Phe Leu His Glu Gly Leu Ser Lys Pro Val Tyr Val Ile Asn Trp Phe
35 40 45

Met Ser Phe Gly
50

<210> 1086
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.H126N"

<400> 1086
Ala Arg Glu Trp Lys Gly Glu Thr Pro Arg Asn Lys Leu Met Arg Lys
1 5 10 15

Ala Tyr Glu Glu Leu Phe Trp Arg His Asn Asn Ile Lys Cys Val Arg
20 25 30

Gln Val Arg Arg Asp Asn Tyr Asp Ala Leu Arg Ser Val Leu Phe Gln
35 40 45

Ile Phe Ser Gln
50

<210> 1087
<211> 59
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.GGG156del"

<400> 1087
Leu Ser Arg Ala Ser Phe Asp Tyr Leu Arg Leu Val Val Arg Glu Leu
1 5 10 15

Glu Gln Gln Leu Ala Ala Val Arg Gly Met Ala Leu Pro Gln Pro Gln
20 25 30

Pro Gln Ser Leu Pro Leu Pro Pro Ser Leu Pro Ser Ala Leu Ala Pro
35 40 45

Val Pro Ser Leu Pro Ser Ala Pro Ala Pro Val
50 55

<210> 1088
<211> 50
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S269fs"

<400> 1088
Lys Ile Tyr Gly Lys Gln Ser Met Val Asp Glu Val Ser Gly Lys Val
1 5 10 15

Leu Glu Met Asp Ile Ser Lys Lys Lys His Tyr Asn Arg Lys Ile Ser
20 25 30

Ile Lys Lys Leu Asn Arg Met Lys Val Pro Leu Met Lys Leu Ile Thr
35 40 45

Arg Val
50

<210> 1089
<211> 27
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
肽"

<220>
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<223> /注釋="p.L441fs"

<400> 1089
Ile Lys Gln Leu Gln Lys Gly Val Gln Gln Lys Arg Pro Ser Glu Ala
1 5 10 15

Gln Ser Val Ile Leu Arg Arg Tyr Phe Trp Asn
20 25

<210> 1090
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.P467H"

<400> 1090
Asp Ser Glu Pro Arg Gln Glu Val Pro Met Tyr Thr Gly Ser Glu Pro
1 5 10 15

Arg Gln Glu Val Pro Met Tyr Thr Gly His His Glu Ser Arg Gln Glu
20 25 30

Val Pro Met Tyr Thr Gly Pro Glu Ser Arg Gln Glu Val Leu Ile Arg
35 40 45

Thr Asp Pro Glu
50

<210> 1091
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R382H"

<400> 1091
Leu Ser Ser Gln Pro Ile Gly Thr Lys Pro Ser Ser Ser Ser Gln Arg
1 5 10 15

Gly Ser Leu Arg Lys Val Ala Thr Gly His His Ser Ala Lys Asp Lys
20 25 30

Glu Thr Ala Ser Ala Ile Lys Ser Ser Glu Ser Pro Arg Asp Ser Val
35 40 45

Val Arg Lys Gln
50

<210> 1092
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F52L"

<400> 1092
Ile Pro Phe Pro Glu Thr Phe Asp Gly Asp Thr Asp Arg Leu Pro Glu
1 5 10 15

Phe Ile Val Gln Thr Ser Ser Tyr Met Leu Leu Val Asp Glu Asn Thr
20 25 30

Phe Ser Asn Asp Ala Leu Lys Val Thr Phe Leu Ile Thr Arg Leu Thr
35 40 45

Gly Pro Ala Leu
50

<210> 1093
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.S645R"

<400> 1093
Lys Gly Ile Asp Gln Glu Gly Lys Met Val Leu Leu Ser Leu Lys Leu
1 5 10 15

Thr Pro Ser Glu Pro Cys Asp Pro Leu Arg Arg Ser Thr Leu Arg Glu
20 25 30

Pro Leu Asp Ile Arg Ser Ser Leu Lys Asp Ser His Thr Glu Glu Gln
35 40 45

Glu Glu Leu Ser
50

<210> 1094
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.L648M"

<400> 1094
Asp Gln Glu Gly Lys Met Val Leu Leu Ser Leu Lys Leu Thr Pro Ser
1 5 10 15

Glu Pro Cys Asp Pro Leu Ser Ser Thr Met Met Arg Glu Pro Leu Asp
20 25 30

Ile Arg Ser Ser Leu Lys Asp Ser His Thr Glu Glu Gln Glu Glu Leu
35 40 45

Ser Val Leu Ser
50

<210> 1095
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R884H"

<400> 1095
Gly His Cys Leu Pro Asp Gly Arg Thr Glu Asn Thr Pro Gly Val Glu
1 5 10 15

Thr Lys Gly Leu Asn Leu Lys Ile Pro His His Val Ile Ala Leu Glu
20 25 30

Asn Pro Arg Thr Arg Ser Leu His Arg Ala Leu Glu Glu Thr Pro Lys
35 40 45

Gly Met Pro Lys
50

<210> 1096
<211> 52
<212> PRT

<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.W240C"

<400> 1096
Gly Tyr Cys Lys Pro Thr Ser Ser Glu Gly Ser Phe Tyr Ile Thr Ser
1 5 10 15

Glu Asn Cys Met Gln His Ala His Lys Cys Cys His Arg Asp Leu Cys
20 25 30

Leu Leu Leu Leu His Ala Tyr Arg Gly Leu Arg Leu His Phe Leu Val
35 40 45

Ile Met Arg Asp
50

<210> 1097
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q285H"

<400> 1097
Leu Val Ile Met Arg Asp Ile Pro Glu Leu Pro His Thr Glu Leu Glu
1 5 10 15

Ala Leu Ala Val Glu Glu Thr Leu Ser His His Leu Cys Ser Glu Leu
20 25 30

Gln Met Leu Asn Asn Pro Glu Lys Ile Ala Glu Gln Ile Ser Lys Asp
35 40 45

Leu Ala Trp Leu
50

<210> 1098
<211> 67
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P117fs"

<400> 1098
Leu Glu Ala Asp Val Asn Val Glu Gly Leu Gly Thr Ala Asn Glu Thr
1 5 10 15

Gly Val Pro Ile Met Ala His Pro Pro Leu Ser Thr Val Thr Thr His
20 25 30

Trp Ser Ser Gly Trp Thr Leu Cys Trp Ala Leu Pro Lys Arg Ala Ser
35 40 45

Asn Trp Thr Ser Arg Thr Ser Arg Gln Trp Ala Pro Pro Trp Thr Ser
50 55 60

Cys Gly Ser
65

<210> 1099
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q95R"

<400> 1099
Lys Glu His Gln Gln Gln Gln Arg Gln Gln Gln Gln Gln Gln Gln Gln
1 5 10 15

Gln Arg Gln Arg Gln Gln Gln Gln Gln Arg Arg Arg Arg Gln Gln Glu
20 25 30

Pro Ser Trp Pro Ala Leu Leu Ala Ser Met Gly Glu Ser Ser Pro Ala
35 40 45

Ala Gln Ala His
50

<210> 1100
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E158K"

<400> 1100
Val Cys Gly Gly Val Pro Glu Pro Thr Gly Leu Asp Ala Ala Cys Thr
1 5 10 15

Lys Leu Gln Ser Leu Gln Arg Leu Phe Lys Lys Pro Thr Thr Pro Ala
20 25 30

Pro Pro Leu Arg Pro Pro Asp Ser Leu Ser Arg Ala Pro Ala Glu Phe
35 40 45

Pro Ser Ala Lys
50

<210> 1101
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K165N"

<400> 1101
Asn Asp Arg Pro Arg Gln Pro Ala Pro Gly Asp Gly Ser Lys Glu Arg
1 5 10 15

Met Cys Gly Glu Glu Leu Glu Asp Thr Asn Asn Asp Asp Pro Glu Cys
20 25 30

Gly Val Glu Glu Glu Asp Ala Gly Leu Ala Gly Gln Pro Pro Gly Lys
35 40 45

Leu Thr Arg Ser
50

<210> 1102
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E56K"

<400> 1102
Asp Ala Leu Gln Pro Gly Ser Thr Arg Val Ala Lys Gly Trp Ser Gln
1 5 10 15

Gly Val Gly Glu Val Thr Ser Thr Ser Lys Lys Tyr Cys Ser Cys Val
20 25 30

Ser Ser Ser Arg Lys Leu Ile His Ser Gly Ile Gln Arg Ile His Arg
35 40 45

Asp Ser Pro Gln
50

<210> 1103
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D459N"

<400> 1103
Ser Tyr Ser Pro Gln Lys Lys Glu Pro Ser Lys Ala Glu Thr Glu Glu
1 5 10 15

Arg Val Ser Met Val Lys Thr Arg Asp Asn Asn Phe Lys Ile Tyr Asn
20 25 30

Glu Asp Val Ser Phe Leu Ser Val Asn Gln Asn Asn Tyr Ser Arg Asn
35 40 45

Pro Thr Gln Ser
50

<210> 1104
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A831T"

<400> 1104
Gln Val Phe Asp Ala Phe Thr Pro Arg Leu Gln Asp Ser Asn Lys Lys
1 5 10 15

Val Asn Gln Trp Ala Leu Glu Ser Phe Thr Thr Lys Met Ile Pro Leu
20 25 30

Leu Arg Glu Ser Leu His Pro Met Leu Leu Ser Ile Ile Ile Thr Val
35 40 45

Ala Asp Asn Leu
50

<210> 1105
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R109H"

<400> 1105
Lys Ala Ala Leu Asp Lys Ser Ala Pro Cys Arg Arg Ser Val Asp His
1 5 10 15

Arg Lys Tyr Leu Gln Lys Gln Leu Lys His His Phe Ser Gln Lys Tyr
20 25 30

Ser Arg Leu Pro Arg Gly Leu Pro Gly Arg Ala Ala Glu Pro Tyr Leu
35 40 45

Lys Arg Gly Ser
50

<210> 1106
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R784W"

<400> 1106
Arg Ala Leu Gly Arg Gln Gln Ala Ser Ser Gln Cys Pro Gly Asp Ser
1 5 10 15

Lys Asp His Ile Ile Ala Thr Glu Glu Trp Trp Gly Gly Pro Gly Gln
20 25 30

Ala Gly Ser Pro Pro Gly Ala Ala Gly Gln Gly Ser Gly Glu Gly Cys
35 40 45

Gly Leu Trp Glu
50

<210> 1107
<211> 86
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.IPPQAQELEIPL1556del"

<400> 1107
Leu Ile Pro Pro Gln Ala Gln Glu Leu Gly Ile Pro Leu Thr Pro Gln
1 5 10 15

Gln Val Gln Ala Leu Gly Ile Pro Leu Thr Pro Gln Gln Ala Gln Ala
20 25 30

Leu Gly Ile Pro Leu Thr Pro Gln Gln Ala Gln Glu Leu Gly Ile Pro
35 40 45

Leu Thr Pro Gln Gln Ala Gln Glu Leu Gly Ile Pro Leu Thr Pro Gln
50 55 60

Gln Ala Gln Ala Gln Gly Ile Pro Leu Thr Pro Gln Gln Ala Gln Ala
65 70 75 80

Leu Gly Ile Ser Leu Thr
85

<210> 1108
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.C51Y"

<400> 1108
Pro Arg Lys Ala Lys Ile Arg His Pro Val Ala Ser Phe Phe His Leu
1 5 10 15

Phe Phe Arg Val Ser Ala Ile Ile Val Tyr Tyr Leu Leu Cys Glu Leu
20 25 30

Leu Ser Ser Ser Phe Ile Thr Cys Met Val Thr Ile Ile Leu Leu Leu
35 40 45

Ser Cys Asp Phe
50

<210> 1109
<211> 27
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成肽"

<220>
<221> 來源
<223> /注釋="p.D428fs"

<400> 1109
Asn Tyr Arg Arg Arg Cys Ala Cys Asp Asp Cys Ser Leu Ser His Ile
1 5 10 15

Leu Thr Cys Gly Ile Met Asp Pro Pro Arg His
20 25

<210> 1110
<211> 105
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成多肽"

<220>
<221> 來源
<223> /注釋="p.D428fs"

<400> 1110
Asn Tyr Arg Arg Arg Cys Ala Cys Asp Asp Cys Ser Leu Ser His Ile
1 5 10 15

Leu Thr Cys Gly Ile Met Asp Pro Pro Ser Leu Met Thr Ser Thr Phe
20 25 30

Thr Ser Ser His Phe Lys Trp Ile Leu Leu Leu Thr Ile Leu Leu Arg
35 40 45

Gly Ala Arg Pro Val Cys His Leu Gln Ala Arg Gly Pro Ala Pro Ala
50 55 60

Leu Pro Ser Gln Phe Ser Ser Thr Pro Gly Ser Ser Ser Gln Thr Val
65 70 75 80

Ala Arg His Gln Leu Phe Val Val Met Met Lys Met Leu His His Cys
85 90 95

Gln Pro Asn Leu Leu Ile Phe Ile His
100 105

<210> 1111
<211> 68
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成多肽"

<220>
<221> 來源
<223> /注釋="p.EEEEYL135del"

<400> 1111
Ile Glu Glu Glu Glu Tyr Leu Gly Lys Glu Gly Tyr Leu Glu Glu Glu
1   5   10   15

Glu Tyr Leu Gly Lys Glu Glu His Leu Gly Lys Glu Gly Tyr Leu Glu
            20   25   30

Lys Glu Asp Tyr Ile Glu Glu Val Asp Tyr Leu Gly Lys Lys Ala Tyr
        35   40   45

Leu Glu Glu Glu Glu Tyr Leu Gly Lys Lys Ser Tyr Leu Glu Glu Glu
    50   55   60

Lys Ala Leu Glu
65

<210> 1112
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Y139H"

<400> 1112
Glu Tyr Leu Gly Lys Glu Gly Tyr Leu Glu Glu Glu Glu Tyr Leu Gly
1   5   10   15

Lys Glu Glu His Leu Glu Glu Glu Glu His His Leu Gly Lys Glu Gly
            20   25   30

Tyr Leu Glu Lys Glu Asp Tyr Ile Glu Glu Val Asp Tyr Leu Gly Lys
        35   40   45

Lys Ala Tyr Leu
    50

<210> 1113
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L112F"

<400> 1113
Gln Gln Leu Lys Lys Ile Phe Gln Glu Tyr Gly Thr Val Gly Val Ser
1   5   10   15

Leu His Ile Gly Ile Ser Leu Ile Ser Phe Phe Gly Ile Phe Tyr Met
            20   25   30

Val Val Ser Ser Gly Val Asp Met Pro Ala Ile Leu Leu Lys Leu Gly
        35   40   45

Phe Lys Glu Ser
50

<210> 1114
<211> 49
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A42fs"

<400> 1114
Gly Pro Ser Gln Pro Pro Val Arg Gln Gly Ala Leu Gln Gly Gly Leu
1 5 10 15

Leu Met Gly Tyr Ser Pro Ala Gly Gly Arg His Pro Pro Gly Ser Thr
20 25 30

Arg Tyr Pro Ser Phe Pro Leu Arg Leu Val Pro Leu Ser Leu Ile Gly
35 40 45

Pro

<210> 1115
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P36S"

<400> 1115
Arg Gly Leu Gly Ala Ala Glu Met Pro Gly Gln Gly Pro Gly Ser Asp
1 5 10 15

Trp Thr Glu Arg Ser Ser Ser Ala Glu Ser Ser Pro Ala Val Ala Gly
20 25 30

Thr Glu Gly Gly Gly Gly Gly Ser Ala Gly Tyr Ser Cys Tyr Gln Asn
35 40 45

Ser Lys Gly Ser
50

<210> 1116
<211> 49
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P1231S"

<400> 1116
Asp Met Asp Asp Ile Phe Ser Ser Gly Ile Gln Ala Lys Thr Thr Lys
1 5 10 15

Pro Lys Ser Arg Ser Ala Gln Ala Ala Ser Ser Glu Pro Arg Phe Glu
20 25 30

His Lys Val Ser Asn Ile Phe Asp Asp Pro Leu Asn Ala Phe Gly Gly
35 40 45

Gln

<210> 1117
<211> 41
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P690fs"

<400> 1117
Pro Gly Gly Arg Gly Pro Gln Gly Ala Leu Gln Ser Pro Ser Ala Gln
1 5 10 15

Lys Arg Gly Leu Ser Pro Ser Pro Ser Cys Gln Gln Val Gln Glu Ala
20 25 30

Thr Ser Leu Trp Lys Pro Ile Pro Cys
35 40

<210> 1118
<211> 53
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S691del"

<400> 1118
Ser Pro Gly Gly Arg Gly Pro Gln Gly Ala Leu Gln Ser Pro Ser Ala
1 5 10 15

Gln Lys Arg Gly Leu Ser Pro Ser Pro Pro Ala Ser Lys Ser Lys Lys
20 25 30

Arg Pro Leu Phe Gly Ser Pro Ser Pro Ala Glu Lys Thr Pro His Pro
35 40 45

Gly Pro Gly Leu Arg
50

<210> 1119
<211> 35
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K9R"

<400> 1119
Met Glu Ala Tyr Glu Gln Val Gln Arg Arg Gly Pro Leu Lys Leu Lys
1 5 10 15

Gly Val Ala Glu Leu Gly Val Thr Lys Arg Lys Lys Lys Lys Lys Asp
20 25 30

Lys Asp Lys
35

<210> 1120
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R740C"

<400> 1120
Leu Gln Thr Lys Tyr Leu Gly Arg Gln Trp Arg Lys Ser Asn Met Lys
1 5 10 15

Thr Met Ser Ala Ile Tyr Gln Lys Val Cys Cys His Arg Met Asn Asp
20 25 30

Asp Trp Ala Tyr Gly Asn Asp Ile Asp Ala Arg Pro Trp Asp Phe Gln
35 40 45

Ala Glu Glu Cys
50

<210> 1121
<211> 36
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.H416R"

<400> 1121
Arg Pro Pro Gly Thr Asp Gly Val Val Pro Ala Thr Val Asn Tyr Tyr
1 5 10 15

Val Thr Pro Val Gln Pro Leu Leu Ala Arg Arg Ala Tyr Pro Thr Trp
20 25 30

Leu Pro Cys Asn
35

<210> 1122
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G372W"

<400> 1122
Gly Ser Ser Leu Arg Ser Glu Pro Ser Glu Thr Gly Val Ser Arg Leu
1 5 10 15

Arg Leu Ala Pro Pro Lys Thr Arg Arg Trp Trp Ser Ser Leu His Ala
20 25 30

Glu Pro Ser Lys Thr Gly Val Ser His Leu Ser Pro Glu Pro Pro Lys
35 40 45

Thr Glu Val Ser
50

<210> 1123
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R690L"

<400> 1123
Glu Asp Lys Phe Phe Ser Gln Glu Lys Tyr Trp Gly Arg Lys Phe His
1 5 10 15

Thr Pro Ser Asn Ser Tyr Thr Ala Gln Leu Leu Val Lys Met Lys Tyr
20 25 30

Gly Ala Trp Tyr Leu Lys Pro Lys Leu Trp Lys Lys Leu Arg Ser Asp
35 40 45

Glu Pro Leu Ile
50

<210> 1124
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L567F"

<400> 1124
Gln Arg Gly Arg Ile Arg Tyr Gly Pro Trp Tyr Phe Glu Pro Lys Leu
1 5 10 15

Gly Lys Lys Leu Arg Ser Asp Glu Pro Phe Phe Ile Asp Pro Lys Pro
20 25 30

Val Leu Glu Lys Pro Asp Glu Pro Asp Ile Leu Asp Gly Leu Tyr Gly
35 40 45

Pro Ile Ala Phe
50

<210> 1125
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.W163C"

<400> 1125
Gly Lys Asp Met Pro Pro Asp Leu Leu Leu Gln Val Leu Lys Gln Leu
1 5 10 15

Asp Pro Glu Arg Lys Leu Glu Asp Ala Cys Cys Ala Arg Cys Glu Ala
20 25 30

Arg Glu Lys Thr Thr Glu Val Pro Thr Glu Ser Gly Lys Tyr Pro Cys
35 40 45

Gly Glu Ser Cys
50

<210> 1126
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P388S"

<400> 1126
Val Ser Pro Leu Arg Gln Leu Pro Pro Glu Ala Gly Val Ser His Leu
1 5 10 15

Cys Pro Glu Pro Pro Lys Thr Arg Val Ser Ser Pro Leu Arg Pro Glu
20 25 30

Thr Pro Lys Asn Gly Val Ser Pro Leu Phe Pro Glu Pro Pro Lys Thr
35 40 45

Arg Ile Ser Asn
50

<210> 1127
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.I499V"

<400> 1127
Ile Ser Ser Gly Asn Ser Phe Pro Pro Gln Gln Ala Gly Ser Pro Leu
1 5 10 15

Lys Arg Pro Phe Ser Ala Ala Ala Ala Val Val Ala Ala Ala Ala Ala
20 25 30

Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Pro Ala Pro
35 40 45

Ala Leu Ala Ala
50

<210> 1128
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A516P"

<400> 1128
Arg Pro Phe Ser Ala Ala Ala Ala Ala Ile Ala Ala Ala Ala Ala Ala Ala
1 5 10 15

Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Pro Pro Ala Pro Ala Pro Ala
20 25 30

Leu Ala Ala Ala Ala Ala Pro Ala Leu Ala Ala Ala Ala Ala Pro Ala
35 40 45

Leu Ala Ala Ala
50

<210> 1129
<211> 49
<212> PRT
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<220>
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多肽"

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<400> 1129
Ser Asp Ala Thr Val Glu Lys Asp Glu Ser His Ala Gly Lys Val Val
1 5 10 15

Leu Arg Ser Trp Tyr Glu Lys Asn Lys Arg Arg Ile Phe Pro Ala Ser
20 25 30

Arg Trp Glu Pro Tyr Asp Pro Glu Lys Lys Trp Asp Lys Tyr Thr Ile
35 40 45

Arg

<210> 1130
<211> 52
<212> PRT
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多肽"

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<400> 1130
Leu Gly Met Gln Ser Ile Pro Ile Ala Thr Ala Cys Thr Ile Tyr Pro
1 5 10 15

Lys Phe Phe Cys Glu Thr Ile Leu Asp Thr Thr Phe Asp Pro Tyr Leu
20 25 30

Ile Ala Met Ser Ser Ile Tyr Leu Ala Gly Lys Val Glu Glu Gln Pro
35 40 45

Leu Trp Ala His
50

<210> 1131
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1131
Ala Gly Leu Lys Val Leu Phe Lys Lys Thr His Arg Ile Leu Arg Arg
1 5 10 15

Leu Phe Asn Leu Cys Lys Arg Cys His Cys Cys Gln Pro Arg Phe Arg
20 25 30

Leu Pro Lys Glu Arg Ser Leu Ser Tyr Trp Trp Asn Arg Ile Gln Ser
35 40 45

Leu Leu Tyr Cys
50

<210> 1132
<211> 52
<212> PRT
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多肽"

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<400> 1132
Trp Leu Thr Arg Ile Gln Ser Phe Leu Tyr Cys Asn Glu Asn Gly Leu
1 5 10 15

Leu Gly Ser Phe Ser Glu Glu Thr His Trp Trp Cys Thr Cys Pro Asn
20 25 30

Asp Gln Val Val Cys Thr Ala Phe Leu Pro Cys Thr Val Gly Asp Ala
35 40 45

Ser Ala Cys Leu
50

<210> 1133
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.R457G"

<400> 1133
Gln Val Val Cys Thr Ala Phe Leu Pro Cys Thr Val Gly Asp Ala Ser
1 5 10 15

Ala Cys Leu Thr Cys Ala Pro Asp Asn Gly Gly Thr Arg Cys Gly Thr
20 25 30

Cys Asn Thr Gly Tyr Met Leu Ser Gln Gly Leu Cys Lys Pro Glu Val
35 40 45

Ala Glu Ser Thr
50

<210> 1134
<211> 45
<212> PRT
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<220>
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多肽"

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<400> 1134
Met Gln Pro Pro Val Pro Gly Pro Leu Gly Leu Leu Asp Pro Ala Glu
1 5 10 15

Gly Leu Leu Leu Arg Arg Lys Lys Thr Ser Leu Trp Phe Val Gly Ser
20 25 30

Leu Leu Leu Val Ser Val Leu Ile Val Thr Val Gly Leu
35 40 45

<210> 1135
<211> 52
<212> PRT
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多肽"

<220>
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<400> 1135
Gly Phe Arg Leu Thr Pro Glu Pro Val Pro Thr Cys Ser Ser Tyr Pro
1 5 10 15

Leu Pro Leu Gln Pro Cys Ser Arg Phe Thr Thr Val Ala Pro Ser Ser
20 25 30

Ala Leu Ala Ser Ser Glu Asp Leu Gln Pro Pro Ser Pro Ser Ser Ser
35 40 45

Gly Ser Gly Leu
50

<210> 1136
<211> 52
<212> PRT
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<220>
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多肽"

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<223> /注釋="p.H445D"

<400> 1136
Pro Ser Ala Glu Val Trp Asn Glu Asn Lys Glu Arg Arg Glu Lys Lys
1 5 10 15

Asp Arg His Pro Ser Arg Lys Ser Ser Asp Asp His Arg Lys Ala Gly
20 25 30

Glu Ser His Arg Arg Arg Ala Gly Asp Lys Asn Gln Lys Ala Ser Ser
35 40 45

His Arg Ser Ala
50

<210> 1137
<211> 49
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1137
Val Asp Ile Val Ala Lys Met Val Glu Lys Gln Asn Ile Glu Ala Lys
1 5 10 15

Val Glu Lys Ala Gln Gly Gly Gln Glu Met Met Glu Met Ile Ser Gly
20 25 30

Thr Met Thr Ser Glu Lys Thr Glu Met Ile Val Phe Glu Thr Lys Ser
35 40 45

Ile

<210> 1138
<211> 49
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 1138
Met Ser Asp Cys Cys Ser Ala Pro Gly Ile Ser Trp Glu Ala Gly Val
1 5 10 15

Gly Arg Pro Ala Val Pro Val Val Leu Glu Leu Gln Ile Arg Arg Gly
20 25 30

Ala Met Ser Glu Glu Thr Val Ser Glu Ser Gln Phe Ser Leu Lys Thr
35 40 45

Ala

<210> 1139
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 1139
Phe Leu Thr Leu Val Phe Ala Leu Gly Phe Phe Phe Leu Leu Leu Pro
1 5 10 15

Tyr Leu Ser Tyr Phe His Cys Asp Asp Leu Leu Pro Ser Pro Ser Pro
20 25 30

Gly Lys Arg Lys Cys Pro Val Gly Arg Arg Arg Arg Pro Arg Gly Arg
35 40 45

Met Lys Asn His
50

<210> 1140
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R304S"

<400> 1140
Ala Ser Ser Arg Trp Gln Glu Thr Ala Arg Thr Ser Cys Ala Phe Asn
1 5 10 15

Ser Ser Val Gln Gln Asp Pro Leu Ser Ser Ser His Pro Pro Glu Thr
20 25 30

Cys Gln Met Glu Ala Gly Ser Leu Phe Leu Leu Ser Ser Asp Gly Gln
35 40 45

Asn Val Val Gly
50

<210> 1141
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R1265S"

<400> 1141
Asn Ser Gln Gly Ile Ser Ser Gly Asp Met Gly Thr Ser Gln Val Val
1 5 10 15

His Val His Leu Glu Asp Ser Gly Ile Ser Ser Val Ala Gln Lys Gln
20 25 30

Glu Pro Arg Val Pro Thr Cys Val Leu Gln Lys Cys Gln Val Thr Asn
35 40 45

Phe Pro Pro Ala
50

<210> 1142
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.L222P"

<400> 1142
Pro Pro Gln Pro Val Ser Pro Leu Asp Ser Lys Phe Pro Ile Asp His
1 5 10 15

Ser Leu Pro Gln Gln Leu Pro Ser Pro Pro Pro Phe Pro Pro His His
20 25 30

Ile Gln Arg Ala Glu Pro Ser Leu Gln Pro Glu Ala Ser Leu Ser Leu
35 40 45

Asn Thr Val Phe
50

<210> 1143
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.W192L"

<400> 1143
Thr Trp Ala Val Pro Val Ser Glu Ser Asn Val Ala Lys Leu Thr Asn
1 5 10 15

Ile Tyr Arg Asp Gln Ser Phe Thr Thr Leu Leu Leu Val Ala Thr Asn
20 25 30

Thr Ser Thr Asn Asp Met Ile Ile Leu Gln Thr Leu His Trp Arg Met
35 40 45

Gln Leu Ser Ile
50

<210> 1144
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.R206Q"

<400> 1144
Asp Glu Ser Asn Phe Asn His Phe Leu Asn Met Thr Glu Lys Gln Gly
1 5 10 15

Cys Ser Val Gln Arg Leu Arg Asn Ile Gln Gln Val Arg Thr Val Lys
20 25 30

Gly Gln Asp Tyr Leu Ser Lys Thr Gly Ala Lys Phe His Gly Lys Met
35 40 45

Glu Gln Lys Phe
50

<210> 1145
<211> 52
<212> PRT
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<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.A141T"

<400> 1145
Ser Gly Gly Ser Val Thr Leu Ser Glu Ser Thr Ala Ile Ile Ser Tyr
1 5 10 15

Gly Thr Thr Gly Leu Val Thr Trp Asp Thr Thr Ala Leu Tyr Leu Ala
20 25 30

Glu Trp Ala Ile Glu Asn Pro Ala Val Phe Thr Asn Arg Thr Val Leu
35 40 45

Glu Leu Gly Ser
50

<210> 1146
<211> 38
<212> PRT
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<220>
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<220>
<221> 來源
<223> /注釋="p.C120Y"

<400> 1146
Arg Ala Ser Cys Ser Pro Leu Ser Tyr Ala Gly Leu Gly Ser Asp Gly
1 5 10 15

Lys Trp Asn Leu Val Met Thr Arg Asn Tyr Tyr Phe Pro Thr Lys Ser
20 25 30

Thr Trp Arg Trp Gln Cys
35

<210> 1147
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成多肽"

<220>
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<223> /注釋="p.S383L"

<400> 1147
Lys Val Gln Phe Glu Arg Lys His Ser Lys Ile His Ser Ile Arg Ser
1 5 10 15

Leu Ala Ser Gln Pro Thr Glu Leu Asn Leu Leu Glu Val Leu Glu Gln
20 25 30

Ser Gln Gln Ser Thr Ser Leu Thr Phe Gly Glu Gly Ala Glu Ser Pro
35 40 45

Gly Gly Gln Ser
50

<210> 1148
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成多肽"

<220>
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<223> /注釋="p.R299L"

<400> 1148
Lys Arg Phe Leu Ile Lys Leu Arg Pro Asp Ala Asn Ser Ala Tyr Gln
1 5 10 15

Asp Thr Leu Glu Phe Leu Met Ala Ser Leu Leu Asp Phe Cys Lys Ser
20 25 30

Phe Trp Lys Ile Cys Val Glu His His Ala Phe Phe Arg Leu Phe Glu
35 40 45

Glu Pro Lys Pro
50

<210> 1149
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E261K"

<400> 1149
Ile Ala Gly Val Met Thr Leu Ser Gln Val Lys Gly Phe Val Arg Lys
1 5 10 15

Asn Gly Val Asn Glu Ala Lys Ile Asp Lys Lys Ile Lys Asn Asp Asn
20 25 30

Val Gln Asp Thr Ala Glu Gln Lys Val Gln Leu Leu Arg Asn Trp His
35 40 45

Gln Leu His Gly
50

<210> 1150
<211> 36
<212> PRT
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多肽"

<220>
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<223> /注釋="p.K3fs"

<400> 1150
Met Lys Lys Asn Thr Cys Phe Pro Arg Val Ile Gly Tyr Lys Tyr Ala
1 5 10 15

Ser Ser Lys Ser Tyr Leu Ser Ile Leu Leu Glu Ser Val Ser Ile Ser
20 25 30

Thr His Gln Leu
35

<210> 1151
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.Q625E"

<400> 1151
Arg Phe Cys Ser Asn Ser Lys His Leu Leu Gly Lys Glu Ala Ile Lys
1 5 10 15

Gln Arg His Leu Gln Leu Leu Gly Tyr Glu Glu Val Val Gln Ile Pro
20 25 30

Tyr His Glu Ile Gly Met Leu Lys Ser Arg Arg Glu Leu Val Glu Tyr
35 40 45

Leu Gln Arg Lys
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<210> 1152
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1152
Thr Lys Val Val Asp Leu Asp Pro Cys Leu Ser Lys Lys Pro Leu Glu
1 5 10 15

Glu Lys Pro Ser Gln Pro Tyr Ser Ala Leu Leu Glu Ser Leu Ser Glu
20 25 30

Val Gln Ser Leu Ser Ser Phe Gln Ser Glu Ser Cys Asp Asp Asn Gly
35 40 45

Tyr His Trp Asp
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<210> 1153
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.H3574N"

<400> 1153
Pro Thr Ala Ile Pro Leu Glu Ile Phe Ile Val Thr Met Glu Asp Asp
1 5 10 15

Phe Pro Gly Gly Val Ile Gly Lys Ile Asn Asn Ala Thr Asp Gln Asp
20 25 30

Met Tyr Asp Val Leu Thr Phe Ala Leu Lys Ser Glu Gln Lys Ser Leu
35 40 45

Phe Lys Val Asn
50

<210> 1154
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1154
Gly Leu Arg Pro Val Val Val Pro Asn Ile Gln Ala Gly His Ser Tyr
1 5 10 15

Val Gly Lys Glu Glu Leu Ile Gly Ile Thr Thr Val Val Leu Phe Val
20 25 30

Ile Phe Ile Leu Val Val Leu Phe Ile Val Phe Arg Lys Lys Val Phe
35 40 45

Arg Lys Asn Tyr
50

<210> 1155
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1155
Val Val Gln Val Leu Asp Glu Asn Asp Asn Lys Pro Gln Phe Pro Glu
1 5 10 15

Lys Val Tyr Gln Ile Lys Leu Pro Glu His His Asp Arg Lys Lys Arg
20 25 30

Gly Glu Pro Ile Tyr Arg Ala Phe Ala Phe Asp Arg Asp Glu Gly Pro
35 40 45

Asn Ala Glu Ile
50

<210> 1156
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1156
Thr Asp Val Asn Asp Asn Pro Pro Val Phe Thr Gln Ala Val Phe Glu
1 5 10 15

Thr Ile Leu Leu Leu Pro Thr Tyr Val Val Val Val Glu Val Leu Lys
20 25 30

Val Ser Ala Thr Asp Pro Asp Ser Glu Val Pro Pro Glu Leu Thr Tyr
35 40 45

Ser Leu Met Glu
50

<210> 1157
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<400> 1157
Gly Arg Ser Gly Ala Pro Ala Glu Arg Glu Ala Glu Pro Arg Val Lys
1 5 10 15

Glu Ser Arg Ser Pro Ala Lys Glu Glu Val Val Ala Lys Met Pro Ala
20 25 30

Arg Ala Ser Pro Pro His Ser Lys Ala Ala Pro Gly Asp Val Lys Val
35 40 45

Lys Glu Glu Arg
50

<210> 1158
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S102R"

<400> 1158
Arg Ile Gln Gln Ile Ile Tyr Cys His Lys Leu Thr Ile Ile Leu Thr
1 5 10 15

Lys Trp Arg Asn Thr Ala Arg His Lys Arg Arg Lys Lys Lys Glu Asp
20 25 30

Glu Leu Ile Leu Lys His Glu Leu Gln Leu Lys Lys Trp Lys Asn Arg
35 40 45

Leu Ile Leu Lys
50

<210> 1159
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V48G"

<400> 1159
Arg Asp Lys Gly Arg Ala Ala Gln Val Cys Thr Ala Trp Arg Asp Ala
1 5 10 15

Ala Tyr His Lys Ser Val Trp Arg Gly Gly Gly Glu Ala Lys Leu His
20 25 30

Leu Arg Arg Ala Asn Pro Ser Leu Phe Pro Ser Leu Gln Ala Arg Gly
35 40 45

Ile Arg Arg Val
50

<210> 1160
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.M144I"

<400> 1160
Lys Gln Pro Cys Thr Asn Asp Met Ala Lys Ser Asn Ser Val Gly Gln
1 5 10 15

Asp Ser Cys Gln Asp Ser Glu Gly Asp Ile Ile Ile Phe Pro Ala Glu
20 25 30

Ser Ser Cys Ala Leu Pro Gln Glu Gly Ser Ala Gly Pro Gly Ser Pro
35 40 45

Gly Ser Ala Pro
50

<210> 1161
<211> 33
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F144fs"

<400> 1161
Lys Arg Phe Phe Ser Glu His Val Pro Cys Asn Gly Phe Ser Asp Ile
1 5 10 15

Glu Asn Leu Glu Gly Pro Glu Ile Phe Leu Arg Met Asn Trp Cys Val
20 25 30

Ser

<210> 1162
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.M553V"

<400> 1162
His Leu Pro Ala Ser Arg Val Val Gly Thr Pro Glu Pro Ser Leu Gly
1 5 10 15

Ala Arg Ala Pro Gln Asp Pro Gly Gly Val Val Ala Gln Ala Cys Glu
20 25 30

Glu Tyr Leu Ser Gln Ile His Ser Cys Gln Thr Leu Gln Asp Arg Thr
35 40 45

Glu Lys Met Lys
50

<210> 1163
<211> 38
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.G443fs"

<400> 1163
Thr Pro Gly Glu Asp Gly Gly Glu Pro Gly Asp Ala Val Ala Ala Ala
1 5 10 15

Glu Gln Pro Ala Gln Cys Gly Gln Gly Ala Ala Val Arg Ala Ala Arg
20 25 30

Gly Arg Glu Leu Gln Glu
35

<210> 1164
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.G423V"

<400> 1164
Ser Asp Asp Asn Thr Leu Lys Val Trp Ser Ala Val Thr Gly Lys Cys
1 5 10 15

Leu Arg Thr Leu Val Gly His Thr Gly Val Val Val Trp Ser Ser Gln
20 25 30

Met Arg Asp Asn Ile Ile Ile Ser Gly Ser Thr Asp Arg Thr Leu Lys
35 40 45

Val Trp Asn Ala
50

<210> 1165
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R465C"

<400> 1165
Asp Arg Thr Leu Lys Val Trp Asn Ala Glu Thr Gly Glu Cys Ile His
1 5 10 15

Thr Leu Tyr Gly His Thr Ser Thr Val Cys Cys Cys Met His Leu His
20 25 30

Glu Lys Arg Val Val Ser Gly Ser Arg Asp Ala Thr Leu Arg Val Trp
35 40 45

Asp Ile Glu Thr
50

<210> 1166
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R465H"

<400> 1166
Asp Arg Thr Leu Lys Val Trp Asn Ala Glu Thr Gly Glu Cys Ile His
1 5 10 15

Thr Leu Tyr Gly His Thr Ser Thr Val His His Cys Met His Leu His
20 25 30

Glu Lys Arg Val Val Ser Gly Ser Arg Asp Ala Thr Leu Arg Val Trp
35 40 45

Asp Ile Glu Thr
50

<210> 1167
<211> 52
<212> PRT
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<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R479Q"

<400> 1167
Ile His Thr Leu Tyr Gly His Thr Ser Thr Val Arg Cys Met His Leu
1 5 10 15

His Glu Lys Arg Val Val Ser Gly Ser Gln Gln Asp Ala Thr Leu Arg
20 25 30

Val Trp Asp Ile Glu Thr Gly Gln Cys Leu His Val Leu Met Gly His
35 40 45

Val Ala Ala Val
50

<210> 1168
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R505G"

<400> 1168
Asp Ala Thr Leu Arg Val Trp Asp Ile Glu Thr Gly Gln Cys Leu His
1 5 10 15

Val Leu Met Gly His Val Ala Ala Val Gly Gly Cys Val Gln Tyr Asp
20 25 30

Gly Arg Arg Val Val Ser Gly Ala Tyr Asp Phe Met Val Lys Val Trp
35 40 45

Asp Pro Glu Thr
50

<210> 1169
<211> 52
<212> PRT
<213> 人工序列

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多肽"

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<400> 1169
Asp Ala Thr Leu Arg Val Trp Asp Ile Glu Thr Gly Gln Cys Leu His
1 5 10 15

Val Leu Met Gly His Val Ala Ala Val Cys Cys Cys Val Gln Tyr Asp
20 25 30

Gly Arg Arg Val Val Ser Gly Ala Tyr Asp Phe Met Val Lys Val Trp
35 40 45

Asp Pro Glu Thr
50

<210> 1170
<211> 52
<212> PRT
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多肽"

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<400> 1170
Phe Met Val Lys Val Trp Asp Pro Glu Thr Glu Thr Cys Leu His Thr
1 5 10 15

Leu Gln Gly His Thr Asn Arg Val Tyr Leu Leu Leu Gln Phe Asp Gly
20 25 30

Ile His Val Val Ser Gly Ser Leu Asp Thr Ser Ile Arg Val Trp Asp
35 40 45

Val Glu Thr Gly
50

<210> 1171
<211> 52
<212> PRT
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<400> 1171
Gly Ser Leu Asp Thr Ser Ile Arg Val Trp Asp Val Glu Thr Gly Asn
1 5 10 15

Cys Ile His Thr Leu Thr Gly His Gln Leu Leu Leu Thr Ser Gly Met
20 25 30

Glu Leu Lys Asp Asn Ile Leu Val Ser Gly Asn Ala Asp Ser Thr Val
35 40 45

Lys Ile Trp Asp
50

<210> 1172
<211> 45
<212> PRT
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多肽"

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<400> 1172
Glu Ser Gly Gly Ser Gly Gly Val Val Trp Arg Ile Arg Ala Ser Asn
1 5 10 15

Thr Lys Leu Val Cys Ala Val Gly Ser Trp Trp Asn Gly Thr Glu Glu
20 25 30

Thr Lys Leu Leu Val Leu Asp Phe Asp Val Asp Met Lys
35 40 45

<210> 1173
<211> 40
<212> PRT
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多肽"

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<400> 1173
Met Asn Gln Glu Leu Leu Ser Val Gly Ser Lys Arg Arg Gln Gln Thr
1 5 10 15

Gly Gly Ser Leu Arg Gly Asn Pro Ser Ser Ser Gln Val Asp Glu Glu
20 25 30

Gln Met Asn Arg Val Val Glu Glu
35 40

<210> 1174
<211> 30
<212> PRT
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多肽"

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<400> 1174
Tyr Asp Lys Lys Val Thr Ile Tyr Asp Pro Arg Asp Arg Met Glu Thr
1 5 10 15

Arg Asp Ala Leu Met Gly Trp Gly Gly Ala Phe Glu Gly Leu
20 25 30

<210> 1175
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 1175
Ser Asn Ala Leu Glu Leu Val Val Thr Asp Ser Ile His Gln Asp Tyr
1 5 10 15

Thr Thr Gln Asn Leu Ile Arg Met Ala Met Met Ala Gly Leu Val Leu
20 25 30

Val Ala Leu Leu Ala Ile Leu Val Glu Asn Trp His Ser His Thr Ala
35 40 45

Leu Asn Lys Glu
50

<210> 1176
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 1176
Val Tyr Tyr Glu Pro Glu Gln Thr Val Leu Ile Asp Asn Cys Arg Gln
1 5 10 15

Gln Cys Thr Cys His Val Gly Lys Val Met Met Val Cys Gln Glu His
20 25 30

Ser Cys Lys Pro Gly Gln Val Cys Gln Pro Ser Gly Gly Ile Leu Ser
35 40 45

Cys Val Thr Lys
50

<210> 1177
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 1177
Glu Ala Leu Cys Gly Leu Cys Gly Asn Phe Asn Gly Asp Pro Ala Asp
1 5 10 15

Asp Leu Ala Leu Arg Gly Gly Gly Gln Ser Ser Ala Asn Ala Leu Ala
20 25 30

Phe Gly Asn Ser Trp Gln Glu Glu Thr Arg Pro Gly Cys Gly Ala Thr
35 40 45

Glu Pro Gly Asp
50

<210> 1178
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 1178
Arg Phe Asp Phe Met Gly Thr Cys Val Tyr Val Leu Ala Gln Thr Cys
1 5 10 15

Gly Thr Arg Pro Gly Leu His Arg Phe Val Val Val Leu Gln Glu Asn
20 25 30

Val Ala Trp Gly Asn Gly Arg Val Ser Val Thr Arg Val Ile Thr Val
35 40 45

Gln Val Ala Asn
50

<210> 1179
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1179
Ser Ser Lys Pro Val Thr Ile Thr Val Gln Val Pro Ser Met Gly Ser
1 5 10 15

Ser Ser Pro Met Gly Ile Ile Val Ala Gly Gly Val Ile Ala Thr Ala
20 25 30

Val Ala Ala Ile Val Ala Ala Val Val Ala Leu Ile Tyr Cys Arg Lys
35 40 45

Lys Arg Ile Ser
50

<210> 1180
<211> 52
<212> PRT
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多肽"

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<400> 1180
Leu Phe Leu Leu Pro Gly Ser Leu Gly Ala Glu Ser His Leu Ser Leu
1 5 10 15

Leu Tyr His Leu Thr Ala Val Ser Ser Ala Ala Ala Pro Gly Thr Pro
20 25 30

Ala Phe Trp Val Ser Gly Trp Leu Gly Pro Gln Gln Tyr Leu Ser Tyr
35 40 45

Asn Ser Leu Arg
50

<210> 1181
<211> 30
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.V505L"

<400> 1181
Met Gln Gln Pro Glu Ser Ser Ala Asn Ile Arg Thr Leu Leu Glu Asn
1 5 10 15

Lys Asp Ser Gln Val Ile Tyr Ser Ser Leu Leu Lys Lys Ser
20 25 30

<210> 1182
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 1182
Ala Ile Met Asn Ala Leu Ile Glu Ala Gly Ala His Met Asp Ala Thr
1 5 10 15

Asn Ala Phe Lys Lys Thr Ala Tyr Glu Met Met Leu Asp Glu Lys Leu
20 25 30

Leu Ala Arg Gly Thr Met Gln Pro Phe Asn Tyr Val Thr Leu Gln Cys
35 40 45

Leu Ala Ala Arg
50

<210> 1183
<211> 77
<212> PRT
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<220>
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多肽"

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<400> 1183
Ser Glu Lys Pro Leu Ala Glu Gln Asp Trp Tyr His Gly Ala Ile Pro
1 5 10 15

Arg Ile Glu Ala Gln Glu Leu Leu Lys Asn Lys Glu Thr Phe Trp Cys
20 25 30

Glu Arg Val Met Gly Asn Leu Val Asn Met Ser Phe Leu Tyr Ile Leu
35 40 45

Met Asp Arg Gly Asp Ile Leu Ser Tyr Asn Met Leu Ile Thr Cys Ile
50 55 60

Asp Ser Arg Ala Leu Gly Phe Gln Thr Phe Leu Asn Leu
65 70 75

<210> 1184
<211> 52
<212> PRT
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多肽"

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<400> 1184
Cys Glu Val Asp Gln Gly Asp Gly Glu Glu Glu Glu Glu Glu Glu Arg
1 5 10 15

Gly Arg Gly Val Ser Leu Leu Gly Arg His His Lys Arg Lys Arg Val
20 25 30

Ile Thr Tyr Ala Gln Arg Gln Ala Ala Asn Ile Arg Glu Arg Lys Arg
35 40 45

Met Phe Asn Leu
50

<210> 1185
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1185
Asn Cys Asn Ala Ser Pro Glu Pro Gly Ala Glu Ala Gly Ala Glu Ala
1 5 10 15

Gly Gly Gly Ala Asp Gly Phe Pro Ala Leu Leu Ala Cys Ser Leu Glu
20 25 30

Glu Lys Leu Ser Leu Cys Phe Arg Pro Ser Asp Pro Gly Ala Glu Pro
35 40 45

Pro Arg Thr Ala
50

<210> 1186
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1186
Gly Ser Gln Gly Lys Lys Leu Leu Asn Leu Cys Ser Pro Leu Pro Cys
1 5 10 15

Met Ile Pro Leu Gln Pro Leu Gly Tyr Lys Lys Val Pro Ser Lys Thr
20 25 30

Leu Leu Ser Tyr Ser Glu Leu Trp Lys Ser Ser Leu Arg Ala Gly Gly
35 40 45

Gly Gly Gly Gly
50

<210> 1187
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.E339Q"

<400> 1187
Asn Tyr Cys Gly Leu Pro Gly Glu Tyr Trp Leu Gly Asn Asp Lys Ile
1 5 10 15

Ser Gln Leu Thr Arg Met Gly Pro Thr Gln Gln Leu Leu Ile Glu Met
20 25 30

Glu Asp Trp Lys Gly Asp Lys Val Lys Ala His Tyr Gly Gly Phe Thr
35 40 45

Val Gln Asn Glu
50

<210> 1188
<211> 50
<212> PRT
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<220>
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多肽"

<220>
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<400> 1188
Lys Pro Leu Glu Val Ala Met Tyr Arg Glu Pro Ser Leu His Asp Val
1 5 10 15

Gly Glu Thr Val Pro Lys Pro Gly Val Met Met Pro Ser Lys Ser Thr
20 25 30

Ser Ala Ser Ala Ile Met Asn Gly Gly Lys Pro Val Asn Lys Ser Lys
35 40 45

Thr Thr
50

<210> 1189
<211> 43
<212> PRT
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<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.A236V"

<400> 1189
Tyr Arg Glu Pro Ser Leu His Asp Val Gly Glu Thr Val Pro Lys Pro
1 5 10 15

Gly Val Thr Pro Ser Lys Ser Thr Ser Val Val Ser Ala Ile Met Asn
20 25 30

Gly Gly Lys Pro Val Asn Lys Ser Lys Thr Thr
35 40

<210> 1190
<211> 52
<212> PRT
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多肽"

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<223> /注釋="p.G380R"

<400> 1190
Val Val Leu Pro Ala Glu Glu Glu Leu Val Glu Ala Asp Glu Ala Gly
1 5 10 15

Ser Val Tyr Ala Gly Ile Leu Ser Tyr Arg Arg Val Gly Phe Phe Leu
20 25 30

Phe Ile Leu Val Val Ala Ala Val Thr Leu Cys Arg Leu Arg Ser Pro
35 40 45

Pro Lys Lys Gly
50

<210> 1191
<211> 117
<212> PRT
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多肽"

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<400> 1191
Gln Gly Gly Pro Leu Tyr Val Leu Val Glu Tyr Ala Ala Lys Gly Asn
1 5 10 15

Leu Arg Glu Phe Leu Arg Ala Arg Arg Ala Pro Gly Pro Gly Leu Leu
20 25 30

Leu Arg His Leu Gln Ala Ala Arg Gly Ala Ala His Leu Gln Gly Pro
35 40 45

Gly Val Leu Cys Leu Pro Gly Gly Pro Gly His Gly Val Leu Gly Leu
50 55 60

Pro Glu Val His Pro Gln Gly Pro Gly Cys Pro Gln Cys Ala Gly Asp
65 70 75 80

Arg Gly Gln Arg Asp Glu Asp Arg Arg Leu Arg Ala Gly Pro Gly Arg
85 90 95

Ala Gln Pro Arg Leu Leu Gln Glu Asp Asp Gln Arg Pro Ala Ala Arg
100 105 110

Glu Val Asp Gly Ala
115

<210> 1192
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 1192
Gly Gly Ser Pro Tyr Pro Gly Ile Pro Val Glu Glu Leu Phe Lys Leu
1 5 10 15

Leu Lys Glu Gly His Arg Met Asp Lys His His Ala Asn Cys Thr His
20 25 30

Asp Leu Tyr Met Ile Met Arg Glu Cys Trp His Ala Ala Pro Ser Gln
35 40 45

Arg Pro Thr Phe
50

<210> 1193
<211> 127
<212> PRT
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多肽"

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<221> 來源
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<400> 1193
Ser Ser Gly Asp Asp Ser Val Phe Ala His Asp Leu Leu Pro Pro Ala
1 5 10 15

Pro Pro Ser Ser Gly Gly Ser Arg Thr Ser Ser Arg Ala Thr Gly Pro
20 25 30

Gln Gln Cys Glu Gly Ser Leu Ala Ala His Pro Ala Ala Gly Ala Gln
35 40 45

Pro Leu Pro Gly Met Arg Leu Ser Ala Asp Gly Glu Thr Ala Thr Gln
50 55 60

Ser Phe Gly Leu Cys Val Cys Val Cys Val Cys Val Cys Val Cys Ala
65 70 75 80

His Pro Arg Val Pro Val Cys Val Arg Ile Leu Pro Pro Gly Ala Glu
85 90 95

Val Pro Trp Val Ser Pro Leu Leu Cys Asn Gly Leu Leu Thr Gly Ala
100 105 110

Ala Ala Pro Arg Gly Leu Cys Ser Gly Gly Thr Gln Cys Arg Met
115 120 125

<210> 1194
<211> 52
<212> PRT
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<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.R248C"

<400> 1194
Arg Gly Asn Tyr Thr Cys Val Val Glu Asn Lys Phe Gly Ser Ile Arg
1 5 10 15

Gln Thr Tyr Thr Leu Asp Val Leu Glu Cys Cys Ser Pro His Arg Pro
20 25 30

Ile Leu Gln Ala Gly Leu Pro Ala Asn Gln Thr Ala Val Leu Gly Ser
35 40 45

Asp Val Glu Phe
50

<210> 1195
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.S249C"

<400> 1195
Gly Asn Tyr Thr Cys Val Val Glu Asn Lys Phe Gly Ser Ile Arg Gln
1 5 10 15

Thr Tyr Thr Leu Asp Val Leu Glu Arg Cys Cys Pro His Arg Pro Ile
20 25 30

Leu Gln Ala Gly Leu Pro Ala Asn Gln Thr Ala Val Leu Gly Ser Asp
35 40 45

Val Glu Phe His
50

<210> 1196
<211> 90
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.H479fs"

<400> 1196
Leu Gly Pro Gly Pro Val Ala Gly Pro Lys Leu Tyr Pro Lys Leu Tyr
1 5 10 15

Thr Asp Ile His Thr His Thr His Thr Leu Ser His Thr Leu Thr Arg
20 25 30

Gly Gly Gln Gly Pro Pro Ala His Pro Leu Ser Val Leu Asp Gly Thr
35 40 45

Val Ser Ala Val Gly Thr Gly Gly Pro Ala Arg Gln Ala Asp Trp Glu
50 55 60

Asp Gly Gly Arg Ser Cys Arg Arg Arg Gln Gly Thr His Gly Glu Glu
65 70 75 80

Glu Trp Pro Ala Pro Gln Ala Val Cys Val
85 90

<210> 1197
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R243L"

<400> 1197
Lys Tyr Thr Cys Arg Val Ser Asn Arg Ala Gly Ala Ile Asn Ala Thr
1 5 10 15

Tyr Lys Val Asp Val Ile Gln Arg Thr Leu Leu Ser Lys Pro Val Leu
20 25 30

Thr Gly Thr His Pro Val Asn Thr Thr Val Asp Phe Gly Gly Thr Thr
35 40 45

Ser Phe Gln Cys
50

<210> 1198
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V274L"

<400> 1198
Thr Gly Thr His Pro Val Asn Thr Thr Val Asp Phe Gly Gly Thr Thr
1 5 10 15

Ser Phe Gln Cys Lys Val Arg Ser Asp Leu Leu Lys Pro Val Ile Gln
20 25 30

Trp Leu Lys Arg Val Glu Tyr Gly Ala Glu Gly Arg His Asn Ser Thr
35 40 45

Ile Asp Val Gly
50

<210> 1199
<211> 49
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.G138fs"

<400> 1199
Leu Asp His Arg Ala Val Ser Gln Val Asn Arg Ile Asn Glu Thr Lys
1 5 10 15

His Ser Val Leu Gln Tyr Val Gly Gly Gly Asp Val Cys Gly Asn Ala
20 25 30

Gly Pro Glu Thr Ser Val Ala Glu Arg Glu Leu Glu Arg Asp Leu Leu
35 40 45

Gly

<210> 1200
<211> 79
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<223> /注釋="p.F100fs"

<400> 1200
Pro Gly Leu Pro Pro Thr Thr His Met Asn Gly Tyr Ser His Leu Gly
1 5 10 15

Lys Lys Lys Arg Met Arg Ser Phe Phe Gly Lys Leu Phe Arg Arg Ser
20 25 30

Lys Phe Glu Ala Lys Pro Thr Ser Gly Pro Trp Gln Pro Gly Arg Asn
35 40 45

Ile Thr Thr Lys Leu Ile Gln Arg Pro Leu Arg Ser Ser Leu Gly Ser
50 55 60

Arg Lys Thr Pro Pro Ser Leu Pro Phe Leu Gly Glu Glu Glu Leu
65 70 75

<210> 1201
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R254W"

<400> 1201
Ser Gly Asp Val Ser Lys Leu Ser Leu Ala Asp Ser Phe Leu Tyr Gly
1 5 10 15

Leu Ile Gln Val Pro Asn Tyr Ser Leu Trp Trp Ile Glu Ala Met Val
20 25 30

Leu Lys Lys Glu Phe Leu Pro Ser Cys Ser Ser Leu Tyr Thr Asp Ile
35 40 45

Thr Val Leu Arg
50

<210> 1202
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D184E"

<400> 1202
Ala Lys His Cys Val Lys Cys Asn Lys Ala Ile Thr Ser Gly Gly Ile
1 5 10 15

Thr Tyr Gln Asp Gln Pro Trp His Ala Glu Glu Cys Phe Val Cys Val
20 25 30

Thr Cys Ser Lys Lys Leu Ala Gly Gln Arg Phe Thr Ala Val Glu Asp
35 40 45

Gln Tyr Tyr Cys
50

<210> 1203
<211> 40
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K309fs"

<400> 1203
Asn Gly Pro Lys Glu Asp Ser Ser Leu Pro Thr Phe Lys Thr Ala Lys
1 5 10 15

Glu Gln Leu Trp Val Asp Gln Gln Lys Ser Thr Thr Asn Leu Ser Val
20 25 30

His Gln Gly Leu His Met Val Val
35 40

<210> 1204
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.I522K"

<400> 1204
Leu Lys Asp Asp Leu Thr Lys Leu Lys Ser Phe Thr Val Met Leu Val
1 5 10 15

Asp Glu Arg Lys Asn Met Met Glu Lys Lys Lys Lys Gln Glu Glu Arg
20 25 30

Lys Val Asp Gly Leu Asn Lys Asn Phe Lys Val Glu Gln Gly Lys Val
35 40 45

Met Asp Val Thr
50

<210> 1205
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.E161Q"

<400> 1205
Gly Pro Pro Glu Gly Trp Thr Glu Leu Thr Met Gly Val Gly Pro Trp
1 5 10 15

Arg Glu Glu Thr Trp Gly Glu Leu Ile Gln Gln Lys Cys Leu Glu Ser
20 25 30

Met Cys Gln Gly Glu Glu Ala Glu Leu Gln Leu Pro Gly His Ser Gly
35 40 45

Pro Pro Val Arg
50

<210> 1206
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R320L"

<400> 1206
Ala Gln Ala Ala Leu Gly Asn Leu Glu Lys Ala Thr Ala Asp Leu Lys
1 5 10 15

Lys Val Leu Ala Ile Asp Pro Lys Asn Leu Leu Ala Ala Gln Glu Glu
20 25 30

Leu Gly Lys Val Val Ile Gln Gly Lys Asn Gln Asp Ala Gly Leu Ala
35 40 45

Gln Gly Leu Arg
50

<210> 1207
<211> 58
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.K159fs"

<400> 1207
Lys Gly Asn Lys Gly Arg Ser Lys Ser Pro Arg Glu Thr Gly Gly Lys
1 5 10 15

Arg His Glu Ser Ser Ser Glu Lys Lys Lys Glu Lys Asp Ile His Leu
20 25 30

Leu Ile Glu Lys Lys Asn Met Glu Lys Thr Ile Ile Thr Gln Val Lys
35 40 45

Lys Arg Lys Thr Arg Leu Lys Ile Leu Asp
50 55

<210> 1208
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<400> 1208
Ala Ser Thr His Ala Asp Ile Ser Arg His Ser Gln Ala Val Gln Gly
1 5 10 15

Gln Ser Glu Gly Ser Arg Arg Ser Arg His His Gln Gly Ser Ser Val
20 25 30

Ser Gln Asp Ser Asp Ser Glu Gly His Ser Glu Asp Ser Glu Arg Trp
35 40 45

Ser Gly Ser Ala
50

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<400> 1209
Glu Arg Trp Ser Gly Ser Ala Ser Arg Asn His Arg Gly Ser Val Gln
1 5 10 15

Glu Gln Ser Arg His Gly Ser Arg His His His Arg Ser His His Glu
20 25 30

Asp Arg Ala Gly His Gly His Ser Ala Asp Arg Ser Arg Gln Ser Gly
35 40 45

Thr Arg His Ala
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<400> 1210
Gly Ser Gly Ser Ser Gln Ser Ser Gly Tyr Gly Gln Tyr Gly Ser Arg
1 5 10 15

Glu Thr Ser Gly Phe Gly Gln His Gly Phe Phe Gly Ser Gly Gln Ser
20 25 30

Thr Gly Phe Gly Gln Tyr Gly Ser Gly Ser Gly Gln Ser Ser Gly Phe
35 40 45

Gly Gln His Gly
50

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<400> 1211
His Thr His Gly Gln Ser Gly Ser Gln His Gly Glu Ser Glu Ser Ile
1 5 10 15

Ile His Asp Arg His Arg Ile Thr His Val Val Gln Thr Gly Asp Thr
20 25 30

Thr Arg His Ser Tyr Ser Gly His Glu Gln Thr Thr Gln Thr Gly Ser
35 40 45

Arg Thr Thr Gly
50

<210> 1212
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<400> 1212
Arg Arg Ser Gly His Ser Glu Ser Ser Asp Ser Glu Val His Ser Gly
1 5 10 15

Gly Ser His Thr His Ser Gly His Thr Gln Pro Ser Gln Val Ser Thr
20 25 30

Trp Arg Val Arg Ile His Ser Ser Gln Glu Thr Pro Asn Tyr Ser Trp
35 40 45

Thr Asp Arg Arg Tyr His
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<210> 1213
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<400> 1213
Ser His Thr Phe Gln Leu Trp Arg Ala Leu Gly Ala Gly Gln Pro Thr
1 5 10 15

Ser His Leu Val Leu Thr Thr Leu Leu Gly Leu Ser Ala Gly Ala Thr
20 25 30

Pro Ala His Arg Cys Gln Arg Gln Gln Pro Leu Pro Gln Gly Glu Asp
35 40 45

Leu Pro Ala Phe Ala Gly Cys His Glu His Ala Ala Arg Ala Ala Val
50 55 60

Cys Pro Gly Val Gln Ala Gly Arg Ala Gly Gly Leu Pro Gln Ala Leu
65 70 75 80

Pro Gly Pro Pro His Pro Asp Ala Leu Cys Leu Gly Ala Glu Pro Ala
85 90 95

Gln Arg Ala Pro Gln Ala Ala Gly Pro Gly Gly Gly Arg Ala Gln Pro
100 105 110

Pro Lys Leu Gln His Val Thr Gly Gly Thr Glu Glu Pro Ala Val His
115 120 125

His Gly Ala Leu Ala
130

<210> 1214
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<400> 1214
Gly Thr His Thr Ile Thr Tyr Ile Pro Leu Cys Pro Gly Ala Tyr Thr
1 5 10 15

Val Thr Ile Lys Tyr Gly Gly Gln Pro Met Met Pro Asn Phe Pro Ser
20 25 30

Lys Leu Gln Val Glu Pro Ala Val Asp Thr Ser Gly Val Gln Cys Tyr
35 40 45

Gly Pro Gly Ile
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<210> 1215
<211> 33
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<400> 1215
Leu Asp Gly Val Tyr Ala Phe Glu Tyr Tyr Pro Ser Thr Pro Gly Arg
1 5 10 15

Tyr Ser Ile Ala Ile Thr Trp Gly Gly Thr Pro His Ser Lys Glu Pro
20 25 30

Leu

<210> 1216
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<220>
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<400> 1216
Phe Leu Asp Gly Val Tyr Ala Phe Glu Tyr Tyr Pro Ser Thr Pro Gly
1 5 10 15

Arg Tyr Ser Ile Ala Ile Thr Trp Gly Asp Thr Thr Phe Gln Arg Ala
20 25 30

Pro Leu Lys Phe Lys Leu Ala Leu Lys Arg Val Cys Arg Lys Ser Val
35 40 45

Leu Gly Ala Leu Gly Ser Met Val Gly Leu Ser Gly Gly Gln Arg Thr
50 55 60

Ser Trp
65

<210> 1217
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<400> 1217
Leu Gln Met Val Gln Val Thr Gly Ser Ser Asp Asn Glu Tyr Phe Tyr
1 5 10 15

Val Asp Phe Arg Glu Tyr Glu Tyr Asp Phe Arg Glu Tyr Glu Tyr Asp
20 25 30

Phe Arg Glu Tyr Glu Tyr Asp Leu Lys Trp Glu Phe Pro Arg Glu Asn
35 40 45

Leu Glu Phe Gly Lys Val Leu Gly Ser Gly Ala Phe Gly Lys Val Met
50 55 60

Asn Ala Thr Ala Tyr Gly Ile Ser Lys Thr Gly Val Ser Ile
65 70 75

<210> 1218
<211> 52
<212> PRT
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<220>
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<400> 1218
Arg Asp Leu Ala Ala Arg Asn Val Leu Val Thr His Gly Lys Val Val
1 5 10 15

Lys Ile Cys Asp Phe Gly Leu Ala Arg His His Ile Met Ser Asp Ser
20 25 30

Asn Tyr Val Val Arg Gly Asn Ala Arg Leu Pro Val Lys Trp Met Ala
35 40 45

Pro Glu Ser Leu
50

<210> 1219
<211> 52
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<400> 1219
Arg Asp Leu Ala Ala Arg Asn Val Leu Val Thr His Gly Lys Val Val
1 5 10 15

Lys Ile Cys Asp Phe Gly Leu Ala Arg Tyr Tyr Ile Met Ser Asp Ser
20 25 30

Asn Tyr Val Val Arg Gly Asn Ala Arg Leu Pro Val Lys Trp Met Ala
35 40 45

Pro Glu Ser Leu
50

<210> 1220
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 1220
Arg Asp Leu Ala Ala Arg Asn Val Leu Val Thr His Gly Lys Val Val
1 5 10 15

Lys Ile Cys Asp Phe Gly Leu Ala Arg Glu Glu Ile Met Ser Asp Ser
20 25 30

Asn Tyr Val Val Arg Gly Asn Ala Arg Leu Pro Val Lys Trp Met Ala
35 40 45

Pro Glu Ser Leu
50

<210> 1221
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<212> PRT
<213> 人工序列

<220>
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<400> 1221
Cys Leu Glu Ala Leu Arg Leu Glu Glu Lys Glu Val Arg His His Arg
1 5 10 15

Ile Leu Glu Ala Lys Ser Ile Gln Thr Phe Phe Pro Thr Glu Glu Gly
20 25 30

Gly Val Leu Thr Leu Pro Pro Val Asp Gly Leu Pro Gly Arg Pro Pro
35 40 45

Cys Pro Pro Gly
50

<210> 1222
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 1222
Gly Ile Pro Leu Pro Pro Pro Leu Pro Gly Ala Gly Ile Pro Pro Pro
1 5 10 15

Pro Pro Leu Pro Gly Ala Gly Ile Pro Thr Thr Pro Pro Pro Leu Pro
20 25 30

Gly Ala Gly Ile Pro Pro Pro Pro Pro Leu Pro Gly Ala Gly Ile Pro
35 40 45

Pro Pro Pro Pro
50

<210> 1223
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 1223
His Phe Leu Asp Lys Ala Gly Ser Val Ser Leu Asp Ser Val Leu Ala
1 5 10 15

Asp Val Arg Ser Leu Gln Arg Gly Leu Gln Gln Leu Thr Gln Arg Glu
20 25 30

Phe Val Arg Gln Asp Asp Cys Met Val Leu Lys Glu Phe Leu Arg Ala
35 40 45

Asn Ser Pro Thr
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<210> 1224
<211> 49
<212> PRT
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<400> 1224
Ala Ile Leu Thr Gln Trp Asp Arg Ser Leu Lys Pro Met Gln Thr Arg
1 5 10 15

Val Val Gly Arg Leu Gln Lys Pro Cys Leu Leu Phe Phe His Trp Leu
20 25 30

Lys Leu Phe Ala Ile Pro Ile Leu Leu Ile Ala Val Phe Leu Val Leu
35 40 45

Thr

<210> 1225
<211> 52
<212> PRT
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<220>
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<400> 1225
Gln Lys Ile Pro Pro Val Asn Thr Asn Leu Glu Asn Leu Tyr Leu Gln
1 5 10 15

Gly Asn Arg Ile Asn Glu Phe Ser Ile Arg Arg Ser Phe Cys Thr Val
20 25 30

Val Asp Val Val Asn Phe Ser Lys Leu Gln Val Leu Arg Leu Asp Gly
35 40 45

Asn Glu Ile Lys
50

<210> 1226
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 1226
Arg Gly Glu Trp Lys Cys Glu Arg His Thr Ser Val Gln Thr Thr Ser
1 5 10 15

Ser Gly Ser Gly Pro Phe Thr Asp Val Cys Cys Ala Ala Val Tyr Gln
20 25 30

Pro Gln Pro His Pro Gln Pro Pro Pro Tyr Gly His Cys Val Thr Asp
35 40 45

Ser Gly Val Val
50

<210> 1227
<211> 56
<212> PRT
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<400> 1227
Pro Glu Pro Asp Thr Glu Pro Asp Ser Thr Ala Ala Val Pro Ser Gln
1 5 10 15

Pro Ala Pro Ser Ala Ala Thr Thr Thr Ala Val Thr Ala Ala Ala Ala
20 25 30

Ser Asp Asp Ser Pro Ser Glu Asp Glu Gln Glu Ala Val Gln Glu Val
35 40 45

Pro Arg Val Val Gln Asn Pro Pro
50 55

<210> 1228
<211> 52
<212> PRT
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多肽"

<220>
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<400> 1228
Gln Gly Thr Ser His Arg Pro Ser Leu Pro Ala Ser Leu Asn Asp Asn
1 5 10 15

Asp Leu Val Asp Ser Asp Glu Asp Glu His His Ala Val Gly Ser Leu
20 25 30

His Pro Lys Gly Ala Phe Ala Gln Pro Arg Pro Ala Leu Ser Pro Ser
35 40 45

Arg Gln Ser Pro
50

<210> 1229
<211> 53
<212> PRT

<213> 人工序列

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多肽"

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<400> 1229
Ala Pro Gly Lys Ser Glu Pro Pro Ser Lys Arg Pro Leu Ser Ser Lys
1 5 10 15

Ser Gln Gln Ser Val Ser Ala Glu Asp Glu Glu Glu Asp Ala Gly Phe
20 25 30

Phe Lys Gly Gly Lys Glu Asp Leu Leu Ser Ser Ser Val Pro Lys Trp
35 40 45

Pro Ser Ser Ser Thr
50

<210> 1230
<211> 36
<212> PRT
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<400> 1230
Asn Leu Thr Lys Glu Leu Lys Ser Pro Asp Glu Gly Phe Glu Gly Lys
1 5 10 15

Ser Leu Tyr Glu Ser Trp Thr Lys Lys Val Leu Pro Gln Ser Ser Val
20 25 30

Ala Cys Pro Gly
35

<210> 1231
<211> 52
<212> PRT
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<220>
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<400> 1231
His Pro Gln Glu Met Lys Thr Tyr Ser Val Ser Phe Asp Ser Leu Phe
1 5 10 15

Ser Ala Val Lys Asn Phe Thr Glu Ile Ser Ser Ser Lys Phe Ser Glu
20 25 30

Arg Leu Gln Asp Phe Asp Lys Ser Asn Pro Ile Val Leu Arg Met Met
35 40 45

Asn Asp Gln Leu
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<210> 1232
<211> 45
<212> PRT
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<220>
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<400> 1232
Gly Gln Phe Cys Ser Asn Ser Ser Ser Ile Arg Arg Thr Ala Pro Thr
1 5 10 15

Ala Ala Leu Pro Pro Arg Ala Arg Cys Gly Arg Ala Pro Val Gly Leu
20 25 30

Val Gly Ala Ala Glu Val Ser Gly Ser Gly Gly Gly Leu
35 40 45

<210> 1233
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1233
Ser Gly Ile Tyr Ala His Ile Thr Lys His Tyr Pro Tyr Tyr Arg Thr
1 5 10 15

Ala Asp Lys Gly Trp Gln Asn Ser Ile Trp Trp His Asn Leu Ser Leu
20 25 30

Asn Arg Tyr Phe Ile Lys Val Pro Arg Ser Gln Glu Glu Pro Gly Lys
35 40 45

Gly Ser Phe Trp
50

<210> 1234
<211> 66
<212> PRT
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<220>
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<400> 1234
Asn Leu Leu Lys Ser Phe Gly Glu Ser Val Leu Arg Ser Val Ser Pro
1 5 10 15

Val Gln Asp Leu Asp Asp Asp Thr Pro His Pro Leu Pro Thr Leu Thr
20 25 30

Cys Pro Thr Met Pro Gly Arg Thr Pro Thr Ala Asn Pro Pro Thr Pro
35 40 45

Ser Ala Ala Ser Tyr Leu Trp Pro Ser Arg Thr Leu Gln Pro Ser Ala
50 55 60

Cys Gln
65

<210> 1235
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1235
Arg Ser Lys Pro Tyr Thr Arg Arg Pro Lys Pro Pro Tyr Ser Tyr Ile
1 5 10 15

Ala Leu Ile Ala Met Ala Ile Arg Asp Leu Leu Ala Gly Gly Arg Leu
20 25 30

Thr Leu Ala Glu Ile Asn Glu Tyr Leu Met Gly Lys Phe Pro Phe Phe
35 40 45

Arg Gly Ser Tyr
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<210> 1236
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.R136L"

<400> 1236
Ser Val Gly Gly Ile Cys Gln Gln Phe Ser Leu Pro Glu Asn Ile Gln
1 5 10 15

Leu Ser Leu Phe Ser Ala Ser Phe Leu Leu Leu Asn Ile Asn Glu Tyr
20 25 30

Leu Ala Val Val Asp Ala Pro Pro Leu Asp Leu Arg Phe Asn Pro Ser
35 40 45

Gly Tyr Leu Leu
50

<210> 1237
<211> 48
<212> PRT

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<400> 1237
Met Ser Arg Ala Arg Ser His Leu Arg Ala Ala Leu Phe Leu Ala Ala
1 5 10 15

Ala Ser Ala Arg Gly Val Val Thr Thr Gln Val Ala Ala Arg Arg Gly
20 25 30

Leu Ser Ala Trp Pro Val Pro Gln Glu Pro Ser Met Glu Tyr Gln Asp
35 40 45

<210> 1238
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1238
Asn Val Ile Asn Ile Asn His Gln Gly Arg Asp Gly His Thr Gly Leu
1 5 10 15

His Ser Ala Cys Tyr His Gly His Ile His His Leu Val Gln Phe Leu
20 25 30

Leu Asp Asn Gly Ala Asp Met Asn Leu Val Ala Cys Asp Pro Ser Arg
35 40 45

Ser Ser Gly Glu
50

<210> 1239
<211> 52
<212> PRT
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多肽"

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<400> 1239
Pro Leu Val Val Leu Gly Val Thr Phe Val Leu Gly Val Leu Gly Asn
1 5 10 15

Gly Leu Val Ile Trp Val Ala Gly Phe Gln Gln Met Thr Arg Thr Val
20 25 30

Thr Thr Ile Cys Tyr Leu Asn Leu Ala Leu Ala Asp Phe Ser Phe Thr
35 40 45

Ala Thr Leu Pro
50

<210> 1240
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1240
Phe Met Ser Ser Asn Ala Ser Glu Val Lys Arg Ile Pro Glu Gly Glu
1 5 10 15

Lys Trp Glu Asp Gly Pro Cys Lys Val Phe Phe Glu Cys Arg Gly Ala
20 25 30

Gln Val Thr Cys Tyr Glu Pro Ser Cys Pro Pro Cys Pro Val Gly Thr
35 40 45

Leu Ala Leu Glu
50

<210> 1241
<211> 53
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.E86del"

<400> 1241
Ala Ile Glu Met Asp Lys Gly Thr Tyr Ile His Ala Leu Asp Asn Gly
1 5 10 15

Leu Phe Thr Leu Gly Ala Pro His Lys Val Asp Glu Gly Pro Ser Pro
20 25 30

Pro Glu Gln Phe Thr Ala Val Lys Leu Ser Asp Ser Arg Ile Ala Leu
35 40 45

Lys Ser Gly Tyr Gly
50

<210> 1242
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.I34T"

<400> 1242
Arg Ile Ala Leu Lys Ser Gly Tyr Gly Lys Tyr Leu Gly Ile Asn Ser
1 5 10 15

Asp Glu Leu Val Gly His Ser Asp Ala Thr Thr Gly Pro Arg Glu Gln
20 25 30

Trp Glu Pro Val Phe Gln Asn Gly Lys Met Ala Leu Leu Ala Ser Asn
35 40 45

Ser Cys Phe Ile
50

<210> 1243
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R37K"

<400> 1243
Leu Lys Ser Gly Tyr Gly Lys Tyr Leu Gly Ile Asn Ser Asp Glu Leu
1 5 10 15

Val Gly His Ser Asp Ala Ile Gly Pro Lys Lys Glu Gln Trp Glu Pro
20 25 30

Val Phe Gln Asn Gly Lys Met Ala Leu Leu Ala Ser Asn Ser Cys Phe
35 40 45

Ile Arg Cys Asn
50

<210> 1244
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.Q39K"

<400> 1244
Ser Gly Tyr Gly Lys Tyr Leu Gly Ile Asn Ser Asp Glu Leu Val Gly
1 5 10 15

His Ser Asp Ala Ile Gly Pro Arg Glu Lys Lys Trp Glu Pro Val Phe
20 25 30

Gln Asn Gly Lys Met Ala Leu Leu Ala Ser Asn Ser Cys Phe Ile Arg
35 40 45

Cys Asn Glu Ala
50

<210> 1245
<211> 52
<212> PRT

<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.P42Q"

<400> 1245
Gly Lys Tyr Leu Gly Ile Asn Ser Asp Glu Leu Val Gly His Ser Asp
1 5 10 15

Ala Ile Gly Pro Arg Glu Gln Trp Glu Gln Gln Val Phe Gln Asn Gly
20 25 30

Lys Met Ala Leu Leu Ala Ser Asn Ser Cys Phe Ile Arg Cys Asn Glu
35 40 45

Ala Gly Asp Ile
50

<210> 1246
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1246
Ser Asp Glu Leu Val Gly His Ser Asp Ala Ile Gly Pro Arg Glu Gln
1 5 10 15

Trp Glu Pro Val Phe Gln Asn Gly Lys Val Val Ala Leu Leu Ala Ser
20 25 30

Asn Ser Cys Phe Ile Arg Cys Asn Glu Ala Gly Asp Ile Glu Ala Lys
35 40 45

Ser Lys Thr Ala
50

<210> 1247
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.A50P"

<400> 1247
Asp Glu Leu Val Gly His Ser Asp Ala Ile Gly Pro Arg Glu Gln Trp
1 5 10 15

Glu Pro Val Phe Gln Asn Gly Lys Met Pro Pro Leu Leu Ala Ser Asn
20 25 30

Ser Cys Phe Ile Arg Cys Asn Glu Ala Gly Asp Ile Glu Ala Lys Ser
35 40 45

Lys Thr Ala Gly
50

<210> 1248
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.L52S"

<400> 1248
Leu Val Gly His Ser Asp Ala Ile Gly Pro Arg Glu Gln Trp Glu Pro
1 5 10 15

Val Phe Gln Asn Gly Lys Met Ala Leu Ser Ser Ala Ser Asn Ser Cys
20 25 30

Phe Ile Arg Cys Asn Glu Ala Gly Asp Ile Glu Ala Lys Ser Lys Thr
35 40 45

Ala Gly Glu Glu
50

<210> 1249
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.A53T"

<400> 1249
Val Gly His Ser Asp Ala Ile Gly Pro Arg Glu Gln Trp Glu Pro Val
1 5 10 15

Phe Gln Asn Gly Lys Met Ala Leu Leu Thr Thr Ser Asn Ser Cys Phe
20 25 30

Ile Arg Cys Asn Glu Ala Gly Asp Ile Glu Ala Lys Ser Lys Thr Ala
35 40 45

Gly Glu Glu Glu
50

<210> 1250
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.N55D"

<400> 1250
His Ser Asp Ala Ile Gly Pro Arg Glu Gln Trp Glu Pro Val Phe Gln
1   5   10   15

Asn Gly Lys Met Ala Leu Leu Ala Ser Asp Asp Ser Cys Phe Ile Arg
            20   25   30

Cys Asn Glu Ala Gly Asp Ile Glu Ala Lys Ser Lys Thr Ala Gly Glu
        35   40   45

Glu Glu Met Ile
    50

<210> 1251
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.I59V"

<400> 1251
Ile Gly Pro Arg Glu Gln Trp Glu Pro Val Phe Gln Asn Gly Lys Met
1   5   10   15

Ala Leu Leu Ala Ser Asn Ser Cys Phe Val Val Arg Cys Asn Glu Ala
            20   25   30

Gly Asp Ile Glu Ala Lys Ser Lys Thr Ala Gly Glu Glu Glu Met Ile
        35   40   45

Lys Ser Leu Ser
    50

<210> 1252
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.G65E"

<400> 1252
Trp Glu Pro Val Phe Gln Asn Gly Lys Met Ala Leu Leu Ala Ser Asn
1   5   10   15

Ser Cys Phe Ile Arg Cys Asn Glu Ala Glu Glu Asp Ile Glu Ala Lys
            20   25   30

Ser Lys Thr Ala Gly Glu Glu Glu Met Ile Lys Ser Leu Ser His Ser
        35   40   45

Leu Pro Ser Ser
    50

<210> 1253
<211> 36
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.I10T"

<400> 1253
Met Ala Val Lys Leu Ser Asp Ser Arg Thr Thr Ala Leu Lys Ser Gly
1 5 10 15

Tyr Gly Lys Tyr Leu Gly Ile Asn Ser Asp Glu Leu Val Gly His Ser
20 25 30

Asp Ala Ile Gly
35

<210> 1254
<211> 37
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.A11T"

<400> 1254
Met Ala Val Lys Leu Ser Asp Ser Arg Ile Thr Thr Leu Lys Ser Gly
1 5 10 15

Tyr Gly Lys Tyr Leu Gly Ile Asn Ser Asp Glu Leu Val Gly His Ser
20 25 30

Asp Ala Ile Gly Pro
35

<210> 1255
<211> 39
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1255
Met Ala Val Lys Leu Ser Asp Ser Arg Ile Ala Leu Asn Asn Ser Gly
1 5 10 15

Tyr Gly Lys Tyr Leu Gly Ile Asn Ser Asp Glu Leu Val Gly His Ser
20 25 30

Asp Ala Ile Gly Pro Arg Glu
35

<210> 1256
<211> 46
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.L20P"

<400> 1256
Met Ala Val Lys Leu Ser Asp Ser Arg Ile Ala Leu Lys Ser Gly Tyr
1 5 10 15

Gly Lys Tyr Pro Pro Gly Ile Asn Ser Asp Glu Leu Val Gly His Ser
20 25 30

Asp Ala Ile Gly Pro Arg Glu Gln Trp Glu Pro Val Phe Gln
35 40 45

<210> 1257
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D32V"

<400> 1257
Asp Ser Arg Ile Ala Leu Lys Ser Gly Tyr Gly Lys Tyr Leu Gly Ile
1 5 10 15

Asn Ser Asp Glu Leu Val Gly His Ser Val Val Ala Ile Gly Pro Arg
20 25 30

Glu Gln Trp Glu Pro Val Phe Gln Asn Gly Lys Met Ala Leu Leu Ala
35 40 45

Ser Asn Ser Cys
50

<210> 1258
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.D142Y"

<400> 1258
Glu Cys Ser Leu Ser Leu Asn Lys Lys Ser Arg Ser Ser Thr Pro Val
1 5 10 15

His Asn Ser Glu Ile Gln Glu Thr Cys Tyr Tyr Ala His His Arg Gly
20 25 30

Arg Ser Arg Ala Cys Thr Gly Arg Ser Lys Arg His Arg Ser Arg Ala
35 40 45

Leu Gly Val Gln
50

<210> 1259
<211> 32
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P1005fs"

<400> 1259
Cys Lys Ala Thr Ser Ala Ala Leu Pro Gln Ser Gln Arg Ser Ser Thr
1 5 10 15

Pro Ser Ser Glu Ile Gly Ala Thr Pro Gln Ala Ala Pro Thr Thr Ser
20 25 30

<210> 1260
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.E1093Q"

<400> 1260
Ala Pro Lys Tyr Thr Glu Pro Leu Leu Ser Pro Arg Asp Glu Pro Arg
1 5 10 15

Ser Asp Glu Cys Gly Ile Asn Pro Gly Gln Gln Lys Ile Ala Ser Ile
20 25 30

Pro Thr Lys Glu Glu Pro Gln Gly Gln Leu Ser Leu Glu Arg Asp Arg
35 40 45

Glu Val Thr Asn
50

<210> 1261
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.L47S"

<400> 1261
Lys Val Ile Asn Val Asp Asp Asp Gly Asn Glu Leu Gly Ser Gly Ile
1 5 10 15

Met Glu Leu Thr Asp Thr Glu Leu Ile Ser Ser Tyr Thr Arg Lys Arg
20 25 30

Asp Ser Val Lys Trp His Tyr Leu Cys Leu Arg Arg Tyr Gly Tyr Asp
35 40 45

Ser Asn Leu Phe
50

<210> 1262
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T43N"

<400> 1262
Cys Asn Ser Cys Glu Leu Thr Asn Ile Thr Ile Ala Ile Glu Lys Glu
1 5 10 15

Glu Cys Arg Phe Cys Ile Ser Ile Asn Asn Asn Thr Trp Cys Ala Gly
20 25 30

Tyr Cys Tyr Thr Arg Asp Leu Val Tyr Lys Asp Pro Ala Arg Pro Lys
35 40 45

Ile Gln Lys Thr
50

<210> 1263
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R430C"

<400> 1263
Gln Ser Gly Ala Arg Ile Glu Leu Gln Arg Asn Pro Pro Pro Asn Ala
1 5 10 15

Asp Pro Asn Met Lys Leu Phe Thr Ile Cys Cys Gly Thr Pro Gln Gln
20 25 30

Ile Asp Tyr Ala Arg Gln Leu Ile Glu Glu Lys Ile Gly Gly Pro Val
35 40 45

Asn Pro Leu Gly
50

<210> 1264
<211> 282
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S140fs"

<400> 1264
Asn Pro Ser Ala Gln Leu Pro Arg Ser Pro Arg Arg Gln Gly Gln Arg
1 5 10 15

Trp Ile Trp Phe Ser Met Glu Ser Pro Lys Pro Leu Leu Ala Ala Glu
20 25 30

Ser His Gly Arg Ile Leu Gln Ser His His Val Leu Pro Gln Arg Leu
35 40 45

Arg His Leu His Ala Leu Arg Leu Ala Gly Ala Val Val Arg Pro Ala
50 55 60

Cys Pro Pro Thr Ala Gln Pro Leu Gly Gln Asp Arg Ala Gly Gly Leu
65 70 75 80

Gly Ser Val Gln Leu Gly Ala Lys Leu Arg Gln Gly Ala Leu Leu Pro
85 90 95

Glu Pro Ala Gly Pro Ser Gln Gly Gly Arg Val Arg Thr Leu Pro Gln
100 105 110

Ala Pro Ala Pro Gly Asn His Asp Gly Asp Ala Val Pro Val Gln Val
115 120 125

Leu Ser Gly Leu Arg Glu Leu Leu Ala Pro Arg Leu His His Arg Glu
130 135 140

Ala Val Glu Glu Arg Pro Gly Gly Leu Gly Arg Ala Arg Gly Ala Gly
145 150 155 160

Pro Gln Gln Lys Gln Leu Arg Glu Val Pro Ala Thr Arg Arg Leu His
165 170 175

Pro Arg Gly Arg Leu Pro Glu Pro Gln Gly Pro Gly Pro Val Pro Ala
180 185 190

Gly Ala Gly Gln Gly Pro Arg Pro Leu Pro Glu Leu Leu Ser Leu Ala
195 200 205

Gly Asp Ala Ala Ala Ser Leu Leu Gln Leu Gly Thr Arg Phe Leu Gln
210 215 220

Gly Leu Leu Glu Thr Ala Gly Gly Ile Gln Val Pro Asp Thr Arg His
225 230 235 240

Ser Gly Leu Val His Leu Arg Gly Trp Cys Gly Ala Trp Ala Ala Arg
245 250 255

Asn Leu Ile Phe Leu Gly Pro His Leu Ser Gly Gly Leu Ile Tyr Leu
260 265 270

Arg Thr Arg Leu Pro Glu Ala Ser Pro Ala
275 280

<210> 1265
<211> 68
<212> PRT

<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G324fs"

<400> 1265
Asn Gln Glu Glu Leu Ala Ser Gly Thr Pro Pro Ala Arg Phe Pro Lys
1 5 10 15

Ala Pro Ser Lys Leu Thr Val Gly Gly His Gly Ala Lys Val Arg Lys
20 25 30

Arg Lys Arg Glu Thr Arg Ile Gln Pro Pro Arg Asn Arg Ser His Cys
35 40 45

Leu Pro Cys Leu Pro Trp Val His Leu His Gln Asn Pro Thr Asp His
50 55 60

Gln Met Leu Thr
65

<210> 1266
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D367N"

<400> 1266
Leu Thr Ile Ile Leu Leu Ala Met Asn Lys Ile Glu Gly Asp Asn Ile
1 5 10 15

Ser Gly Val Cys Phe Val Gly Leu Tyr Asn Asn Val Asp Ala Leu Arg
20 25 30

Tyr Phe Val Leu Ala Pro Leu Cys Leu Tyr Val Val Val Gly Val Ser
35 40 45

Leu Leu Leu Ala
50

<210> 1267
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R416Q"

<400> 1267
Ile Ser Leu Asn His Val Arg Gln Val Ile Gln His Asp Gly Arg Asn
1 5 10 15

Gln Glu Lys Leu Lys Lys Phe Met Ile Gln Gln Ile Gly Val Phe Ser
20 25 30

Gly Leu Tyr Leu Val Pro Leu Val Thr Leu Leu Gly Cys Tyr Val Tyr
35 40 45

Glu Gln Val Asn
50

<210> 1268
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R73H"

<400> 1268
Leu Ser Pro Lys His Ala Pro Asp Ile Pro Asp Asp Ser Thr Asp Asn
1 5 10 15

Ile Thr Ile Phe Thr Arg Ile Leu Asp His His Leu Leu Asp Gly Tyr
20 25 30

Asp Asn Arg Leu Arg Pro Gly Leu Gly Asp Ala Val Thr Glu Val Lys
35 40 45

Thr Asp Ile Tyr
50

<210> 1269
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R460Q"

<400> 1269
Pro Phe Ser Arg Ala Asn Ala Ala Glu Thr Ile Ser Ala Ala Arg Ala
1 5 10 15

Leu Pro Ser Ala Ser Pro Thr Ser Ile Gln Gln Thr Gly Tyr Met Pro
20 25 30

Arg Lys Ala Ser Val Gly Ser Ala Ser Thr Arg His Val Phe Gly Ser
35 40 45

Arg Leu Gln Arg
50

<210> 1270
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S126N"

<400> 1270
Arg Gln Ser Trp Lys Asp Glu Arg Leu Arg Phe Lys Gly Pro Met Gln
1 5 10 15

Arg Leu Pro Leu Asn Asn Leu Leu Ala Asn Asn Lys Ile Trp Thr Pro
20 25 30

Asp Thr Phe Phe His Asn Gly Lys Lys Ser Ile Ala His Asn Met Thr
35 40 45

Thr Pro Asn Lys
50

<210> 1271
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q224K"

<400> 1271
Ser Glu Val Val Tyr Val Trp Thr Asn Gly Ser Thr Lys Ser Val Val
1 5 10 15

Val Ala Glu Asp Gly Ser Arg Leu Asn Lys Lys Tyr His Leu Met Gly
20 25 30

Gln Thr Val Gly Thr Glu Asn Ile Ser Thr Ser Thr Gly Glu Tyr Thr
35 40 45

Ile Met Thr Ala
50

<210> 1272
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V314I"

<400> 1272
Ser Ala Arg His Ser Leu Pro Lys Val Ser Tyr Ala Thr Ala Met Asp
1 5 10 15

Trp Phe Ile Ala Val Cys Phe Ala Phe Ile Ile Phe Ser Ala Leu Ile
20 25 30

Glu Phe Ala Ala Val Asn Tyr Phe Thr Asn Leu Gln Thr Gln Lys Ala
35 40 45

Lys Arg Lys Ala
50

<210> 1273
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成多肽"

<220>
<221> 來源
<223> /注釋="p.R416C"

<400> 1273
Lys Ala Thr Met Tyr Ser Tyr Asp Ser Ala Ser Ile Gln Tyr Arg Lys
1 5 10 15

Pro Leu Ser Ser Arg Glu Ala Tyr Gly Cys Cys Ala Leu Asp Arg His
20 25 30

Gly Val Pro Ser Lys Gly Arg Ile Arg Arg Arg Ala Ser Gln Leu Lys
35 40 45

Val Lys Ile Pro
50

<210> 1274
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成多肽"

<220>
<221> 來源
<223> /注釋="p.D500N"

<400> 1274
Arg Ser Leu Pro His Lys Lys Thr His Leu Arg Arg Arg Ser Ser Gln
1 5 10 15

Leu Lys Ile Lys Ile Pro Asp Leu Thr Asn Asn Val Asn Ala Ile Asp
20 25 30

Arg Trp Ser Arg Ile Val Phe Pro Phe Thr Phe Ser Leu Phe Asn Leu
35 40 45

Val Tyr Trp Leu
50

<210> 1275
<211> 119
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成多肽"

<220>
<221> 來源
<223> /注釋="p.Q412fs"

<400> 1275
Gly Ser Tyr Arg Ser Val Gly Val Glu Thr Gly Glu Thr Lys Lys Glu
1 5 10 15

Gly Ala Ala Arg Ser Gly Gly Gln Gly Ala Ser Val Pro Gly Ser Gly
20 25 30

Pro Ser Thr Gln Thr Pro Leu Thr Phe Thr Pro Ala Leu Cys Ser Leu
35 40 45

Arg Arg Leu Arg Pro Ser Met Ser Ser Thr Gly Arg His Thr Pro Cys
50 55 60

Glu His Arg Thr Gln Ala Thr Leu Ala Cys Pro Gly Ala Arg Arg Gln
65 70 75 80

Leu Pro Arg Asn Phe Leu Gly Glu Arg Ala Leu Gly Leu Pro Ser Pro
85 90 95

Leu Arg Val Ser Lys Trp Asp Asp Ser Arg Pro Arg Lys Thr Arg Gly
100 105 110

Ser Leu Gly Leu Pro Glu Leu
115

<210> 1276
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E205K"

<400> 1276
Leu Arg Leu Thr Ile Asn Ala Glu Cys Tyr Leu Gln Leu His Asn Phe
1 5 10 15

Pro Met Asp Glu His Ser Cys Pro Leu Lys Lys Phe Ser Ser Tyr Gly
20 25 30

Tyr Pro Lys Asn Glu Ile Glu Tyr Lys Trp Lys Lys Pro Ser Val Glu
35 40 45

Val Ala Asp Pro
50

<210> 1277
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A368V"

<400> 1277
Val Ser Tyr Val Lys Ala Val Asp Ile Tyr Leu Trp Val Ser Phe Val
1 5 10 15

Phe Val Phe Leu Ser Val Leu Glu Tyr Val Val Ala Val Asn Tyr Leu
20 25 30

Thr Thr Val Gln Glu Arg Lys Glu Arg Lys Leu Arg Glu Lys Phe Pro
35 40 45

Cys Met Cys Gly
50

<210> 1278
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L352I"

<400> 1278
Val Ala Trp Asn Pro His Lys Met Leu Met Ala Gly Ile Gln Cys Cys
1 5 10 15

Ala Leu Leu Val Lys Asp Lys Ser Asp Ile Ile Leu Lys Lys Cys Tyr
20 25 30

Ser Ala Lys Ala Ser Tyr Leu Phe Gln Gln Asp Lys Phe Tyr Asp Val
35 40 45

Ser Tyr Asp Thr
50

<210> 1279
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A271S"

<400> 1279
Glu Ser Leu Val Leu Leu Arg Arg Leu Leu Ala Trp Asp Leu Asp Asp
1 5 10 15

Val Leu Tyr Ala Lys Leu Asn Ala Arg Ser Ser Ala Ser Ser Arg Leu
20 25 30

Ala Ala Ile Pro Ala Ala Leu Ala Arg Ala Ala Arg Thr Trp Asn Ala
35 40 45

Leu Asp Ala Gly
50

<210> 1280
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G358C"

<400> 1280
Leu Glu Ile Val Thr Cys Ser His Val Gly His Val Phe Arg Lys Ala
1 5 10 15

Thr Pro Tyr Thr Phe Pro Gly Gly Thr Cys Cys His Val Ile Asn Lys
20 25 30

Asn Asn Arg Arg Leu Ala Glu Val Trp Met Asp Glu Phe Lys Asp Phe
35 40 45

Phe Tyr Ile Ile
50

<210> 1281
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D234E"

<400> 1281
Val Asn Arg Asp Trp Leu Gln Pro Leu Leu His Arg Val Lys Glu Asp
1 5 10 15

Tyr Thr Arg Val Val Cys Pro Val Ile Glu Glu Ile Ile Asn Leu Asp
20 25 30

Thr Phe Thr Tyr Ile Glu Ser Ala Ser Glu Leu Arg Gly Gly Phe Asp
35 40 45

Trp Ser Leu His
50

<210> 1282
<211> 28
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.W317fs"

<400> 1282
Gly Ile Phe Val Ile Asp Lys Ser Trp Phe Asn His Leu Gly Lys Tyr
1 5 10 15

Asp Ala Gln Met Asp Ile Trp Gly Gly Arg Glu Phe
20 25

<210> 1283
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E395K"

<400> 1283
Ala Met Asp Arg His Tyr Phe Gln Asn Thr Gly Ala Tyr Asp Ser Leu
1 5 10 15

Met Ser Leu Arg Gly Gly Glu Asn Leu Lys Lys Leu Ser Phe Lys Ala
20 25 30

Trp Leu Cys Gly Gly Ser Val Glu Ile Leu Pro Cys Ser Arg Val Gly
35 40 45

His Ile Tyr Gln
50

<210> 1284
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A45T"

<400> 1284
Thr Ala Leu Leu Phe Ile Tyr Leu His His Asn His Val Ser Ser Trp
1 5 10 15

Gln Lys Lys Ser Gln Glu Pro Leu Ser Thr Thr Trp Ser Pro Gly Lys
20 25 30

Lys Val His Gln Gln Ile Ile Tyr Gly Ser Glu Gln Ile Pro Lys Pro
35 40 45

His Val Ile Val
50

<210> 1285
<211> 52
<212> PRT
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 1285
Leu Glu Pro Leu Leu His Ala Ile Ala Lys Asp Pro Lys Met Val Val
1 5 10 15

Cys Pro Leu Ile Asp Val Ile Asp Asp Ile Ile Thr Leu Glu Tyr Lys
20 25 30

Pro Ser Pro Leu Val Arg Gly Thr Phe Asp Trp Asn Leu Gln Phe Lys
35 40 45

Trp Asp Asn Val
50

<210> 1286
<211> 53
<212> PRT
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多肽"

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<400> 1286
Trp Gly Tyr Arg Lys Asp Arg Thr Leu Phe His Pro Val Ser Asn Ser
1 5 10 15

Cys Met Asp Cys Asn Pro Ala Glu Lys Ile Phe Met Ala Arg Cys Asp
20 25 30

Pro Leu Ser Glu Thr Gln Gln Trp Ile Phe Glu His Ile Asn Met Thr
35 40 45

Val Leu Glu Lys Phe
50

<210> 1287
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 1287
Leu Leu Leu Leu Pro Pro Arg Leu Leu Ala Arg Pro Ser Leu Leu Leu
1 5 10 15

Arg Arg Ser Leu Ser Ala Ala Ser Cys Ala Ala Pro Ile Ser Leu Pro
20 25 30

Ala Ala Ala Ser Arg Ser Ser Met Asp Gly Ala Gly Ala Glu Glu Val
35 40 45

Leu Ala Pro Leu
50

<210> 1288
<211> 31
<212> PRT
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<220>
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多肽"

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<400> 1288
Ile Glu Ser Met Gln Ile Asn Gly Ser Val Leu Lys Asn Gly Ser Leu
1   5   10   15

Thr Asn His Phe Ser Phe Glu Lys Lys Arg Pro Glu Trp Leu Ser
            20   25   30

<210> 1289
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1289
Ala Ala Pro Thr Leu Val Gln Leu Glu Glu Glu Ile Glu Glu Glu Val
1   5   10   15

Arg Arg Glu Leu Ala Leu Pro Pro Pro Ala Ala Pro Ser Pro Pro Ala
            20   25   30

Pro Pro Arg Arg Gln Pro Cys His Phe Arg Asn Leu Asp Gln Met Val
        35   40   45

Gln Ser Leu Val
    50

<210> 1290
<211> 73
<212> PRT
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多肽"

<220>
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<400> 1290
Cys Asp Arg Lys Gly Thr Gln Ala Cys Gln Asp Leu Met Gly Asn Phe
1   5   10   15

Phe Cys Leu Cys Lys Ala Gly Trp Gly Ala Gly Ser Ala Thr Lys Met
            20   25   30

Ser Thr Asn Ala Ala Arg Arg Thr Gly Ala Ala Ser Arg Ser Ala Thr
        35   40   45

Thr Ser Arg Val Ala Ser Thr Val Pro Ala Thr Ala Ala Ser Ser Ser
    50   55   60

Pro Leu Met Ala Gly Pro Ala Lys Thr
65   70

<210> 1291
<211> 52
<212> PRT

<213> 人工序列

<220>
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多肽"

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<223> /注釋="p.R313S"

<400> 1291
Glu Glu Met Ser Glu Met Gln Lys Gln Leu Ala Asn Tyr Glu Arg Asp
1 5 10 15

Lys Gln Ile Leu Leu Cys Thr Lys Ala Ser Ser Leu Lys Val Arg Glu
20 25 30

Lys Glu Leu Lys Asp Leu Gln Trp Glu His Glu Val Leu Glu Gln Arg
35 40 45

Phe Thr Lys Val
50

<210> 1292
<211> 41
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.N334fs"

<400> 1292
Ala Arg Arg Ala Gly Thr Ser Cys Ala Asn Cys Gln Thr Thr Thr Thr
1 5 10 15

Thr Leu Trp Arg Arg Asn Ala Asn Gly Gly Pro Cys Leu Gln Cys Leu
20 25 30

Trp Ala Leu Leu Gln Ala Ser Gln Tyr
35 40

<210> 1293
<211> 131
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<400> 1293
Cys Lys Lys Val His Asp Ser Leu Glu Asp Phe Pro Lys Asn Ser Ser
1 5 10 15

Phe Asn Pro Ala Ala Leu Ser Arg His Asn Val Leu Pro Glu Pro His
20 25 30

Leu Ala Leu Gln Pro Leu Gln Pro His Ala Asp His Ala His Ala Asp
35 40 45

Ala Pro Ala Ile Gln Pro Val Leu Trp Thr Thr Pro Pro Leu Gln His
50 55 60

Gly His Arg His Gly Leu Glu Pro Cys Ser Met Leu Thr Gly Pro Pro
65 70 75 80

Ala Arg Val Pro Ala Val Pro Phe Asp Leu His Phe Cys Arg Ser Ser
85 90 95

Ile Met Lys Pro Lys Arg Asp Gly Tyr Met Phe Leu Lys Ala Glu Ser
100 105 110

Lys Ile Met Phe Ala Thr Leu Gln Arg Ser Ser Leu Trp Cys Leu Cys
115 120 125

Ser Asn His
130

<210> 1294
<211> 123
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 1294
Glu Asp Phe Pro Lys Asn Ser Ser Phe Asn Pro Ala Ala Leu Ser Arg
1 5 10 15

His Met Ser Ser Leu Ser His Ile Ser Ala Leu Gln Pro Leu Gln Pro
20 25 30

His Ala Asp His Ala His Ala Asp Ala Pro Ala Ile Gln Pro Val Leu
35 40 45

Trp Thr Thr Pro Pro Leu Gln His Gly His Arg His Gly Leu Glu Pro
50 55 60

Cys Ser Met Leu Thr Gly Pro Pro Ala Arg Val Pro Ala Val Pro Phe
65 70 75 80

Asp Leu His Phe Cys Arg Ser Ser Ile Met Lys Pro Lys Arg Asp Gly
85 90 95

Tyr Met Phe Leu Lys Ala Glu Ser Lys Ile Met Phe Ala Thr Leu Gln
100 105 110

Arg Ser Ser Leu Trp Cys Leu Cys Ser Asn His
115 120

<210> 1295
<211> 123
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

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<221> 來源
<223> /注釋="p.S408fs"

<400> 1295
Glu Asp Phe Pro Lys Asn Ser Ser Phe Asn Pro Ala Ala Leu Ser Arg
1 5 10 15

His Met Ser Ser Leu Ser His Ile Ser Ala Leu Gln Pro Leu Gln Pro
20 25 30

His Ala Asp His Ala His Ala Asp Ala Pro Ala Ile Gln Pro Val Leu
35 40 45

Trp Thr Thr Pro Pro Leu Gln His Gly His Arg His Gly Leu Glu Pro
50 55 60

Cys Ser Met Leu Thr Gly Pro Pro Ala Arg Val Pro Ala Val Pro Phe
65 70 75 80

Asp Leu His Phe Cys Arg Ser Ser Ile Met Lys Pro Lys Arg Asp Gly
85 90 95

Tyr Met Phe Leu Lys Ala Glu Ser Lys Ile Met Phe Ala Thr Leu Gln
100 105 110

Arg Ser Ser Leu Trp Cys Leu Cys Ser Asn His
115 120

<210> 1296
<211> 100
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.S430fs"

<400> 1296
Ile Ser Pro Phe Ser His Ser Ser His Met Leu Thr Thr Pro Thr Pro
1 5 10 15

Met His Pro Pro Ser Ser Leu Ser Phe Trp Thr Thr Pro Pro Leu Gln
20 25 30

His Gly His Arg His Gly Leu Glu Pro Cys Ser Met Leu Thr Gly Pro
35 40 45

Pro Ala Arg Val Pro Ala Val Pro Phe Asp Leu His Phe Cys Arg Ser
50 55 60

Ser Ile Met Lys Pro Lys Arg Asp Gly Tyr Met Phe Leu Lys Ala Glu
65 70 75 80

Ser Lys Ile Met Phe Ala Thr Leu Gln Arg Ser Ser Leu Trp Cys Leu
85 90 95

Cys Ser Asn His
100

<210> 1297
<211> 97
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.H434fs"

<400> 1297
Phe Ser His Ser Ser His Met Leu Thr Thr Pro Thr Pro Met His Pro
1 5 10 15

Pro Ser Ser Leu Ser Phe Gly Pro His Pro Pro Leu Gln His Gly His
20 25 30

Arg His Gly Leu Glu Pro Cys Ser Met Leu Thr Gly Pro Pro Ala Arg
35 40 45

Val Pro Ala Val Pro Phe Asp Leu His Phe Cys Arg Ser Ser Ile Met
50 55 60

Lys Pro Lys Arg Asp Gly Tyr Met Phe Leu Lys Ala Glu Ser Lys Ile
65 70 75 80

Met Phe Ala Thr Leu Gln Arg Ser Ser Leu Trp Cys Leu Cys Ser Asn
85 90 95

His

<210> 1298
<211> 95
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.H435fs"

<400> 1298
His Ser Ser His Met Leu Thr Thr Pro Thr Pro Met His Pro Pro Ser
1 5 10 15

Ser Leu Ser Phe Gly Pro His His Pro Leu Gln His Gly His Arg His
20 25 30

Gly Leu Glu Pro Cys Ser Met Leu Thr Gly Pro Pro Ala Arg Val Pro
35 40 45

Ala Val Pro Phe Asp Leu His Phe Cys Arg Ser Ser Ile Met Lys Pro
50 55 60

Lys Arg Asp Gly Tyr Met Phe Leu Lys Ala Glu Ser Lys Ile Met Phe
65 70 75 80

Ala Thr Leu Gln Arg Ser Ser Leu Trp Cys Leu Cys Ser Asn His
85 90 95

<210> 1299
<211> 28
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.M443I"

<400> 1299
Thr Thr Pro Thr Pro Met His Pro Pro Ser Ser Leu Ser Phe Gly Pro
1 5 10 15

His His Pro Ser Ser Met Val Thr Ala Ile Ile Gly
20 25

<210> 1300
<211> 48
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.L328fs"

<400> 1300
Arg Arg Leu Ser Ala Ala Arg Arg Ala Gly Thr Ser Cys Ala Asn Cys
1 5 10 15

Gln Thr Thr Thr Thr Thr Leu Trp Arg Leu Glu Glu Glu Cys Gln Trp
20 25 30

Gly Pro Cys Leu Gln Cys Leu Trp Ala Leu Leu Gln Ala Ser Gln Tyr
35 40 45

<210> 1301
<211> 36
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G431fs"

<400> 1301
Gln Ala Glu Leu Lys Arg Leu Ser Glu Leu Leu Thr Glu Ser Ile Ser
1 5 10 15

Arg Gly Thr Phe Phe Val Pro Gly Gly Ala Gln Tyr Leu Leu Arg Ser
20 25 30

Lys Lys Glu Asp
35

<210> 1302
<211> 33
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L389fs"

<400> 1302
Val Ser Leu Leu Lys Arg Asn Asn Cys Gly Lys Ala Leu Asp Ile Ala
1 5 10 15

Arg Gln Ala Arg Asp Met Leu Gly Gly Met Gly Phe Leu Thr Ser Ile
20 25 30

Thr

<210> 1303
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R82C"

<400> 1303
Glu Glu Gln Leu Thr Thr Asp Glu Ile Leu Ile Arg Asp Thr Phe Arg
1 5 10 15

Thr Tyr Cys Gln Glu Arg Leu Met Pro Cys Cys Ile Leu Leu Ala Asn
20 25 30

Arg Asn Glu Val Phe His Arg Glu Ile Ile Ser Glu Met Gly Glu Leu
35 40 45

Gly Val Leu Gly
50

<210> 1304
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T307A"

<400> 1304
Arg Val Leu Lys Arg Lys Thr Phe Asn Lys Val Leu Gly His Val Asn
1 5 10 15

Asn Ile Leu Ile Ser Ala Val Leu Pro Ala Ala Ala Phe Arg Val Ala
20 25 30

Lys Lys Arg Ala Pro Lys Val Leu Gly Thr Thr Leu Val Val Gly Leu
35 40 45

Leu Ala Gly Val
50

<210> 1305
<211> 103
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.E105fs"

<400> 1305
Gly Gln Thr Gly Gly Leu Thr Gln Pro Lys Lys Asp Glu Pro Lys Lys
1 5 10 15

Leu Pro Pro Arg Pro Gly Gly Pro Glu Thr Gln Ala Arg Thr Pro Ser
20 25 30

Pro Asn Lys Ala Gly Tyr Ser Pro Asp Cys Asp Pro Lys Arg Thr Ala
35 40 45

Ser Arg Arg Gln Gly Thr Pro Lys Ser Arg Ile Cys Pro Gln Leu Leu
50 55 60

Pro Ala Glu Glu Gly Gln Gly Ala Arg Ala Pro Thr Arg Ala Gln Gly
65 70 75 80

Ala Val Ser Pro Thr Pro His His Thr Pro Arg Val His Ala Leu Ala
85 90 95

Val Gln Asp Ala Val Arg Cys
100

<210> 1306
<211> 88
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.G593fs"

<400> 1306
Ser Val Cys Ser Asp Asn Ser Tyr Asp Thr Tyr Ala Asn Ser Thr Ala
1 5 10 15

Thr Pro Val Gly Pro Arg Gly Gly Gly Gln Pro His Gln Asp Pro His
20 25 30

Arg Ala Glu Trp Ala Leu Ala Glu Asp Met Ser Val Pro Pro Val Pro
35 40 45

Asp Thr Glu Ala Gly Glu Pro Arg Arg Ala Gly Gly Ser Val Ser Glu
50 55 60

Leu Gly Val Leu Trp Glu Arg Ala Pro Gln Pro Pro Cys Gly Leu Gln
65 70 75 80

Pro Leu Val Ser Arg Ser Leu Ser
85

<210> 1307
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.R268L"

<400> 1307
Arg Asp Ser Lys Glu Lys Asn Glu Arg Arg Leu Ala Tyr Gln Lys Arg
1 5 10 15

Lys Glu Ser Met Pro Arg Lys Ala Arg Leu Leu Phe Trp Gly Lys Ile
20 25 30

Val Ala Lys Asn Asn Lys Asn Met Ala Phe Lys Leu Lys Ser Lys Ser
35 40 45

Cys His Asp Leu
50

<210> 1308
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S509L"

<400> 1308
Val Met Ser Phe Gln Ser His Met Thr Leu Lys Pro Thr Cys Glu Ile
1 5 10 15

Phe His Lys Gln Asn Ser Lys Leu Asn Leu Leu Gly Ile Ser Pro Asp
20 25 30

Pro Thr Leu Pro Gln Glu Ser Ile Ser Ala Ser Leu Asn Ser Leu Leu
35 40 45

Leu Pro Lys Asn
50

<210> 1309
<211> 28
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.A17fs"

<400> 1309
Met Arg Leu Leu Gly Ala Ala Ala Val Ala Ala Leu Gly Arg Gly Arg
1 5 10 15

Ala Pro Arg Leu Pro Arg Leu Ala Glu Glu Ala Gly
20 25

<210> 1310
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

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<223> /注釋="p.Q308K"

<400> 1310
Leu Gly Thr Val Leu Gln Val Gln Cys Thr Cys Arg Thr Ile Thr Gln
1 5 10 15

Ser Glu Glu Ser Leu Cys Lys Ile Phe Lys Lys His Met Leu His Arg
20 25 30

Lys Ser Cys Phe Asn Tyr Pro Thr Leu Ser Asn Val Lys Gly Met Ala
35 40 45

Leu Tyr Thr Arg
50

<210> 1311
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A63V"

<400> 1311
Met Ser Glu Gln Asp Trp Ser Ala Ile Gln Asn Phe Cys Glu Gln Val
1 5 10 15

Asn Thr Asp Pro Asn Gly Pro Thr His Val Val Pro Trp Leu Leu Ala
20 25 30

His Lys Ile Gln Ser Pro Gln Glu Lys Glu Ala Leu Tyr Ala Leu Thr
35 40 45

Val Leu Glu Met
50

<210> 1312
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R227H"

<400> 1312
Pro Asn Phe Glu Glu Gly Gly Pro Thr Ser Val Gly Arg Lys His Glu
1 5 10 15

Phe Ile Arg Ser Glu Ser Glu Asn Trp His His Ile Phe Arg Glu Glu
20 25 30

Gln Asn Gly Glu Asp Glu Asp Gly Gly Trp Arg Leu Ala Gly Ser Arg
35 40 45

Arg Asp Gly Glu
50

<210> 1313
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.V276fs"

<400> 1313
Leu Leu Lys Leu Lys Tyr Asp Glu Lys Ile Lys Asn Ile Arg Glu Glu
1 5 10 15

Ala Glu Arg Asn Ile Phe Lys Asp Val Leu Ile Gly Phe Gly Arg Cys
20 25 30

Phe Gln Lys Tyr Gly Ile Gly Phe Cys Arg Asn Val Ser Phe Ile Leu
35 40 45

Pro Asn Leu Leu
50

<210> 1314
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A544S"

<400> 1314
Ser Cys Cys Glu Lys Gly Asp Thr Phe Phe Val Leu Val Phe Gln Leu
1 5 10 15

Gly Arg Phe Thr Glu Glu Asp Lys Thr Ser Ser Val Ala Lys Leu Glu
20 25 30

Ala Ile Phe Gly Ala Asp Phe Thr Lys Tyr Ala Ile Met Leu Phe Thr
35 40 45

Arg Lys Glu Asp
50

<210> 1315
<211> 79
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G227fs"

<400> 1315
Ser Arg Ser Ser Lys Cys Pro Val Glu Ala Lys Val Thr Ser Gly Arg
1 5 10 15

Glu Thr Leu Arg Leu Arg Ser Gly Gly Leu Pro Gln Trp Arg Lys Arg
20 25 30

Pro Val Ser Leu Arg Arg Arg His Leu Gly Arg Leu Met Thr Cys Trp
35 40 45

Lys Ala Thr Trp Ala Phe Gly Thr Pro Ser Trp Arg Pro Pro Trp Trp
50 55 60

Arg Arg Pro Arg Arg Gln Arg Ala Pro Arg Ser Leu His Ala Val
65 70 75

<210> 1316
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R123L"

<400> 1316
Lys Val His Pro Asn Lys Ala Glu Phe Ile Arg Ala Lys Tyr Gln Met
1 5 10 15

Leu Ala Phe Val His Arg Leu Pro Cys Leu Leu Asp Asp Asp Ser Val
20 25 30

Thr Ala Lys Asp Leu Ser Lys Gln Leu His Ser Ser Val Arg Thr Gly
35 40 45

Asn Leu Glu Thr
50

<210> 1317
<211> 61
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A311fs"

<400> 1317
Tyr Lys Leu Val Thr Gly Asp Arg Asn Asn Ser Ser Cys Arg Asn Tyr
1 5 10 15

Asn Lys Gln Ala Ser Glu Gln Asn Trp Val Ile Thr Val Gln Asn Lys
20 25 30

Ile Glu Trp Gly Arg Arg Glu Ala Pro Ser Leu Thr Pro Met His Ser
35 40 45

Leu Leu Ile Ser Pro Met Ile Thr Arg Ile Leu Lys Asn
50 55 60

<210> 1318
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R160H"

<400> 1318
Leu Ile Phe Lys Leu Ile Ile Glu Phe Leu Phe Leu Tyr Leu Leu His
1 5 10 15

Thr Leu Trp His Gly Phe Asn Met Pro His His Leu Val Gln Cys Ala
20 25 30

Asn Val Ala Pro Cys Pro Asn Ile Val Asp Cys Tyr Ile Ala Arg Pro
35 40 45

Thr Glu Lys Lys
50

<210> 1319
<211> 48
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R22S"

<400> 1319
Met Asn Trp Ala Phe Leu Gln Gly Leu Leu Ser Gly Val Asn Lys Tyr
1 5 10 15

Ser Thr Val Leu Ser Ser Ser Ile Trp Leu Ser Val Val Phe Ile Phe
20 25 30

Arg Val Leu Val Tyr Val Val Ala Ala Glu Glu Val Trp Asp Asp Glu
35 40 45

<210> 1320
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.I407M"

<400> 1320
Lys Met Pro Tyr Glu Pro Leu Thr Pro Val Leu Tyr Leu Ser Leu Trp
1 5 10 15

Asp Ala Leu Lys Tyr Leu Gly Glu Pro Met Met Lys Ser Glu Lys Pro
20 25 30

Ile Asn Met Glu Asn Leu Pro Val Asn Gly Gly Asn Gly Gln Ser Phe
35 40 45

Gly Tyr Ile Leu
50

<210> 1321
<211> 30
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.W272fs"

<400> 1321
Gln Glu Gln Leu Val His His Ile Asn Ser Glu His Ile His Gly Glu
1 5 10 15

Arg Lys Glu Phe Val Cys His Trp Gly Ala Ala Pro Gly Ser
20 25 30

<210> 1322
<211> 52
<212> PRT
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<223> /注釋="p.P998L"

<400> 1322
Val His Ala Pro Arg Arg Cys Ser Asp Gly Gly Ala His Gly Tyr Gly
1 5 10 15

Arg Arg His Leu Gln Pro His Asp Ala Leu Leu Gly His Gly Val Arg
20 25 30

Arg Ala Ser Asp Pro Val Arg Thr Gly Ser Glu Gly Leu Ala Leu Pro
35 40 45

Arg Val Pro Arg
50

<210> 1323
<211> 70
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.P1033fs"

<400> 1323
Pro Val Arg Thr Gly Ser Glu Gly Leu Ala Leu Pro Arg Val Pro Arg
1 5 10 15

Phe Ser Ser Leu Ser Ser Cys Asn Pro Arg Arg Trp Pro Arg Pro Arg
20 25 30

Arg Ser Ala Val Ser Cys Phe Arg Ile Thr Arg Gly Pro Arg Ala Ala
35 40 45

Ser Pro Glu Thr Ser Thr Arg Pro Pro Val Leu Pro Ala Ser Pro Arg
50 55 60

Thr Ser Pro Trp Ser Pro
65 70

<210> 1324
<211> 129
<212> PRT
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多肽"

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<400> 1324
Ile Pro Arg Gly Ser Asn Leu Arg Phe Met Thr Trp Asp Val Ala Leu
1 5 10 15

Ser Arg Thr Ala Arg Ala Trp Gly Lys Asn Val Cys Leu Arg Ile Ile
20 25 30

Phe Ile Tyr Lys Met Tyr Lys Trp Ser Ile Leu Asn Phe Met Val Leu
35 40 45

Val Lys Ile Cys Gly Ser Ala Leu Lys Met Asn Leu Leu Gln Val Leu
50 55 60

Leu Ser Glu Val Gly Met Gln Arg Arg Lys Cys Thr Ile Leu Lys Met
65 70 75 80

Ala Val Ala Leu Glu Thr Val Leu Ile Ile Phe Ser Leu Phe Gly Thr
85 90 95

Thr Leu Thr Lys Leu Val Val Leu Leu Leu His Val Gln Lys Leu Asp
100 105 110

Ile Leu Tyr Met Gln Gln Phe Ser Tyr Ala Thr Met Arg Gln Glu Glu
115 120 125

His

<210> 1325
<211> 66
<212> PRT

<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.Q223fs"

<400> 1325
Lys Leu Glu Leu Gln Gly Val Lys Gly Gly Val Asp His Ala Ala Ala
1 5 10 15

Phe Gly Arg Ile Ala Phe Ser Cys Pro Pro Glu Arg Val Ala Arg Leu
20 25 30

Arg Arg Leu Asp Glu Lys Gly Glu Pro Glu Asp Ser Asp Ser Pro Gly
35 40 45

Glu Pro Gly His Pro Arg Glu Ser Asn Ser Thr Gly Gly His Ser Gly
50 55 60

Arg Pro
65

<210> 1326
<211> 37
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.L454I"

<400> 1326
Asp Thr Ile Ser Arg Ala Cys Phe Pro Leu Ala Phe Leu Ile Phe Asn
1 5 10 15

Ile Phe Tyr Trp Val Ile Tyr Lys Ile Ile Ile Arg His Glu Asp Ile
20 25 30

His Gln Gln Gln Asp
35

<210> 1327
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.F132L"

<400> 1327
Ala Tyr Ser Glu Tyr Pro Asp Asp Ser Leu Asp Leu Asp Pro Ser Met
1 5 10 15

Leu Asp Ser Ile Trp Lys Pro Asp Leu Leu Leu Phe Ala Asn Glu Lys
20 25 30

Gly Ala Asn Phe His Glu Val Thr Thr Asp Asn Lys Leu Leu Arg Ile
35 40 45

Phe Lys Asn Gly
50

<210> 1328
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.A178V"

<400> 1328
Ile Tyr Leu Asp Asp Asp Val Ile Val Gln Gly Asp Ile Gln Glu Leu
1 5 10 15

Tyr Asp Thr Thr Leu Ala Leu Gly His Val Val Ala Ala Phe Ser Asp
20 25 30

Asp Cys Asp Leu Pro Ser Ala Gln Asp Ile Asn Arg Leu Val Gly Leu
35 40 45

Gln Asn Thr Tyr
50

<210> 1329
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.Q389R"

<400> 1329
Arg His Gln Glu Leu Phe Arg Leu Arg Gly Ile Lys Ala Gln Val Ala
1 5 10 15

Leu Arg Leu Ala Glu Leu Ala Arg Arg Arg Arg Arg Arg Arg Gln Ala
20 25 30

Arg Arg Glu Ala Glu Ala Asp Lys Pro Arg Arg Leu Gly Arg Leu Lys
35 40 45

Tyr Gln Ala Pro
50

<210> 1330
<211> 39
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.G380fs"

<400> 1330
Cys Tyr Val Asp Met Ser Thr Val Asp Ala Asp Thr Val Thr Glu Leu
1 5 10 15

Ala Gln Val Ile Val Ser Arg Gly Gly Ala Leu Ser Gly Ser Pro Arg
20 25 30

Leu Arg Glu Ser Ala Ala Val
35

<210> 1331
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R200G"

<400> 1331
Lys Tyr Phe Leu Asp Asn Leu Asp Lys Leu Gly Glu Pro Asp Tyr Ile
1 5 10 15

Pro Ser Gln Gln Asp Ile Leu Leu Ala Gly Gly Arg Pro Thr Lys Gly
20 25 30

Ile His Glu Tyr Asp Phe Glu Ile Lys Asn Val Pro Phe Lys Met Val
35 40 45

Asp Val Gly Gly
50

<210> 1332
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P283Q"

<400> 1332
Lys Trp Phe Thr Asp Thr Ser Ile Ile Leu Phe Leu Asn Lys Lys Asp
1 5 10 15

Ile Phe Glu Glu Lys Ile Lys Lys Ser Gln Gln Leu Thr Ile Cys Phe
20 25 30

Pro Glu Tyr Thr Gly Pro Ser Ala Phe Thr Glu Ala Val Ala Tyr Ile
35 40 45

Gln Ala Gln Tyr
50

<210> 1333
<211> 52
<212> PRT

<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R844C"

<400> 1333
Gln Tyr Phe Leu Asp Lys Ile Asp Val Ile Lys Gln Ala Asp Tyr Val
1 5 10 15

Pro Ser Asp Gln Asp Leu Leu Arg Cys Cys Cys Val Leu Thr Ser Gly
20 25 30

Ile Phe Glu Thr Lys Phe Gln Val Asp Lys Val Asn Phe His Met Phe
35 40 45

Asp Val Gly Gly
50

<210> 1334
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R844H"

<400> 1334
Gln Tyr Phe Leu Asp Lys Ile Asp Val Ile Lys Gln Ala Asp Tyr Val
1 5 10 15

Pro Ser Asp Gln Asp Leu Leu Arg Cys His His Val Leu Thr Ser Gly
20 25 30

Ile Phe Glu Thr Lys Phe Gln Val Asp Lys Val Asn Phe His Met Phe
35 40 45

Asp Val Gly Gly
50

<210> 1335
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.I80T"

<400> 1335
Leu Ala Lys Ile Tyr Ala Met His Trp Gly Thr Asp Ser Arg Leu Leu
1 5 10 15

Val Ser Ala Ser Gln Asp Gly Lys Leu Thr Thr Ile Trp Asp Ser Tyr
20 25 30

Thr Thr Asn Lys Val His Ala Ile Pro Leu Arg Ser Ser Trp Val Met
35 40 45

Thr Cys Ala Tyr
50

<210> 1336
<211> 46
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T68fs"

<400> 1336
Cys Glu Glu His Ala Arg Ser Asp Pro Leu Leu Ile Gly Ile Pro Thr
1 5 10 15

Ser Glu Asn Pro Phe Lys Asp Lys Lys Leu Ala Ser Ser Tyr Ser Gly
20 25 30

Ile Glu Lys Gln Leu Leu Ala Ser Ser Gln Gln Arg Lys Leu
35 40 45

<210> 1337
<211> 31
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F54fs"

<400> 1337
Ala Ile Ser Pro Thr His Pro Gly Glu Gly Leu Val Leu Arg Pro Leu
1 5 10 15

Cys Thr Ala Asp Leu Asn Arg Gly Phe Leu Arg Tyr Trp Val Ser
20 25 30

<210> 1338
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R1189Q"

<400> 1338
Val Lys Ala Val Leu Arg Asp Phe Tyr Glu Ser Met Phe Pro Ile Pro
1 5 10 15

Ser Gln Phe Glu Leu Pro Arg Glu Tyr Gln Gln Asn Arg Phe Leu His
20 25 30

Met His Glu Leu Gln Glu Trp Arg Ala Tyr Arg Asp Lys Leu Lys Phe
35 40 45

Trp Thr His Cys
50

<210> 1339
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.Q1536H"

<400> 1339
Lys Lys Glu Ser Asn Leu Glu Thr Glu Leu Lys Ser Gln Thr Ala Arg
1 5 10 15

Ile Met Glu Leu Glu Asp His Ile Thr His His Lys Thr Ile Glu Ile
20 25 30

Glu Ser Leu Asn Glu Val Leu Lys Asn Tyr Asn Gln Gln Lys Asp Ile
35 40 45

Glu His Lys Glu
50

<210> 1340
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.L492I"

<400> 1340
Glu Leu Glu Glu Leu Arg His Glu Lys Glu Met Gln Arg Glu Glu Ile
1 5 10 15

Gln Lys Leu Met Gly Gln Ile His Gln Ile Ile Arg Ser Glu Leu Gln
20 25 30

Asp Met Glu Ala Gln Gln Val Asn Glu Ala Glu Ser Ala Arg Glu Gln
35 40 45

Leu Gln Asp Leu
50

<210> 1341
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R355W"

<400> 1341
Ile Leu Asn Thr Pro Asp Leu Arg Lys Gln Trp Leu Gln Glu Val Lys
1 5 10 15

Val Met Ala Asp Arg Ile Ile Gly Met Trp Trp Thr Gln Leu Val Ser
20 25 30

Asn Leu Lys Lys Glu Gly Ser Thr His Asn Trp Gln His Ile Thr Asp
35 40 45

Gln Ile Gly Met
50

<210> 1342
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S41L"

<400> 1342
Leu Ala Leu Val Ser Cys Ile Leu Thr Gln Ala Ser Ala Val Gln Arg
1 5 10 15

Gly Tyr Gly Asn Pro Ile Glu Ala Ser Leu Leu Tyr Gly Leu Asp Leu
20 25 30

Asp Cys Gly Ala Pro Gly Thr Pro Glu Ala His Val Cys Phe Asp Pro
35 40 45

Cys Gln Asn Tyr
50

<210> 1343
<211> 40
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K210fs"

<400> 1343
Phe Leu Ala Arg Leu Lys Gly Gln Asp Pro Gly Ala Pro Gln Leu Gln
1 5 10 15

Ser Glu Ser Lys Pro Pro Lys Lys Lys Glu Lys Glu Lys Glu Ala Glu
20 25 30

Arg Gly Gly Arg Ser Tyr Ser Ile
35 40

<210> 1344
<211> 97
<212> PRT

<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K210fs"

<400> 1344
Ala Phe Leu Ala Arg Leu Lys Gly Gln Asp Pro Gly Ala Pro Gln Leu
1 5 10 15

Gln Ser Glu Ser Lys Pro Pro Lys Lys Arg Lys Arg Lys Gly Gly Arg
20 25 30

Lys Arg Arg Lys Lys Leu Gln His Leu Lys Gly Met Met Gln Met Arg
35 40 45

Ser Thr Gln Asn Met Leu Ser Arg Thr Ser Glu Lys Ala Arg Arg Arg
50 55 60

Lys Gly Asp Ile Lys Lys Glu Arg Ser Gln Met Lys Glu Arg Val Gln
65 70 75 80

Leu Lys Gly Met Arg Arg Arg Thr Leu Gln Glu Gln Val Gly Leu Gly
85 90 95

Asn

<210> 1345
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R347L"

<400> 1345
Leu Val Asn Asp Ala Val Leu Gln Ala His Leu Asn Gly Gln Lys Leu
1 5 10 15

Leu Glu Gln Val Asn Arg Ile Cys Gly Leu Leu Pro Val Arg Thr Pro
20 25 30

Thr Gln Ser Pro Arg Cys Ser Phe Asp Gln Ser Lys Glu Lys His Gly
35 40 45

Met Lys Thr Thr
50

<210> 1346
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A214T"

<400> 1346
Cys Val Ser Lys Tyr Thr Asp Gln Leu Lys Pro Phe Gly Asp Val Pro
1   5   10   15

Arg Lys Leu Lys Ile Gln Val Thr Arg Thr Thr Phe Ile Ala Ala Arg
            20   25   30

Thr Phe Val Gln Gly Leu Thr Val Gly Arg Glu Val Ala Asn Arg Val
        35   40   45

Ser Lys Val Ser
    50

<210> 1347
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R717Q"

<400> 1347
Thr Arg Met Tyr Ala Leu Thr Ser Asp Ala Gln Pro Leu Leu Leu Ser
1   5   10   15

Thr Phe Ser Gly Asp Arg Arg Phe Ser Gln Gln Phe Gly Gly Val Leu
            20   25   30

His Leu Ser Asp Leu Asp Asp Asp Gly Leu Asp Glu Ile Ile Met Ala
        35   40   45

Ala Pro Leu Arg
    50

<210> 1348
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A50V"

<400> 1348
Ile Pro Tyr Ala Ser Leu Ile Ala Thr Ile Leu Leu Tyr Ala Gly Val
1   5   10   15

Ala Leu Phe Cys Gly Cys Gly His Glu Val Val Leu Ser Gly Thr Val
            20   25   30

Asn Ile Leu Gln Thr Tyr Phe Glu Met Ala Arg Thr Ala Gly Asp Thr
        35   40   45

Leu Asp Val Phe
    50

<210> 1349
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.I174M"

<400> 1349
Gly Gln Ser His His Asn Val Phe Pro Asp Gly Lys Pro Phe Pro His
1 5 10 15

His Pro Gly Trp Arg Arg Trp Asn Phe Met Met Tyr Val Phe His Thr
20 25 30

Leu Gly Gln Tyr Phe Gln Lys Leu Gly Arg Cys Ser Val Arg Val Ser
35 40 45

Val Asn Thr Ala
50

<210> 1350
<211> 18
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.C3fs"

<400> 1350
Met Glu Cys Leu Leu Phe Pro Gly Ile Ser Ala Pro Gly Cys Lys Ile
1 5 10 15

Ala Thr

<210> 1351
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R443G"

<400> 1351
Thr Ala Leu Pro Leu Asn Phe Ser Arg Lys Phe Ile Asp Trp Lys Gly
1 5 10 15

Ile Pro Val Asn Lys Ser Gln Leu Lys Gly Gly Gly Tyr Ser Tyr Gln
20 25 30

Ile Lys Met Cys Pro Gln Asn Thr Ser Ile Pro Ile Arg Gly Arg Val
35 40 45

Leu Ile Gly Ser
50

<210> 1352
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S1283Y"

<400> 1352
Lys Asp Gln Met Thr Ile Ser Leu Gly Lys Thr Pro Arg Thr Met Glu
1 5 10 15

Val Thr Glu Met Ser Pro Ser Lys Asn Tyr Tyr Phe Ile Ser Tyr Ser
20 25 30

Arg Gly Thr Pro Ser Leu Glu Met Thr Asp Thr Gly Phe Pro Glu Thr
35 40 45

Thr Lys Ile Ser
50

<210> 1353
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L630P"

<400> 1353
Pro Arg Thr Pro His Cys Val Gly Lys Lys Val Pro Gln Pro Val Gly
1 5 10 15

Ala Ala Asp Leu Ala Pro Asp Thr Ser Pro Pro Cys Arg Lys Glu Gly
20 25 30

Ser Ser Ala Ser Arg Ser Cys Arg Pro Gly Pro Gly His Leu Thr Arg
35 40 45

Arg Glu Glu Asp
50

<210> 1354
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R113Q"

<400> 1354
Leu Ser Asn Asn Lys Ile Ser Glu Leu Lys Asn Gly Ser Phe Ser Gly
1 5 10 15

Leu Ser Leu Leu Glu Arg Leu Asp Leu Gln Gln Asn Asn Leu Ile Ser
20 25 30

Ser Ile Asp Pro Gly Ala Phe Trp Gly Leu Ser Ser Leu Lys Arg Leu
35 40 45

Asp Leu Thr Asn
50

<210> 1355
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G240C"

<400> 1355
Lys Ile Ser Lys Met Ser Leu Ala Asn Ile Tyr Leu Glu Ser Lys Gly
1 5 10 15

Ser Ser Val Cys Gln Val Thr Ala Ile Cys Cys Val Thr Val Ile Leu
20 25 30

Leu Tyr Thr Ser Arg Ala Cys Tyr Asn Leu Phe Ile Leu Ser Phe Ser
35 40 45

Gln Asn Lys Ser
50

<210> 1356
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F754L"

<400> 1356
Pro Val Pro Ser Gly Cys Ala Ser Leu Ser Ser Gln His Ser Tyr Phe
1 5 10 15

Asp Thr Glu Ser Ser Ser Ser Asp Glu Leu Leu Phe Cys Arg Cys His
20 25 30

Arg Pro Tyr Cys Glu Ile Cys Phe Gln Ser Ser Ser Asp Ser Ser Asp
35 40 45

Ser Gly Thr Ser
50

<210> 1357
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D566N"

<400> 1357
Leu Ile Gly Trp Thr Ser Ser Val Cys Gln Asn Leu Glu Lys Gln Ile
1 5 10 15

Ser Leu Ile Gly Gln Gly Lys Thr Ser Asn Asn His Leu Ile Phe Asn
20 25 30

Met Cys Leu Ile Asp Arg Trp Asp Tyr Met Thr Ala Val Ala Glu Phe
35 40 45

Leu Phe Leu Leu
50

<210> 1358
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P762T"

<400> 1358
Asn Pro His Leu Gln Lys Lys Arg Cys Ser Lys Lys Gly Leu Gly Arg
1 5 10 15

Ser Ile Met Arg Arg Ile Thr Glu Ile Thr Thr Glu Thr Val Ser Arg
20 25 30

Gln Cys Ser Lys Glu Asp Lys Glu Gly Ala Asp His Gly Thr Ala Lys
35 40 45

Gly Thr Ala Leu
50

<210> 1359
<211> 37
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G517fs"

<400> 1359
Ala Glu Ala Lys Ile Asn Leu Phe Gly Glu Glu Ala Leu Pro Gly Val
1 5 10 15

Leu Val Thr Ala Arg Thr Val Pro Gly Ala Ala Ser Gly Ala Ala Glu
20 25 30

Ala Ala Glu Leu Leu
35

<210> 1360
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R216H"

<400> 1360
Phe Thr Leu Phe Ile Val Met Met Leu Tyr Ala Pro Ala Ala Leu Ile
1 5 10 15

Val Cys Phe Thr Tyr Phe Asn Ile Phe His His Ile Cys Gln Gln His
20 25 30

Thr Lys Asp Ile Ser Glu Arg Gln Ala Arg Phe Ser Ser Gln Ser Gly
35 40 45

Glu Thr Gly Glu
50

<210> 1361
<211> 110
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<223> /注釋="p.AAAAATAAGGPDTGEWGPPA36del"

<400> 1361
Ala Ala Met Asn Ala Ser Ala Ala Ser Leu Asn Asp Ser Gln Val Val
1 5 10 15

Val Val Ala Ala Glu Gly Ala Ala Ala Leu Gly Ala Gly Gly Gly Ala
20 25 30

Asn Gly Ser Leu Glu Leu Ser Ser Gln Leu Ser Ala Gly Pro Pro Gly
35 40 45

Leu Leu Leu Pro Ala Val Asn Pro Trp Asp Val Leu Leu Cys Val Ser
50 55 60

Gly Thr Val Ile Ala Gly Glu Asn Ala Leu Val Val Ala Leu Ile Ala
65 70 75 80

Ser Thr Pro Ala Leu Arg Thr Pro Met Phe Val Leu Val Gly Ser Leu
85 90 95

Ala Thr Ala Asp Leu Leu Ala Gly Cys Gly Leu Ile Leu His
100 105 110

<210> 1362
<211> 52
<212> PRT

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多肽"

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<400> 1362
Arg Phe Thr Ile Gln Leu Ile Ser Ile Asp Glu Val Glu Ile Ser Pro
1 5 10 15

Val Lys Gly Ser Ala Ser Ile Ile Ile Trp Trp Gly Asp Lys Arg Ala
20 25 30

Ser Gly Glu Val Gly Ile Ala Pro Ser Ser Arg His Ile Leu Ile Gly
35 40 45

Glu Pro Ser Ala
50

<210> 1363
<211> 52
<212> PRT
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多肽"

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<400> 1363
Gln Arg Val Asn Ile Thr Ile Ile Arg Ser Ser Gly Asp Phe Gly His
1 5 10 15

Val Arg Leu Trp Tyr Lys Thr Met Ser Trp Trp Thr Ala Glu Ala Gly
20 25 30

Leu Asp Phe Val Pro Ala Ala Gly Glu Leu Leu Phe Glu Ala Gly Glu
35 40 45

Met Arg Lys Ser
50

<210> 1364
<211> 52
<212> PRT
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多肽"

<220>
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<400> 1364
Ala Tyr Arg His Phe Trp Met Leu Val Leu Phe Val Ile Phe Asn Ser
1 5 10 15

Leu Gln Gly Leu Tyr Val Phe Met Val Phe Phe Phe Ile Leu His Asn
20 25 30

Gln Met Cys Cys Pro Met Lys Ala Ser Tyr Thr Val Glu Met Asn Gly
35 40 45

His Pro Gly Pro
50

<210> 1365
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.S706L"

<400> 1365
Lys Glu Pro Cys Met Tyr Pro Ala Gly Gly Gly Ser Trp Lys Ser Arg
1 5 10 15

Pro Glu Glu Glu Glu Asp Ile Val Asn Leu Leu Trp Phe Trp Ser Arg
20 25 30

Lys Tyr Thr Lys Pro Glu Ala Ile Ile Gly Ser Trp Leu Trp Ala Thr
35 40 45

Glu Glu Ser Asn
50

<210> 1366
<211> 52
<212> PRT
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<220>
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多肽"

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<223> /注釋="p.V30I"

<400> 1366
Val Pro Asp Gly Cys Arg Asn Gly Leu Lys Ser Lys Tyr Tyr Arg Leu
1 5 10 15

Cys Asp Lys Ala Glu Ala Trp Gly Ile Ile Ile Leu Glu Thr Val Ala
20 25 30

Thr Ala Gly Val Val Thr Ser Val Ala Phe Met Leu Thr Leu Pro Ile
35 40 45

Leu Val Cys Lys
50

<210> 1367
<211> 75
<212> PRT
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<223> /注釋="p.231_239RKEDPGSLR>R"

<400> 1367
Lys Glu Asp Leu Gly Ser Leu Gly Lys Val Asp Pro Leu Cys Ser Ser
1   5   10   15

Lys Thr Tyr Thr Val Ser Pro Arg Lys Arg Val Asp Pro Val Ser Ser
            20   25   30

Asp Lys Val Asp Pro Val Phe Pro Arg Lys Glu Glu Pro Arg Tyr Ser
        35   40   45

Gly Lys Glu His Pro Val Ser Ser Glu Lys Val Ala Pro Thr Ser Ala
    50   55   60

Glu Lys Val Asp Leu Val Leu Ser Gly Lys Arg
65   70   75

<210> 1368
<211> 39
<212> PRT
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<220>
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多肽"

<220>
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<400> 1368
Ala Pro Ala Ser Glu Asp Ser Leu Ser Val Glu Gly Arg Arg Gly Pro
1   5   10   15

Leu Arg Ala Val Met Gln Ser Leu Arg His His Pro Ser Cys Cys Gly
            20   25   30

Cys Ser Gly Ala Ala Pro Glu
        35

<210> 1369
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.T100P"

<400> 1369
Ala Arg Ala Ser Gly Pro Lys Ala Arg Pro Ser Ala Gly Gly His Trp
1   5   10   15

Trp Ser Ser Thr Val Gly Asn Val Ser Pro Pro Met Gly Gly Ser Asp
            20   25   30

Leu Cys Arg Leu Arg Ala Pro Ser Ala Ala Ala Met Gln Arg Ser His
        35   40   45

Ser Asp Leu Val
    50

<210> 1370
<211> 52
<212> PRT
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多肽"

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<400> 1370
Lys Ala Ala Glu Gln Leu Ala Thr Thr Thr Cys His Ala Leu Pro Pro
1 5 10 15

Ala Ala Leu Leu Cys Gly Met Arg Glu Met Met Arg Ala Gly Gly Cys
20 25 30

Cys His Ala Leu Pro Ala Thr Gly Ile Leu Ala Phe Pro Lys Leu Val
35 40 45

Ala Ser Val Ser
50

<210> 1371
<211> 39
<212> PRT
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<220>
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多肽"

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<400> 1371
Pro Ser Asp Pro Met Gly Asp Ser Ser Pro Gly Ser Gly Lys Lys Thr
1 5 10 15

Pro Ser Arg Ser Val Lys Ala Ser Pro Pro Gly Pro Ala Ala Ser Ala
20 25 30

Ser Ser Ser Arg Ser Lys Ser
35

<210> 1372
<211> 36
<212> PRT
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<220>
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多肽"

<220>
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<400> 1372
Met Gln Arg Ala Ala Ala Leu Val Arg Pro Pro Gly Cys Gly Pro Arg
1 5 10 15

Thr Pro Ser Ser Trp Gly Arg Ser Gln Ser Ser Ala Ala Ala Glu Ala
20 25 30

Ser Ala Val Leu
35

<210> 1373
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1373
Asp Phe Leu Leu Gln Gly Arg Leu Tyr Ile Ser Pro Asn Trp Leu Cys
1 5 10 15

Phe His Ala Ser Leu Phe Gly Lys Asp Met Met Lys Val Val Ile Pro
20 25 30

Val Val Ser Val Gln Met Ile Lys Lys His Lys Met Ala Arg Leu Leu
35 40 45

Pro Asn Gly Leu
50

<210> 1374
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1374
Gly Tyr Val Pro Lys Asn Phe Ile Asp Ile Gln Phe Pro Lys Trp Phe
1 5 10 15

His Glu Gly Leu Ser Arg His Gln Ala Asp Asp Asn Leu Leu Met Gly
20 25 30

Lys Glu Val Gly Phe Phe Ile Ile Arg Ala Ser Gln Ser Ser Pro Gly
35 40 45

Asp Phe Ser Ile
50

<210> 1375
<211> 52
<212> PRT
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<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.A300T"

<400> 1375
Arg His Leu Gln Phe Phe Ser Glu Phe Gly Asn Ser Asp Ile Tyr Val
1 5 10 15

Ser Leu Ala Gly Lys Lys Lys His Gly Thr Thr Pro Thr Asn Tyr Gly
20 25 30

Phe Cys Phe Lys Pro Asn Lys Ala Gly Gly Pro Arg Asp Leu Lys Met
35 40 45

Leu Cys Ala Glu
50

<210> 1376
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1376
Ile Ser His Glu Asp Leu Ile Gln Asn Phe Leu Asn Ala Gly Ser Phe
1 5 10 15

Pro Glu Ile Gln Gly Phe Leu Gln Leu Leu Leu Gly Ser Gly Arg Lys
20 25 30

Leu Trp Lys Arg Phe Phe Cys Phe Leu Arg Arg Ser Gly Leu Tyr Tyr
35 40 45

Ser Thr Lys Gly
50

<210> 1377
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1377
Glu Ser Pro Ser Ala Pro Asp Gly Gly Cys Pro Gln Gly Gly Gly Asn
1 5 10 15

Arg Ala Lys Tyr Glu Ser Ala Gly Met Tyr Tyr Cys Val Pro Gln Val
20 25 30

Gly Leu Val Gly Pro Ala Ser Val Thr Phe Pro Val Val Ala Ser Gly
35 40 45

Glu Pro Val Ser
50

<210> 1378
<211> 37
<212> PRT

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多肽"

<220>
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<400> 1378
Leu Val Asn Met Asp Asp Asn Ile Val Lys His Tyr Ser Asn Glu Asp
1 5 10 15

Thr Phe Gln Leu Gln Ile Glu Glu Ala Trp Trp Gly Ser Tyr Lys Leu
20 25 30

Thr Leu Thr Glu Ile
35

<210> 1379
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 1379
Glu Gly Tyr Arg Met Leu Phe Gln Asp Leu Glu Lys Lys Lys Glu Arg
1 5 10 15

Leu Val Val Val Asp Cys Glu Ser Glu Cys Cys Leu Asn Ala Ile Leu
20 25 30

Gly Gln Ile Ile Lys Leu Glu Lys Asn Gly Ile Gly Tyr His Tyr Ile
35 40 45

Leu Ala Asn Leu
50

<210> 1380
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1380
Leu Val Gly Gly Leu Gly Leu Ala Met Leu Val Ala Leu Ile Glu Phe
1 5 10 15

Cys Tyr Lys Ser Arg Ala Glu Ala Lys Gln Gln Met Lys Val Ala Lys
20 25 30

Asn Ala Gln Asn Ile Asn Pro Ser Ser Ser Gln Asn Ser Gln Asn Phe
35 40 45

Ala Thr Tyr Lys
50

<210> 1381
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1381
Pro Arg Pro Ser Ala Ser Ala Thr Leu His Ser Ala Ile Trp Ile Val
1 5 10 15

Tyr Gly Ala Phe Val Gln Gln Gly Gly Lys Lys Ser Ser Val Asn Ser
20 25 30

Met Ala Met Arg Ile Val Met Gly Ser Trp Trp Leu Phe Thr Leu Ile
35 40 45

Val Cys Ser Ser
50

<210> 1382
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.R683L"

<400> 1382
Val Ser Arg Met Asp Asn Pro Ile Arg Thr Phe Gln Asp Leu Ser Lys
1 5 10 15

Gln Val Glu Met Ser Tyr Gly Thr Val Leu Leu Asp Ser Ala Val Tyr
20 25 30

Glu Tyr Phe Arg Ala Lys Gly Thr Asn Pro Leu Glu Gln Asp Ser Thr
35 40 45

Phe Ala Glu Leu
50

<210> 1383
<211> 58
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多肽"

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<400> 1383
Tyr Thr Thr Leu Ala Thr Arg Met Met Met Gly Ala Trp Trp Leu Phe
1 5 10 15

Ala Leu Ile Val Ile Ser Ser Tyr Thr Gln Thr Ser Leu Leu Ser Ser
20 25 30

Leu Leu His Ala Leu Lys Val Pro Ser Ser Leu Ser Arg Thr Phe Pro
35 40 45

Ser Lys Gln Lys Ser Leu Met Ala Gln Ser
50 55

<210> 1384
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1384
Val Ser Ser Leu Gln Cys His Arg His Lys Pro Trp Arg Leu Gly Pro
1 5 10 15

Arg Phe Met Asn Leu Ile Lys Glu Ala Gln Gln Trp Asp Gly Leu Thr
20 25 30

Gly His Ile Thr Phe Asn Lys Thr Asn Gly Leu Arg Lys Asp Phe Asp
35 40 45

Leu Asp Ile Ile
50

<210> 1385
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.R519Q"

<400> 1385
Trp Asn Gly Met Ile Gly Glu Val Val Met Lys Arg Ala Tyr Met Ala
1 5 10 15

Val Gly Ser Leu Thr Ile Asn Glu Glu Gln Gln Ser Glu Val Val Asp
20 25 30

Phe Ser Val Pro Phe Ile Glu Thr Gly Ile Ser Val Met Val Ser Arg
35 40 45

Ser Asn Gly Thr
50

<210> 1386
<211> 26
<212> PRT

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<220>
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肽"

<220>
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<223> /注釋="p.K22fs"

<400> 1386
Met Glu Leu Glu Asn Ile Val Ala Asn Ser Leu Leu Leu Lys Ala Arg
1 5 10 15

Gln Gly Gly Tyr Gly Lys Lys Lys Trp Ser
20 25

<210> 1387
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.F682L"

<400> 1387
Ser Ala Leu Leu Thr Lys Thr Asn Cys Ile Ala Arg Ile Phe Asp Gly
1 5 10 15

Val Lys Asn Gly Ala Gln Arg Pro Lys Leu Leu Ile Ser Pro Ser Ser
20 25 30

Gln Val Phe Ile Cys Leu Gly Leu Ile Leu Val Gln Ile Val Met Val
35 40 45

Ser Val Trp Leu
50

<210> 1388
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R183C"

<400> 1388
Ala Asn Leu Leu Arg Leu Phe Gln Ile Pro Gln Ile Ser Tyr Ala Ser
1 5 10 15

Thr Ser Ala Lys Leu Ser Asp Lys Ser Cys Cys Tyr Asp Tyr Phe Ala
20 25 30

Arg Thr Val Pro Pro Asp Phe Tyr Gln Ala Lys Ala Met Ala Glu Ile
35 40 45

Leu Arg Phe Phe
50

<210> 1389
<211> 50
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.P895fs"

<400> 1389
Ser Ser Gly Glu Thr Leu Arg Tyr Lys Asp Arg Arg Leu Ala Gln His
1 5 10 15

Lys Ser Glu Ile Glu Cys Phe Thr Pro Gln Arg Glu Tyr Gly Glu Trp
20 25 30

Trp Glu Ser Asn Asn Glu Gln Phe Gln Trp Lys Ile Arg His Val Gly
35 40 45

Pro Glu
50

<210> 1390
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1390
Gly Phe Asp Gln Tyr Phe Met Thr Arg Ser Leu Glu Asn Asn Arg Arg
1 5 10 15

Asn Ile Trp Phe Ala Glu Phe Trp Glu Asp Asp Asn Phe Asn Cys Lys
20 25 30

Leu Thr Ser Ser Gly Thr Gln Ser Asp Asp Ser Thr Arg Lys Cys Thr
35 40 45

Gly Glu Glu Arg
50

<210> 1391
<211> 33
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.A718fs"

<400> 1391
Ser Pro Thr Ser Gln Leu Val Ile Thr Phe Ser Leu Thr Ser Leu Gln
1 5 10 15

Val Val Gly Met Ile Ala Trp Leu Gly Gly Pro Ala Pro Thr Gln Arg
20 25 30

Asp

<210> 1392
<211> 52
<212> PRT
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<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.R679Q"

<400> 1392
Val Cys Ser Phe Arg Arg Val Phe Leu Gly Leu Gly Met Cys Ile Ser
1 5 10 15

Tyr Ala Ala Leu Leu Thr Lys Thr Asn Gln Gln Ile Tyr Arg Ile Phe
20 25 30

Glu Gln Gly Lys Lys Ser Val Thr Ala Pro Arg Leu Ile Ser Pro Thr
35 40 45

Ser Gln Leu Ala
50

<210> 1393
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.R852C"

<400> 1393
Ser Val Ser Leu Gly Met Leu Tyr Met Pro Lys Val Tyr Ile Ile Ile
1 5 10 15

Phe His Pro Glu Gln Asn Val Gln Lys Cys Cys Lys Arg Ser Phe Lys
20 25 30

Ala Val Val Thr Ala Ala Thr Met Gln Ser Lys Leu Ile Gln Lys Gly
35 40 45

Asn Asp Arg Pro
50

<210> 1394
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R192L"

<400> 1394
Ala Met Pro Lys Lys Asp Ala Arg Thr Leu Leu Ala Arg Phe Asn Glu
1 5 10 15

Gln Ile Glu Pro Ile Tyr Ala Leu Leu Leu Leu Glu Thr Glu Asp Val
20 25 30

Asn Leu Ala Tyr Glu Ile Leu Glu Pro Glu Pro Thr Glu Ile Pro Ala
35 40 45

Leu Lys Gln Ser
50

<210> 1395
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K306N"

<400> 1395
His Ala Gly Cys Gly Lys Thr Phe Ala Met Lys Gln Ser Leu Thr Arg
1 5 10 15

His Ala Val Val His Asp Pro Asp Lys Asn Asn Lys Met Lys Leu Lys
20 25 30

Val Lys Lys Ser Arg Glu Lys Arg Ser Leu Ala Ser His Leu Ser Gly
35 40 45

Tyr Ile Pro Pro
50

<210> 1396
<211> 31
<212> PRT
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<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S767fs"

<400> 1396
Lys Glu Gly Pro Ser Gly Ser Gly Asp Ser Gln Leu Ser Ala Ser Ser
1 5 10 15

Arg Ser Glu Ser Gly Arg Met Lys Lys Val Ile Ile Lys Trp Ala
20 25 30

<210> 1397
<211> 42
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E562fs"

<400> 1397
Leu Ile Asp Leu Val Arg Trp Lys Ile Leu Lys Asp Lys His Ile Pro
1 5 10 15

Gln Phe Leu Gln Glu Ala Leu Glu Lys Arg Leu Lys Ala Val Glu Ser
20 25 30

Pro Ile Phe Gly Val Leu Ser Phe Ser Ser
35 40

<210> 1398
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G549C"

<400> 1398
Asn Phe Thr Glu Lys Gln Lys Ile Glu Leu Asn Lys Leu Leu Gln Ile
1 5 10 15

Asp Tyr Tyr Asn Leu Thr Lys Phe Tyr Cys Cys Thr Val Lys Leu Asp
20 25 30

Thr Met Ile Phe Gly Val Ile Glu Tyr Cys Glu Arg Gly Ser Leu Arg
35 40 45

Glu Val Leu Asn
50

<210> 1399
<211> 52
<212> PRT
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<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.C500R"

<400> 1399
Pro Ser Arg Pro Val Thr Phe Val Ser Asn Ser Asn Tyr Ala Ala Asp
1 5 10 15

Lys Gly Ala Pro Tyr Val Asp Val Ile Arg Arg Leu Asn Ser Tyr Tyr
20 25 30

Ser Trp Tyr His Asp Tyr Gly His Leu Glu Leu Ile Gln Leu Gln Leu
35 40 45

Ala Thr Gln Phe
50

<210> 1400
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L501V"

<400> 1400
Ser Arg Pro Val Thr Phe Val Ser Asn Ser Asn Tyr Ala Ala Asp Lys
1 5 10 15

Gly Ala Pro Tyr Val Asp Val Ile Cys Val Val Asn Ser Tyr Tyr Ser
20 25 30

Trp Tyr His Asp Tyr Gly His Leu Glu Leu Ile Gln Leu Gln Leu Ala
35 40 45

Thr Gln Phe Glu
50

<210> 1401
<211> 29
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
肽"

<220>
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<223> /注釋="p.L223fs"

<400> 1401
Ser Gln Arg Leu Phe Leu Pro Leu Ile Leu Lys Glu Val Asp Ser Leu
1 5 10 15

Leu Tyr Val Asp Thr Asp Ile Leu Phe Phe Thr Thr Ser
20 25

<210> 1402
<211> 61
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A214fs"

<400> 1402
Pro Gly Ala Ala Thr Glu Lys Ala Arg Lys Gln Gly Gly Ala Ala Lys
1 5 10 15

Asp Thr Arg Ala Gln Ser Gly Glu Ala Lys Glu Gly Ala Pro Gln Ala
20 25 30

Arg Gln Gly His Ala Gly Thr Phe Gln Cys Trp Trp Ala Gln Gln Glu
35 40 45

Gly Lys Gly Gln Arg Gln Gln Glu Gln Pro Arg Arg Cys
50 55 60

<210> 1403
<211> 30
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.Q125R"

<400> 1403
Leu Ile Lys Ala Thr Ile Ala Gly Gly Gly Val Ile Pro His Ile His
1 5 10 15

Lys Ser Leu Ile Gly Lys Lys Gly Gln Arg Arg Lys Thr Ala
20 25 30

<210> 1404
<211> 77
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K144fs"

<400> 1404
Gly Lys Ser Glu Thr Ile Leu Ser Pro Pro Pro Glu Lys Arg Gly Arg
1 5 10 15

Lys Ala Thr Ser Gly Lys Lys Gly Gly Arg Asn Pro Arg Leu Pro Asn
20 25 30

His Gly Arg Pro Lys Ser Pro Asn Gln Arg Thr Ala Ile Lys Lys Glu
35 40 45

Leu Gln Ile Pro Pro Leu Lys Met Gly Gln Gly Met Asp Ser Pro Phe
50 55 60

Cys Leu Leu Arg Ala Leu Phe Trp Asp Arg Ser Cys Pro
65 70 75

<210> 1405
<211> 31
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R131L"

<400> 1405
Asp Thr Asn Leu Cys Ala Ile His Ala Lys Arg Val Thr Ile Met Pro
1 5 10 15

Lys Asp Ile Gln Leu Ala Arg Arg Ile Leu Leu Gly Glu Arg Ala
20 25 30

<210> 1406
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R172C"

<400> 1406
Ala Glu Lys Met Gly Tyr Lys Ala Ile Phe Val Thr Val Asp Thr Pro
1 5 10 15

Tyr Leu Gly Asn Arg Leu Asp Asp Val Cys Cys Asn Arg Phe Lys Leu
20 25 30

Pro Pro Gln Leu Arg Met Lys Asn Phe Glu Thr Ser Thr Leu Ser Phe
35 40 45

Ser Pro Glu Glu
50

<210> 1407
<211> 38
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.H12N"

<400> 1407
Met Ser Leu Val Cys Leu Thr Asp Phe Gln Ala Asn Asn Ala Arg Glu
1 5 10 15

Gln Leu Ser Lys Ser Thr Arg Asp Phe Ile Glu Gly Gly Ala Asp Asp
20 25 30

Ser Ile Thr Arg Asp Asp
35

<210> 1408
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R168H"

<400> 1408
Asn Lys Val Lys Lys Met Lys Arg Tyr His Val Gly Lys Val Trp Arg
1 5 10 15

Arg Glu Ser Pro Thr Ile Val Gln Gly His His Tyr Arg Glu Phe Cys
20 25 30

Gln Cys Asp Phe Asp Ile Ala Gly Gln Phe Asp Pro Met Ile Pro Asp
35 40 45

Ala Glu Cys Leu
50

<210> 1409
<211> 36
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S530fs"

<400> 1409
Glu Asn Ser Pro Leu Ser Asp Val Ala Lys Asn Thr Glu Ser Ser Ala
1 5 10 15

Phe Gly Gly Ser Leu Pro Ala Lys Lys Val Ile His Phe Lys Lys Ser
20 25 30

Lys Ile Ile Trp
35

<210> 1410
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F42L"

<400> 1410
Gly Lys Val Asn Val Asp Glu Val Gly Gly Glu Ala Leu Gly Arg Leu
1 5 10 15

Leu Val Val Tyr Pro Trp Thr Gln Arg Leu Leu Phe Glu Ser Phe Gly
20 25 30

Asp Leu Ser Thr Pro Asp Ala Val Met Gly Asn Pro Lys Val Lys Ala
35 40 45

His Gly Lys Lys
50

<210> 1411
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.F86C"

<400> 1411
Val Lys Ala His Gly Lys Lys Val Leu Gly Ala Phe Ser Asp Gly Leu
1   5   10   15

Ala His Leu Asp Asn Leu Lys Gly Thr Cys Cys Ala Thr Leu Ser Glu
            20   25   30

Leu His Cys Asp Lys Leu His Val Asp Pro Glu Asn Phe Arg Leu Leu
        35   40   45

Gly Asn Val Leu
    50

<210> 1412
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G499V"

<400> 1412
Pro Leu Phe Ala Asn Ala Asp Pro Asn Phe Val Thr Ala Met Leu Ser
1   5   10   15

Lys Leu Arg Phe Glu Val Phe Gln Pro Val Val Asp Tyr Ile Ile Arg
            20   25   30

Glu Gly Ala Val Gly Lys Lys Met Tyr Phe Ile Gln His Gly Val Ala
        35   40   45

Gly Val Ile Thr
    50

<210> 1413
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R659L"

<400> 1413
Gln Ala Ile Ala Pro Ile Asn Tyr Pro Gln Met Thr Thr Leu Asn Ser
1   5   10   15

Thr Ser Ser Thr Thr Thr Pro Thr Ser Leu Leu Met Arg Thr Gln Ser
            20   25   30

Pro Pro Val Tyr Thr Ala Thr Ser Leu Ser His Ser Asn Leu His Ser
        35   40   45

Pro Ser Pro Ser
    50

<210> 1414
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A714S"

<400> 1414
Gln Pro Ser Ala Ile Leu Ser Pro Cys Ser Tyr Thr Thr Ala Val Cys
1 5 10 15

Ser Pro Pro Val Gln Ser Pro Leu Ala Ser Ser Arg Thr Phe His Tyr
20 25 30

Ala Ser Pro Thr Ala Ser Gln Leu Ser Leu Met Gln Gln Gln Pro Gln
35 40 45

Gln Gln Val Gln
50

<210> 1415
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P231Q"

<400> 1415
Ile Ile Leu Asp Pro Lys Val Ile Lys Met Asn Tyr Leu Lys Ser Trp
1 5 10 15

Phe Val Val Asp Phe Ile Ser Ser Ile Gln Gln Val Asp Tyr Ile Phe
20 25 30

Leu Ile Val Glu Lys Gly Met Asp Ser Glu Val Tyr Lys Thr Ala Arg
35 40 45

Ala Leu Arg Ile
50

<210> 1416
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P326T"

<400> 1416
Leu Ile Gly Met Met Leu Leu Leu Cys His Trp Asp Gly Cys Leu Gln
1 5 10 15

Phe Leu Val Pro Leu Leu Gln Asp Phe Thr Thr Pro Asp Cys Trp Val
20 25 30

Ser Leu Asn Glu Met Val Asn Asp Ser Trp Gly Lys Gln Tyr Ser Tyr
35 40 45

Ala Leu Phe Lys
50

<210> 1417
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R525H"

<400> 1417
Ile Val Gly Ala Thr Cys Tyr Ala Met Phe Ile Gly His Ala Thr Ala
1 5 10 15

Leu Ile Gln Ser Leu Asp Ser Ser Arg His His Gln Tyr Gln Glu Lys
20 25 30

Tyr Lys Gln Val Glu Gln Tyr Met Ser Phe His Lys Leu Pro Pro Asp
35 40 45

Thr Arg Gln Arg
50

<210> 1418
<211> 22
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.S9fs"

<400> 1418
Met Ser Gly Thr Lys Leu Glu Asp Ser Pro Pro Leu Ser Gln Leu Val
1 5 10 15

Ile Cys Phe Gly Ala Glu
20

<210> 1419
<211> 20
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.S9fs"

<400> 1419
Met Ser Gly Thr Lys Leu Glu Asp Ser Pro Leu Val Ala Thr Gly His
1 5 10 15

Leu Leu Arg Ser
20

<210> 1420
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D100Y"

<400> 1420
Val Cys Val Ala Val Trp Lys Asn His His Met Arg Thr Val Thr Asn
1 5 10 15

Tyr Phe Ile Val Asn Leu Ser Leu Ala Tyr Tyr Val Leu Val Thr Ile
20 25 30

Thr Cys Leu Pro Ala Thr Leu Val Val Asp Ile Thr Glu Thr Trp Phe
35 40 45

Phe Gly Gln Ser
50

<210> 1421
<211> 79
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P901fs"

<400> 1421
Pro Asp Glu Val Gly Thr Gly Pro Gly Val Gly Phe Asn Val Asn Met
1 5 10 15

Ala Phe Thr Gly Gly Leu Asp Pro Pro Trp Glu Thr Leu Ser Thr Trp
20 25 30

Arg Pro Ser Glu Arg Trp Ser Cys Arg Ser Pro Ala Ser Leu Pro Arg
35 40 45

Met Trp Cys Trp Cys His Gln Ala Ser Met Pro Trp Arg Ala Thr Pro
50 55 60

Pro Leu Leu Gly Ala Thr Thr Ser Pro Pro Asp Ala Ser Gly Thr
65 70 75

<210> 1422
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A1044T"

<400> 1422
Cys Val Ser Ala Leu Leu Ser Val Glu Leu Gln Pro Leu Asp Glu Ala
1 5 10 15

Val Leu Gln Gln Lys Pro Asn Ile Asn Thr Thr Val Ala Thr Leu Glu
20 25 30

Lys Val Ile Glu Ile Gln Ser Lys His Trp Ser Cys Val Gln Lys Phe
35 40 45

Ala Ala Gly Leu
50

<210> 1423
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R503C"

<400> 1423
Ser Asn Leu Ile Arg Ile Glu Gly Asp Pro Gln Gly Val Gln Gln Ala
1 5 10 15

Lys Arg Glu Leu Leu Glu Leu Ala Ser Cys Cys Met Glu Asn Glu Arg
20 25 30

Thr Lys Asp Leu Ile Ile Glu Gln Arg Phe His Arg Thr Ile Ile Gly
35 40 45

Gln Lys Gly Glu
50

<210> 1424
<211> 51
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G747fs"

<400> 1424
Glu Lys Gln Thr Lys Ser Phe Thr Val Asp Ile Arg Ala Lys Pro Glu
1 5 10 15

Tyr His Lys Phe Leu Ile Gly Lys Gly Ala Ala Lys Phe Ala Arg Cys
20 25 30

Ala Thr Ala Leu Glu His Val Ser Ser Ser Leu Arg Leu Arg Thr Arg
35 40 45

Thr Arg Thr
50

<210> 1425
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E1109K"

<400> 1425
Thr Val Val Val Asn Leu Leu Gln Lys Pro Leu Pro Phe Asp Arg Asp
1 5 10 15

Thr Lys Thr Leu Trp Lys Ala Leu Ala Lys Lys Lys Pro Ala Ser Ser
20 25 30

Gly Lys Leu Leu Gln Ala Leu Ile Asp Lys Leu Glu Thr Glu Leu Glu
35 40 45

Asp Asp Ile Ala
50

<210> 1426
<211> 49
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R333fs"

<400> 1426
Met Ala Gly Gly His Val Phe Arg Asn Ala His Phe Asp Tyr Ser Pro
1 5 10 15

Ala Gly Leu Ala Val His Arg Gly Gly Thr Leu Arg His Pro Arg Ala
20 25 30

Val Pro Ser Ala Ala Gly Pro Leu Arg Thr Pro His Ser His Pro Gln
35 40 45

Ala

<210> 1427
<211> 45
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P19A"

<400> 1427
Met Ser Glu Ala Val Arg Val Pro Ser Pro Ala Thr Pro Leu Val Val
1 5 10 15

Ala Ala Ala Ala Ala Pro Glu Glu Arg Lys Gly Lys Glu Ser Glu Arg
20 25 30

Glu Lys Leu Pro Pro Ile Val Ser Ala Gly Ala Gly Ala
35 40 45

<210> 1428
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A183S"

<400> 1428
Ile Cys Phe Lys Tyr Tyr His Gly Val Ser Gly Ala Leu Arg Ala Thr
1 5 10 15

Thr Pro Ser Val Thr Val Lys Asn Ser Ser Ser Ala Pro Ile Phe Lys
20 25 30

Ser Ile Gly Ala Asp Glu Thr Val Gln Gly Gln Gly Ser Arg Arg Leu
35 40 45

Ile Ser Phe Ser
50

<210> 1429
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R2330H"

<400> 1429
Pro Val Leu Ala Val Ile Gly Gly Val Asp Ala Gly Leu Arg Val Gly
1 5 10 15

Gly Arg Cys Val His Lys Gln Thr Gly His His His Ala Thr Leu Leu
20 25 30

Gly Val Val Lys Glu Gly Ser Thr Ser Ala Lys Val Gln Trp Asp Glu
35 40 45

Ala Glu Ile Thr
50

<210> 1430
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S329F"

<400> 1430
Ser Gln Met Leu Ser Ala Ile Leu Leu Leu Leu Gln Leu Trp Asp Ser
1 5 10 15

Gly Ala Gln Glu Thr Asp Asn Glu Arg Phe Phe Ala Gln Gly Thr Ser
20 25 30

Ala Pro Leu Leu Pro Leu Leu Gln Arg Phe Gln Ser Ile Ile Cys Arg
35 40 45

Lys Asp Ala Pro
50

<210> 1431
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P96T"

<400> 1431
Ser Cys Leu Pro Gly Val Ser Gln Leu Leu Arg Arg Gly Asp Glu Val
1 5 10 15

Gly Ser Gly Leu Arg Cys Pro Leu Val Thr Thr Glu Ser Ala Ala Gly
20 25 30

Ser Thr Met Asp Ser Ala Gly Leu Gly Gln Glu Ala Pro Ala Leu Phe
35 40 45

Arg Pro Cys Thr
50

<210> 1432
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T482P"

<400> 1432
Cys Arg Ser Trp Arg Leu Pro Cys Ser Trp Leu Ser Thr Arg Met Pro
1 5 10 15

Trp Arg Ser Gly Trp Arg Lys Thr Cys Pro Pro Pro Ala Cys Ser Gly
20 25 30

Cys Lys Leu Cys Cys Arg Thr Ser Ala Arg Cys Leu Pro Pro Arg Cys
35 40 45

His Pro Pro Ala
50

<210> 1433
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S467Y"

<400> 1433
Asn Pro Asp Asp Asp Ala His Gly Pro Trp Cys Tyr Thr Gly Asn Pro
1 5 10 15

Leu Ile Pro Trp Asp Tyr Cys Pro Ile Tyr Tyr Arg Cys Glu Gly Asp
20 25 30

Thr Thr Pro Thr Ile Val Asn Leu Asp His Pro Val Ile Ser Cys Ala
35 40 45

Lys Thr Lys Gln
50

<210> 1434
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.M686T"

<400> 1434
Ala Glu Lys Ile Gly Ser Gly Pro Cys Glu Gly Asp Tyr Gly Gly Pro
1 5 10 15

Leu Val Cys Glu Gln His Lys Met Arg Thr Thr Val Leu Gly Val Ile
20 25 30

Val Pro Gly Arg Gly Cys Ala Ile Pro Asn Arg Pro Gly Ile Phe Val
35 40 45

Arg Val Ala Tyr
50

<210> 1435
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G229A"

<400> 1435
Pro Gln Cys Ser Glu Val Glu Cys Met Thr Cys Asn Gly Glu Ser Tyr
1 5 10 15

Arg Gly Leu Met Asp His Thr Glu Ser Ala Ala Lys Ile Cys Gln Arg
20 25 30

Trp Asp His Gln Thr Pro His Arg His Lys Phe Leu Pro Glu Arg Tyr
35 40 45

Pro Asp Lys Gly
50

<210> 1436
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V692A"

<400> 1436
Ala Phe Arg Asp Gly Glu Val Arg Leu Val Arg Pro Ala Gly Leu Ser
1 5 10 15

Ser Gly Ser Gly Arg Val Glu Val Phe Ala Ala Gly Gly Arg Trp Gly
20 25 30

Thr Val Cys Asp Asp Ser Trp Asn Ile Ser Gly Ala Ala Val Val Cys
35 40 45

Arg Gln Leu Gly
50

<210> 1437
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A72T"

<400> 1437
Val Ser Ala His Leu Asp Lys Ala Ser Ile Met Arg Leu Thr Ile Ser
1 5 10 15

Tyr Leu Arg Met His Arg Leu Cys Ala Thr Thr Gly Glu Trp Asn Gln
20 25 30

Val Gly Ala Gly Gly Glu Pro Leu Asp Ala Cys Tyr Leu Lys Ala Leu
35 40 45

Glu Gly Phe Val
50

<210> 1438
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R940L"

<400> 1438
Ala Gln Leu Val Ala Ala Ser Lys Val Lys Ala Asp Lys Asp Ser Pro
1 5 10 15

Asn Leu Ala Gln Leu Gln Gln Ala Ser Leu Leu Gly Val Asn Gln Ala
20 25 30

Thr Ala Gly Val Val Ala Ser Thr Ile Ser Gly Lys Ser Gln Ile Glu
35 40 45

Glu Thr Asp Asn
50

<210> 1439
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R280H"

<400> 1439
Pro Asp Ala Ala Asn Pro Trp Gln Leu Lys Ser Ser Ala Asp Tyr Leu
1 5 10 15

Ala Glu Thr Lys Val Arg Pro Leu Glu His His Arg Lys Tyr Met Leu
20 25 30

Lys Ser Leu Asp Gln Ile Glu Thr Val Asn Gly Gly Ser Val Ala Ser
35 40 45

Arg Leu Thr Phe
50

<210> 1440
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K188N"

<400> 1440
Ala Ala Ala Gly Val Lys Lys Val Ala Lys Ser Pro Lys Lys Ala Lys
1 5 10 15

Ala Ala Ala Lys Pro Lys Lys Ala Thr Asn Asn Ser Pro Ala Lys Pro
20 25 30

Lys Ala Val Lys Pro Lys Ala Ala Lys Pro Lys Ala Ala Lys Pro Lys
35 40 45

Ala Ala Lys Pro
50

<210> 1441
<211> 52
<212> PRT
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.A65V"

<400> 1441
Val Ser Glu Leu Ile Thr Lys Ala Val Ala Ala Ser Lys Glu Arg Ser
1 5 10 15

Gly Val Ser Leu Ala Ala Leu Lys Lys Val Val Leu Ala Ala Ala Gly
20 25 30

Tyr Asp Val Glu Lys Asn Asn Ser Arg Ile Lys Leu Gly Leu Lys Ser
35 40 45

Leu Val Ser Lys
50

<210> 1442
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.I81M"

<400> 1442
Ser Gly Val Ser Leu Ala Ala Leu Lys Lys Ala Leu Ala Ala Ala Gly
1 5 10 15

Tyr Asp Val Glu Lys Asn Asn Ser Arg Met Met Lys Leu Gly Leu Lys
20 25 30

Ser Leu Val Ser Lys Gly Thr Leu Val Gln Thr Lys Gly Thr Gly Ala
35 40 45

Ser Gly Ser Phe
50

<210> 1443
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G133A"

<400> 1443
Asn Lys Lys Ala Ala Ser Gly Glu Ala Lys Pro Lys Ala Lys Lys Ala
1 5 10 15

Gly Ala Ala Lys Ala Lys Lys Pro Ala Ala Ala Ala Ala Lys Lys Pro
20 25 30

Lys Lys Ala Thr Gly Ala Ala Thr Pro Lys Lys Ser Ala Lys Lys Thr
35 40 45

Pro Lys Lys Ala
50

<210> 1444
<211> 51
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R25P"

<400> 1444
Met Ser Glu Thr Ala Pro Ala Ala Pro Ala Ala Pro Ala Pro Ala Glu
1 5 10 15

Lys Thr Pro Val Lys Lys Lys Ala Pro Pro Lys Ser Ala Gly Ala Ala
20 25 30

Lys Arg Lys Ala Ser Gly Pro Pro Val Ser Glu Leu Ile Thr Lys Ala
35 40 45

Val Ala Ala
50

<210> 1445
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R30P"

<400> 1445
Gly Lys Gln Gly Gly Lys Ala Arg Ala Lys Ala Lys Thr Arg Ser Ser
1 5 10 15

Arg Ala Gly Leu Gln Phe Pro Val Gly Pro Pro Val His Arg Leu Leu
20 25 30

Arg Lys Gly Asn Tyr Ala Glu Arg Val Gly Ala Gly Ala Pro Val Tyr
35 40 45

Leu Ala Ala Val
50

<210> 1446
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E77K"

<400> 1446
Asp Thr Gly Ile Ser Ser Lys Ala Met Gly Ile Met Asn Ser Phe Val
1 5 10 15

Asn Asp Ile Phe Glu Arg Ile Ala Gly Lys Lys Ala Ser Arg Leu Ala
20 25 30

His Tyr Asn Lys Arg Ser Thr Ile Thr Ser Arg Glu Ile Gln Thr Ala
35 40 45

Val Arg Leu Leu
50

<210> 1447
<211> 39
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K13R"

<400> 1447
Met Pro Glu Pro Ala Lys Ser Ala Pro Ala Pro Lys Arg Arg Gly Ser
1 5 10 15

Lys Lys Ala Val Thr Lys Ala Gln Lys Lys Asp Gly Lys Lys Arg Lys
20 25 30

Arg Ser Arg Lys Glu Ser Tyr
35

<210> 1448
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A48S"

<400> 1448
Thr Lys Ala Ala Arg Lys Ser Ala Pro Ala Thr Gly Gly Val Lys Lys
1 5 10 15

Pro His Arg Tyr Arg Pro Gly Thr Val Ser Ser Leu Arg Glu Ile Arg
20 25 30

Arg Tyr Gln Lys Ser Thr Glu Leu Leu Ile Arg Lys Leu Pro Phe Gln
35 40 45

Arg Leu Val Arg
50

<210> 1449
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E74K"

<400> 1449
Leu Arg Glu Ile Arg Arg Tyr Gln Lys Ser Thr Glu Leu Leu Ile Arg
1 5 10 15

Lys Leu Pro Phe Gln Arg Leu Val Arg Lys Lys Ile Ala Gln Asp Phe
20 25 30

Lys Thr Asp Leu Arg Phe Gln Ser Ser Ala Val Met Ala Leu Gln Glu
35 40 45

Ala Cys Glu Ala
50

<210> 1450
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K37M"

<400> 1450
Thr Gly Gly Lys Ala Pro Arg Lys Gln Leu Ala Thr Lys Ala Ala Arg
1 5 10 15

Lys Ser Ala Pro Ala Thr Gly Gly Val Met Met Lys Pro His Arg Tyr
20 25 30

Arg Pro Gly Thr Val Ala Leu Arg Glu Ile Arg Arg Tyr Gln Lys Ser
35 40 45

Thr Glu Leu Leu
50

<210> 1451
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R68P"

<400> 1451
Gly Val Lys Arg Ile Ser Gly Leu Ile Tyr Glu Glu Thr Arg Gly Val
1   5   10   15

Leu Lys Val Phe Leu Glu Asn Val Ile Pro Pro Asp Ala Val Thr Tyr
            20   25   30

Thr Glu His Ala Lys Arg Lys Thr Val Thr Ala Met Asp Val Val Tyr
        35   40   45

Ala Leu Lys Arg
    50

<210> 1452
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R30P"

<400> 1452
Gly Lys Gln Gly Gly Lys Ala Arg Ala Lys Ala Lys Ser Arg Ser Ser
1   5   10   15

Arg Ala Gly Leu Gln Phe Pro Val Gly Pro Pro Val His Arg Leu Leu
            20   25   30

Arg Lys Gly Asn Tyr Ala Glu Arg Val Gly Ala Gly Ala Pro Val Tyr
        35   40   45

Met Ala Ala Val
    50

<210> 1453
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G54D"

<400> 1453
Lys Arg Lys Arg Ser Arg Lys Glu Ser Tyr Ser Ile Tyr Val Tyr Lys
1   5   10   15

Val Leu Lys Gln Val His Pro Asp Thr Asp Asp Ile Ser Ser Lys Ala
            20   25   30

Met Gly Ile Met Asn Ser Phe Val Asn Asp Ile Phe Glu Arg Ile Ala
        35   40   45

Gly Glu Ala Ser
    50

<210> 1454
<211> 29
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.P534fs"

<400> 1454
Leu Ser Ser His Ser Glu Lys Thr Lys Pro Glu Gln Ser Leu Leu Ser
1 5 10 15

Leu Gln His Pro Pro Ser Thr Ala Pro Leu Cys Leu Ser
20 25

<210> 1455
<211> 44
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.H554fs"

<400> 1455
Pro Ser Thr Ala Pro Pro Val Pro Leu Leu Arg Ser His Ser Met Pro
1 5 10 15

Ser Ala Ala Cys Thr Ile Ser Thr Pro Thr Thr Pro Ser Glu Val Ala
20 25 30

Thr Pro Ser Met Thr Ile Ser Pro Thr Pro Lys Pro
35 40

<210> 1456
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q78R"

<400> 1456
Asp Asp Thr Gln Phe Val Arg Phe Asp Ser Asp Ala Ala Ser Gln Arg
1 5 10 15

Met Glu Pro Arg Ala Pro Trp Ile Glu Arg Arg Glu Gly Pro Glu Tyr
20 25 30

Trp Asp Gln Glu Thr Arg Asn Val Lys Ala Gln Ser Gln Thr Asp Arg
35 40 45

Val Asp Leu Gly
50

<210> 1457
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.N104K"

<400> 1457
Glu Gly Pro Glu Tyr Trp Asp Arg Asn Thr Gln Ile Tyr Lys Ala Gln
1 5 10 15

Ala Gln Thr Asp Arg Glu Ser Leu Arg Lys Lys Leu Arg Gly Tyr Tyr
20 25 30

Asn Gln Ser Glu Ala Gly Ser His Thr Leu Gln Ser Met Tyr Gly Cys
35 40 45

Asp Val Gly Pro
50

<210> 1458
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E84K"

<400> 1458
Leu Ser Glu Ala Tyr Asp Glu Asp Gln Leu Phe Phe Phe Asp Phe Ser
1 5 10 15

Gln Asn Thr Arg Val Pro Arg Leu Pro Lys Lys Phe Ala Asp Trp Ala
20 25 30

Gln Glu Gln Gly Asp Ala Pro Ala Ile Leu Phe Asp Lys Glu Phe Cys
35 40 45

Glu Trp Met Ile
50

<210> 1459
<211> 50
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A236fs"

<400> 1459
Tyr Thr Ala Ile Ala Tyr Trp Val Pro Arg Asn Ala Leu Pro Ser Asp
1 5 10 15

Leu Leu Glu Asn Val Leu Cys Gly Val Gly Leu Trp Pro Gly Cys Ala
20 25 30

Gly His His Arg Gly His Cys Ser His His Leu Leu Pro Glu Ala Leu
35 40 45

Leu Arg
50

<210> 1460
<211> 36
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G114fs"

<400> 1460
Asn Ser Gln Lys Asp Ile Leu Glu Glu Lys Arg Ala Val Pro Asp Arg
1 5 10 15

Met Cys Arg His Asn Tyr Glu Leu Gly Glu Ala His Asp Pro Ala Ala
20 25 30

Pro Ser Pro Ala
35

<210> 1461
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R247H"

<400> 1461
Ala Gln Ser Lys Met Leu Ser Gly Ile Gly Gly Phe Val Leu Gly Leu
1 5 10 15

Ile Phe Leu Gly Leu Gly Leu Ile Ile His His His Arg Gly Gln Lys
20 25 30

Gly Pro Arg Gly Pro Pro Pro Ala Gly Asn Ile Ser Ala Met Ile Gln
35 40 45

Ser Gly Glu Arg
50

<210> 1462
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G250S"

<400> 1462
Lys Met Leu Ser Gly Ile Gly Gly Phe Val Leu Gly Leu Ile Phe Leu
1   5   10   15

Gly Leu Gly Leu Ile Ile Arg His Arg Ser Ser Gln Lys Gly Pro Arg
            20   25   30

Gly Pro Pro Pro Ala Gly Asn Ile Ser Ala Met Ile Gln Ser Gly Glu
        35   40   45

Arg Ala Gln Ala
    50

<210> 1463
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E362K"

<400> 1463
Leu Pro Pro Ser Ser Asn Ile Val Gln Thr Pro Glu Asp Phe Asn Leu
1   5   10   15

Leu Lys Ser Ser Asn Phe Arg Arg Tyr Lys Lys Val Leu Arg Glu Ile
            20   25   30

Leu Thr Thr Leu Gly Leu Ser Cys Asp Met Lys Gln Val Pro Ala Leu
        35   40   45

Thr Pro Leu Tyr
    50

<210> 1464
<211> 38
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S12T"

<400> 1464
Met Phe Ala Ala Gly Leu Ala Pro Phe Tyr Ala Thr Thr Asn Phe Ser
1   5   10   15

Leu Trp Ser Ala Ala Tyr Cys Ser Ser Ala Gly Pro Gly Gly Cys Ser
            20   25   30

Phe Pro Leu Asp Pro Ala
        35

<210> 1465
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.N231K"

<400> 1465
Gly Arg Pro Ala Gly Val His Leu Ser Gly Leu Gln Pro Ser Ala Gly
1 5 10 15

Gln Phe Phe Ala Ser Leu Asp Pro Ile Lys Lys Glu Ala Ser Ala Ile
20 25 30

Leu Ser Pro Leu Asn Ser Asn Pro Arg Asn Ser Val Gln His Gln Phe
35 40 45

Gln Asp Thr Phe
50

<210> 1466
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S133Y"

<400> 1466
Arg Glu Leu Tyr Val Gln Gly Gly Gly Asp Cys Pro Glu Met Ser Ile
1 5 10 15

Gly Ala Ile Lys Ile Ala Leu Glu Ile Tyr Tyr Leu Pro Gly Ser Phe
20 25 30

Ile Tyr Val Phe Thr Asp Ala Arg Ser Lys Asp Tyr Arg Leu Thr His
35 40 45

Glu Val Leu Gln
50

<210> 1467
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E248D"

<400> 1467
Glu Glu Phe Leu Asn His Ser Lys Ala Arg Glu Ala Glu Leu Arg Gln
1 5 10 15

Leu Arg Lys Ser Asn Met Glu Phe Glu Asp Asp Arg Asn Ala Ala Leu
20 25 30

Gln Lys His Val Glu Ser Met Arg Thr Ala Val Glu Lys Leu Glu Val
35 40 45

Asp Val Ile Gln
50

<210> 1468
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T417M"

<400> 1468
Gly His Asn Leu Leu Ser Pro Asp Gly Lys Met Ile Ser Val Ser Gly
1 5 10 15

Gly Gly Leu Pro Pro Val Ser Thr Leu Met Met Asn Ile His Ser Leu
20 25 30

Ser His His Asn Pro Gln Gln Ser Gln Asn Leu Ile Met Thr Pro Leu
35 40 45

Ser Gly Val Met
50

<210> 1469
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.N302K"

<400> 1469
Gly Val Ser Pro Ser Lys Ala His Gly Leu Gly Ser Asn Leu Val Thr
1 5 10 15

Glu Val Arg Val Tyr Asn Trp Phe Ala Lys Lys Arg Arg Lys Glu Glu
20 25 30

Ala Phe Arg Gln Lys Leu Ala Met Asp Ala Tyr Ser Ser Asn Gln Thr
35 40 45

His Ser Leu Asn
50

<210> 1470
<211> 32
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L361fs"

<400> 1470
Gln Val Lys Thr Leu Gln Glu Thr Asn Met Met Tyr Met His Asn Thr
1   5   10   15

Val Ser Leu Glu Glu Glu Leu Lys Lys Gln Met Gln His Val His Asn
            20   25   30

<210> 1471
<211> 37
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G11C"

<400> 1471
Met Ser Ser Tyr Phe Val Asn Ser Phe Cys Cys Cys Arg Tyr Pro Asn
1   5   10   15

Gly Pro Asp Tyr Gln Leu His Asn Tyr Gly Asp His Ser Ser Val Ser
            20   25   30

Glu Gln Phe Arg Asp
        35

<210> 1472
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Y151C"

<400> 1472
Ala Glu Val Pro Ser Tyr Gln Arg Leu Val Pro Glu Ser Cys Pro Val
1   5   10   15

Glu Asn Pro Glu Val Pro Val Pro Gly Cys Cys Phe Arg Leu Ser Gln
            20   25   30

Thr Tyr Ala Thr Gly Lys Thr Gln Glu Tyr Asn Asn Ser Pro Glu Gly
        35   40   45

Ser Ser Thr Val
    50

<210> 1473
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q67H"

<400> 1473
Gly Arg His Ala Ala Ala Ala Ala Ala Leu Gln Leu Tyr Gly Asn Ser
1 5 10 15

Ala Ala Gly Phe Pro His Ala Pro Pro His His Ala His Ala His Pro
20 25 30

His Pro Ser Pro Pro Pro Ser Gly Thr Gly Cys Gly Gly Arg Glu Gly
35 40 45

Arg Gly Gln Glu
50

<210> 1474
<211> 77
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P122fs"

<400> 1474
Gly Ser Pro Ala Ala Ala Tyr Gln Ala Ala Pro Pro Pro Pro Pro His
1 5 10 15

Pro Pro Pro Pro Pro Pro Pro Pro Pro Ala Ala Gly Leu Pro Val Thr
20 25 30

Gly Ser Pro Arg Ser Phe Thr Asp Thr Ile Thr Tyr Arg Asp Ser Arg
35 40 45

Phe Leu Arg Pro Ser Lys Arg Pro Ser Trp Tyr Asn Ile Leu Thr Val
50 55 60

Asn Arg Pro Val Val Ile Leu Ala Arg Thr Gln Thr Thr
65 70 75

<210> 1475
<211> 54
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R284fs"

<400> 1475
Gly Gly Ala Gly Val Gln His Ile Ala Leu Lys Thr Glu Asp Ile Ile
1 5 10 15

Thr Ala Ile Arg His Leu Arg Glu Arg Pro Gly Val Leu Ile Cys Ser
20 25 30

Leu His Val Leu Gln Thr Thr Ala Gly Glu Ala Glu Asp Gly Gln Asp
35 40 45

Gln Gly Glu Gly Glu His
50

<210> 1476
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S468L"

<400> 1476
Asn His Ile Ile Leu Leu Thr Lys Ala Glu Pro Glu Ala Ile Pro Glu
1 5 10 15

Arg Arg Gln Ser Pro Lys Arg Leu Leu Leu Leu Arg Lys Asp Thr Ser
20 25 30

Val Lys Ile Lys Ile Pro Pro Val Ala Glu Ala Gly Trp Asn Leu Tyr
35 40 45

Ile Val Asn Thr
50

<210> 1477
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K812N"

<400> 1477
Val Ala Cys Leu Pro Asp Val Val Leu Gln Glu Leu Phe Phe Lys Leu
1 5 10 15

Thr Ser Gln Tyr Ile Trp Arg Leu Ser Asn Asn Arg Gln Pro Pro Asp
20 25 30

Thr Thr Pro Leu Arg Thr Ser Glu Asp Leu Ile Asn Ala Cys Ser His
35 40 45

Tyr Gly Leu Ile
50

<210> 1478
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K58N"

<400> 1478
Leu His Leu Ser Leu Ser Ser Gln Ala Gly Asp Arg Arg Pro Leu Pro
1 5 10 15

Val Asp Arg Ala Ala Gly Leu Lys Glu Asn Asn Thr Leu Ile Leu Leu
20 25 30

Asp Val Ser Thr Lys Asn Pro Val Arg Thr Val Asn Glu Asn Phe Leu
35 40 45

Ser Leu Gln Leu
50

<210> 1479
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q61K"

<400> 1479
Ile Glu Asp Ser Tyr Arg Lys Gln Val Val Ile Asp Gly Glu Thr Cys
1 5 10 15

Leu Leu Asp Ile Leu Asp Thr Ala Gly Lys Lys Glu Glu Tyr Ser Ala
20 25 30

Met Arg Asp Gln Tyr Met Arg Thr Gly Glu Gly Phe Leu Cys Val Phe
35 40 45

Ala Ile Asn Asn
50

<210> 1480
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q61R"

<400> 1480
Ile Glu Asp Ser Tyr Arg Lys Gln Val Val Ile Asp Gly Glu Thr Cys
1 5 10 15

Leu Leu Asp Ile Leu Asp Thr Ala Gly Arg Arg Glu Glu Tyr Ser Ala
20 25 30

Met Arg Asp Gln Tyr Met Arg Thr Gly Glu Gly Phe Leu Cys Val Phe
35 40 45

Ala Ile Asn Asn
50

<210> 1481
<211> 38
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G12S"

<400> 1481
Met Thr Glu Tyr Lys Leu Val Val Val Gly Ala Ser Ser Gly Val Gly
1 5 10 15

Lys Ser Ala Leu Thr Ile Gln Leu Ile Gln Asn His Phe Val Asp Glu
20 25 30

Tyr Asp Pro Thr Ile Glu
35

<210> 1482
<211> 38
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<400> 1482
Met Thr Glu Tyr Lys Leu Val Val Val Gly Ala Asp Asp Gly Val Gly
1 5 10 15

Lys Ser Ala Leu Thr Ile Gln Leu Ile Gln Asn His Phe Val Asp Glu
20 25 30

Tyr Asp Pro Thr Ile Glu
35

<210> 1483
<211> 38
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G12A"

<400> 1483
Met Thr Glu Tyr Lys Leu Val Val Val Gly Ala Ala Ala Gly Val Gly
1 5 10 15

Lys Ser Ala Leu Thr Ile Gln Leu Ile Gln Asn His Phe Val Asp Glu
20 25 30

Tyr Asp Pro Thr Ile Glu
35

<210> 1484
<211> 39
<212> PRT

<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<400> 1484
Met Thr Glu Tyr Lys Leu Val Val Val Gly Ala Gly Val Val Val Gly
1 5 10 15

Lys Ser Ala Leu Thr Ile Gln Leu Ile Gln Asn His Phe Val Asp Glu
20 25 30

Tyr Asp Pro Thr Ile Glu Asp
35

<210> 1485
<211> 33
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.P439fs"

<400> 1485
Pro His His His His His Arg Val Pro Arg Glu Glu Asp Glu Glu Val
1 5 10 15

Ser Ala Glu Leu Gly His Gln Ala Pro Gln Pro Gln Ala Lys Pro Pro
20 25 30

Arg

<210> 1486
<211> 50
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.H92P"

<400> 1486
Leu Gly Ile Phe His His His Arg His Pro Gly His Val Ser His Val
1 5 10 15

Pro Asn Val Gly Leu His His His His Pro Pro Pro Arg His Thr Pro
20 25 30

His His Leu His His His His His Pro His Arg His His Pro Arg His
35 40 45

Ala Arg
50

<210> 1487
<211> 27
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.M1fs"

<400> 1487
Cys Leu Asn Ser Tyr Lys Ala Ser Ser Leu Ser Ser Met Phe Ser Thr
1 5 10 15

Asn Met Pro Pro Ser Met Gly Ser Met Ile Arg
20 25

<210> 1488
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G2539S"

<400> 1488
Gln His Gly Ser Gly Ser Ser Gln Ser Ser Gly Tyr Gly Arg Gln Gly
1 5 10 15

Ser Gly Ser Gly Gln Ser Pro Gly His Ser Ser Gln Arg Gly Ser Gly
20 25 30

Ser Arg Gln Ser Pro Ser Tyr Gly Arg His Gly Ser Gly Ser Gly Arg
35 40 45

Ser Ser Ser Ser
50

<210> 1489
<211> 44
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R120Q"

<400> 1489
Ile Tyr Lys Gln Tyr Phe Lys Ser Asn Phe Pro Ala Arg Ala Ala Tyr
1 5 10 15

Gln Val Ala Ala Leu Pro Lys Gly Ser Gln Gln Ile Glu Ile Glu Ala
20 25 30

Val Ala Ile Gln Gly Pro Leu Thr Thr Ala Ser Leu
35 40

<210> 1490
<211> 47
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E287K"

<400> 1490
Arg Asp Arg Cys Leu His Glu Ser Lys Gly Arg Ala His Pro Gln Val
1 5 10 15

Asp Pro Lys Leu Leu Asn Lys Leu His Lys Lys Tyr Phe His Glu Pro
20 25 30

Asn Lys Lys Phe Phe Glu Leu Val Gly Arg Thr Phe Asp Trp His
35 40 45

<210> 1491
<211> 34
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G399W"

<400> 1491
Glu Ile Asp Arg Glu Val Val Arg Arg Leu Arg Glu Phe Tyr Arg Pro
1 5 10 15

Phe Asn Leu Lys Phe Tyr Gln Met Thr Trp Trp His Asp Phe Gly Trp
20 25 30

Asp Gly

<210> 1492
<211> 42
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G313S"

<400> 1492
Val Pro Ala Lys Ala Glu Ala Gly Ala Glu Ala Gly Gly Gly Ala Gly
1 5 10 15

Pro Gly Ala Glu Asp Glu Ala Gly Arg Ser Ser Ala Val Gly Asp Pro
20 25 30

Glu Leu Gly Asp Pro Pro Ala Ala Pro Gln
35 40

<210> 1493
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F209L"

<400> 1493
Glu Ala Phe Ser Asp Ile Leu Arg Arg Glu Ile Gln His Phe Gly Val
1 5 10 15

Lys Ile Ser Ile Val Glu Pro Gly Tyr Leu Leu Arg Thr Gly Met Thr
20 25 30

Asn Met Thr Gln Ser Leu Glu Arg Met Lys Gln Ser Trp Lys Glu Ala
35 40 45

Pro Lys His Ile
50

<210> 1494
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R169W"

<400> 1494
Gln Ala Leu Arg Gly Val Gln Glu Ser Thr Glu Ala Arg Leu Arg Glu
1 5 10 15

Leu Arg Gln Gln Asn Glu Ile Leu Trp Trp Trp Glu Val Val Thr Leu
20 25 30

Arg Gln Ser His Gly Gln Gln His Arg Val Ile Gly Lys Leu Ile Gln
35 40 45

Cys Leu Phe Gly
50

<210> 1495
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V85L"

<400> 1495
Asp Glu Asn Gly His Ile Ser Ile Pro Ser Met Val Ser Phe Thr Asp
1 5 10 15

Asn Asp Val Tyr Val Gly Tyr Glu Ser Leu Leu Glu Leu Ala Asp Ser
20 25 30

Asn Pro Gln Asn Thr Ile Tyr Asp Ala Lys Arg Phe Ile Gly Lys Ile
35 40 45

Phe Thr Ala Glu
50

<210> 1496
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R483C"

<400> 1496
Arg Ile Gly Ser Phe Thr Ile Gln Asn Val Phe Pro Gln Ser Asp Gly
1 5 10 15

Asp Ser Ser Lys Val Lys Val Lys Val Cys Cys Val Asn Ile His Gly
20 25 30

Ile Phe Ser Val Ala Ser Ala Ser Val Ile Glu Lys Gln Asn Leu Glu
35 40 45

Gly Asp His Ser
50

<210> 1497
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R282L"

<400> 1497
His Tyr Val Glu Ser Ile Asp Pro Val Thr Val Ser Ile Asn Ser Trp
1 5 10 15

Ile Glu Leu Glu Glu Asp His Leu Ala Leu Leu Val Glu Glu Ala Ile
20 25 30

Thr Arg Met Leu Val Cys Ala Leu Lys Thr Ala Glu Asn Pro Gln Asn
35 40 45

Thr Arg Ala Trp
50

<210> 1498
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S219L"

<400> 1498
Leu Lys Ile Ile Ala Val Trp Thr Ile Ser Val Gly Ile Ser Met Pro
1 5 10 15

Ile Pro Val Phe Gly Leu Gln Asp Asp Leu Leu Lys Val Phe Lys Glu
20 25 30

Gly Ser Cys Leu Leu Ala Asp Asp Asn Phe Val Leu Ile Gly Ser Phe
35 40 45

Val Ser Phe Phe
50

<210> 1499
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R236C"

<400> 1499
Ser Val Ser Ser Thr Tyr Ser Ile Leu Gln Ser Ser Ala Gly Gly Phe
1 5 10 15

Ala Gln Ile Gln Phe Asn Val Val Met Cys Cys Arg His Pro Leu Val
20 25 30

Tyr Val Val Ser Leu Leu Ile Pro Ser Ile Phe Leu Met Leu Val Asp
35 40 45

Leu Gly Ser Phe
50

<210> 1500
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R152C"

<400> 1500
Ala Ser Ile Trp Asn Val Thr Ala Ile Ala Leu Asp Arg Tyr Trp Ser
1 5 10 15

Ile Thr Arg His Met Glu Tyr Thr Leu Cys Cys Thr Arg Lys Cys Val
20 25 30

Ser Asn Val Met Ile Ala Leu Thr Trp Ala Leu Ser Ala Val Ile Ser
35 40 45

Leu Ala Pro Leu
50

<210> 1501
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.W298C"

<400> 1501
Asp Thr Trp Arg Glu Gln Lys Glu Gln Arg Ala Ala Leu Met Val Gly
1 5 10 15

Ile Leu Ile Gly Val Phe Val Leu Cys Cys Cys Ile Pro Phe Phe Leu
20 25 30

Thr Glu Leu Ile Ser Pro Leu Cys Ser Cys Asp Ile Pro Ala Ile Trp
35 40 45

Lys Ser Ile Phe
50

<210> 1502
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q403R"

<400> 1502
Asp Phe Pro Glu Val Ser Ser Gly Ile Tyr Val Gln Glu Val Ala Pro
1 5 10 15

Asn Ser Pro Ser Gln Arg Gly Gly Ile Arg Arg Asp Gly Asp Ile Ile
20 25 30

Val Lys Val Asn Gly Arg Pro Leu Val Asp Ser Ser Glu Leu Gln Glu
35 40 45

Ala Val Leu Thr
50

<210> 1503
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D222N"

<400> 1503
Ala Phe Met Lys Glu Thr Ile Lys Leu Gly Ile Lys Ser Arg Pro Lys
1 5 10 15

Gly Leu Trp Gly Tyr Tyr Leu Tyr Pro Asn Asn Cys His Asn Tyr Asn
20 25 30

Val Tyr Ala Pro Asn Tyr Ser Gly Ser Cys Pro Glu Asp Glu Val Leu
35 40 45

Arg Asn Asn Glu
50

<210> 1504
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R451Q"

<400> 1504
Asn Pro Leu Glu Ala Lys Leu Tyr Gln Gln Thr Ile Tyr Cys Asp Ile
1 5 10 15

Leu Gly Arg Glu Ile Arg Leu Pro Leu Gln Gln Ile Lys Gly Glu Gly
20 25 30

Met Gly Pro Lys Ile His Phe Asn Phe Glu Leu Leu Asp Ile Gly Lys
35 40 45

Val Phe Thr Gly
50

<210> 1505
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R939Q"

<400> 1505
Pro Glu Leu Asn Leu Gly Ala His Phe Ser Leu Asp Thr His Tyr Tyr
1 5 10 15

His Phe Lys Leu Ile Asn Lys Gly Arg Gln Gln Ile Gln Gln Leu Phe
20 25 30

Trp Met Asn Asp Ser Phe Arg Pro Gln Ala Lys Leu Ser Lys Lys Gly
35 40 45

Arg Val Lys Lys
50

<210> 1506
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R1187C"

<400> 1506
Val His Tyr Pro Asn Leu Ser Phe Glu Thr Lys Glu Leu Asp Phe Gly
1 5 10 15

Cys Ile Leu Asn Asp Thr Glu Leu Ile Cys Cys Tyr Val Thr Ile Thr
20 25 30

Asn Cys Ser Pro Leu Val Val Lys Phe Arg Trp Phe Phe Leu Val Asn
35 40 45

Asp Glu Glu Asn
50

<210> 1507
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R158C"

<400> 1507
Thr Val His Phe Gln Ile Ser Ser Gln Leu Gln Phe Ser Pro Glu Glu
1 5 10 15

Val Leu Gly Met Val Leu Asn Tyr Ser Cys Cys Ser Leu Ala Glu Asp
20 25 30

Phe Ala Glu Gln Pro Ile Lys Asp Ala Val Ile Thr Val Pro Val Phe
35 40 45

Phe Asn Gln Ala
50

<210> 1508
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R832C"

<400> 1508
Tyr Cys Glu Lys Glu Asn Asp Pro Lys Arg Arg Ser Cys Gln Thr Ala
1 5 10 15

Leu Val Glu Ile Leu Asp Val Ile Val Cys Cys Ser Phe Ala Pro Ile
20 25 30

Leu Pro His Leu Ala Glu Glu Val Phe Gln His Ile Pro Tyr Ile Lys
35 40 45

Glu Pro Lys Ser
50

<210> 1509
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S130R"

<400> 1509
Arg Thr Leu Tyr Asp Val Ile Leu Tyr Gly Leu Gln Glu His Ser Glu
1 5 10 15

Val Ser Gly Phe Leu Leu Glu Cys Asp Arg Arg Ser Val Gln Gly Ala
20 25 30

Leu Gln Lys His Leu Ala Leu Tyr Arg Ile Arg Arg Lys Val Thr Val
35 40 45

Glu Pro His Pro
50

<210> 1510
<211> 74
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K1213fs"

<400> 1510
Pro Val Asn Ala Trp Ala Ser Ser Leu His Ser Val Ser Ser Lys Ser
1 5 10 15

Phe Arg Asp Phe Leu Leu Glu Glu Lys Ser Leu Leu Leu Ala Ile Val
20 25 30

Gln Ala Ile Met Ser Lys Lys Phe Leu Leu Lys Glu Leu Lys Ile Leu
35 40 45

Arg His Gln Lys Leu Ser Asp Ala Leu Pro Met Val Pro Gln Asp Gln
50 55 60

Lys Ala Thr Ile Phe Gln Ile Tyr His Phe
65 70

<210> 1511
<211> 30
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K37fs"

<400> 1511
Ala Leu Pro Ser Thr Phe Arg Ser Val Leu Gly Ala Arg Leu Pro Pro
1 5 10 15

Pro Glu Arg Leu Cys Gly Phe Gln Lys Arg Leu Thr Ala Lys
20 25 30

<210> 1512
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R132G"

<400> 1512
Val Phe Arg Glu Ala Ile Ile Cys Lys Asn Ile Pro Arg Leu Val Ser
1 5 10 15

Gly Trp Val Lys Pro Ile Ile Ile Gly Gly Gly His Ala Tyr Gly Asp
20 25 30

Gln Tyr Arg Ala Thr Asp Phe Val Val Pro Gly Pro Gly Lys Val Glu
35 40 45

Ile Thr Tyr Thr
50

<210> 1513
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R132C"

<400> 1513
Val Phe Arg Glu Ala Ile Ile Cys Lys Asn Ile Pro Arg Leu Val Ser
1 5 10 15

Gly Trp Val Lys Pro Ile Ile Ile Gly Cys Cys His Ala Tyr Gly Asp
20 25 30

Gln Tyr Arg Ala Thr Asp Phe Val Val Pro Gly Pro Gly Lys Val Glu
35 40 45

Ile Thr Tyr Thr
50

<210> 1514
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R132H"

<400> 1514
Val Phe Arg Glu Ala Ile Ile Cys Lys Asn Ile Pro Arg Leu Val Ser
1 5 10 15

Gly Trp Val Lys Pro Ile Ile Ile Gly His His His Ala Tyr Gly Asp
20 25 30

Gln Tyr Arg Ala Thr Asp Phe Val Val Pro Gly Pro Gly Lys Val Glu
35 40 45

Ile Thr Tyr Thr
50

<210> 1515
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R140Q"

<400> 1515
Thr Ile Thr Pro Asp Glu Ala Arg Val Glu Glu Phe Lys Leu Lys Lys
1 5 10 15

Met Trp Lys Ser Pro Asn Gly Thr Ile Gln Gln Asn Ile Leu Gly Gly
20 25 30

Thr Val Phe Arg Glu Pro Ile Ile Cys Lys Asn Ile Pro Arg Leu Val
35 40 45

Pro Gly Trp Thr
50

<210> 1516
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R172K"

<400> 1516
Val Phe Arg Glu Pro Ile Ile Cys Lys Asn Ile Pro Arg Leu Val Pro
1 5 10 15

Gly Trp Thr Lys Pro Ile Thr Ile Gly Lys Lys His Ala His Gly Asp
20 25 30

Gln Tyr Lys Ala Thr Asp Phe Val Ala Asp Arg Ala Gly Thr Phe Lys
35 40 45

Met Val Phe Thr
50

<210> 1517
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T374P"

<400> 1517
Asp Asn Ala Phe Leu Ser Tyr His Pro His Pro Phe Ala Gln Arg Thr
1 5 10 15

Leu Thr Ala Arg Phe Gln Val Asn Asn Pro Pro Arg Pro Pro His Val
20 25 30

Gln Leu Leu Arg Lys Pro Val Leu Thr Ala Met Gly Leu Leu Ala Leu
35 40 45

Leu Asp Glu Glu
50

<210> 1518
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.H33Q"

<400> 1518
Ala Ala Leu Leu Ala Leu Leu Ala Ser Leu Leu Ala Ala Pro Pro Val
1 5 10 15

Ala Pro Ala Glu Ala Pro His Leu Val Gln Gln Val Asp Ala Ala Arg
20 25 30

Ala Leu Trp Pro Leu Arg Arg Phe Trp Arg Ser Thr Gly Phe Cys Pro
35 40 45

Pro Leu Pro His
50

<210> 1519
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R194G"

<400> 1519
Ser Arg Ala Ala Arg Arg Pro Cys Gly Cys Pro Leu Gly Gly Glu Asp
1 5 10 15

Pro Pro Gly Thr Pro Ala Ala Thr Pro Gly Gly Ala Ala Cys Cys Cys
20 25 30

Ala Pro Gln Pro Ala Glu Asp Glu Pro Pro Ala Pro Pro Ala Val Cys
35 40 45

Pro Arg Lys Arg
50

<210> 1520
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V79A"

<400> 1520
Lys Asp Arg His Asp Phe Arg Ile Pro Gln Glu Glu Phe Asp Gly Asn
1 5 10 15

Gln Phe Gln Lys Ala Gln Ala Ile Ser Ala Ala Leu His Glu Met Ile
20 25 30

Gln Gln Thr Phe Asn Leu Phe Ser Thr Glu Asp Ser Ser Ala Ala Trp
35 40 45

Glu Gln Ser Leu
50

<210> 1521
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L80F"

<400> 1521
Asp Arg His Asp Phe Arg Ile Pro Gln Glu Glu Phe Asp Gly Asn Gln
1 5 10 15

Phe Gln Lys Ala Gln Ala Ile Ser Val Phe Phe His Glu Met Ile Gln
20 25 30

Gln Thr Phe Asn Leu Phe Ser Thr Glu Asp Ser Ser Ala Ala Trp Glu
35 40 45

Gln Ser Leu Leu
50

<210> 1522
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 1522
Val Asp Glu Gly Leu Lys Asn Tyr Val Pro Val Asn His Phe Trp Asp
1 5 10 15

Gln Ser Glu Pro Arg Leu Phe Val Cys Lys Lys Ala Val Gln Glu Thr
20 25 30

Pro Arg Ser Gln Pro Gln Ser Ala Asn Gly Gln Pro Gln Asp Gly Arg
35 40 45

Ala Gly Pro Ala
50

<210> 1523
<211> 52
<212> PRT
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多肽"

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<400> 1523
Tyr Glu Arg Ala Gly Asp Leu Phe Glu Lys Ile His Asn Pro Gln Lys
1 5 10 15

Ala Leu Glu Cys Tyr Arg Lys Gly Asn Thr Thr Phe Met Lys Ala Val
20 25 30

Glu Leu Ala Arg Leu Ala Phe Pro Val Glu Val Val Lys Leu Glu Glu
35 40 45

Ala Trp Gly Asp
50

<210> 1524
<211> 52
<212> PRT
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多肽"

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<400> 1524
Ala Gln His Tyr Ala Ser Leu Gln Glu Tyr Glu Ile Ala Glu Glu Leu
1 5 10 15

Tyr Thr Lys Gly Asp Arg Thr Lys Asp Val Val Ile Asp Met Tyr Thr
20 25 30

Gln Ala Gly Arg Trp Glu Gln Ala His Lys Leu Ala Met Lys Cys Met
35 40 45

Arg Pro Glu Asp
50

<210> 1525
<211> 52
<212> PRT
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多肽"

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<400> 1525
Ser Ser Pro Ser Pro Pro Gln Arg Ala Gln Arg Gly Asp His Ser Ser
1 5 10 15

Arg Glu Gln Gly His Ala Pro Gly Gly Ser Ser Ser Gln Ala Arg Gln
20 25 30

Ile Asp Phe Pro Leu Arg Ile Leu Val Pro Thr Gln Phe Val Gly Ala
35 40 45

Ile Ile Gly Lys
50

<210> 1526
<211> 29
<212> PRT
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肽"

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<400> 1526
His Lys Val Ala Gly Leu Leu Thr Gln Lys Leu Thr Tyr Glu Asn Gly
1 5 10 15

Leu Leu Lys Met Asn Phe Thr Gly Gly Gly His Leu Pro
20 25

<210> 1527
<211> 52
<212> PRT
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多肽"

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<400> 1527
Phe Leu Ala Glu Asp Arg Arg Ile Asn Val Ala Val Thr Arg Ala Arg
1 5 10 15

Arg His Val Ala Val Ile Cys Asp Ser Ser Ser Thr Val Asn Asn His
20 25 30

Ala Phe Leu Lys Thr Leu Val Glu Tyr Phe Thr Gln His Gly Glu Val
35 40 45

Arg Thr Ala Phe
50

<210> 1528
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 1528
Lys Cys Ala Arg Ile Thr Ser Arg Ile Ile Arg Ser Ser Glu Asp Pro
1 5 10 15

Asn Glu Asp Ile Val Glu Arg Asn Ile Gln Gln Ile Ile Val Pro Leu
20 25 30

Asn Asn Arg Glu Asn Ile Ser Asp Pro Thr Ser Pro Leu Arg Thr Arg
35 40 45

Phe Val Tyr His
50

<210> 1529
<211> 45
<212> PRT
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多肽"

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<400> 1529
Asp Pro Ala Ala Arg Arg Arg Lys Lys Lys Ser Tyr Tyr Ala Lys Leu
1 5 10 15

Arg Gln Gln Glu Ile Glu Arg Glu Arg Ala Ser Arg Glu Val Pro Gly
20 25 30

Ser Cys Gln Gly Thr Glu Arg Trp Ser Glu Gln Arg Leu
35 40 45

<210> 1530
<211> 52
<212> PRT
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多肽"

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<400> 1530
Lys Arg Ser His Thr Gly Glu Arg Pro Phe Gln Cys Asn Gln Cys Gly
1 5 10 15

Ala Ser Phe Thr Gln Lys Gly Asn Leu Arg Arg Arg His Ile Lys Leu
20 25 30

His Thr Gly Glu Lys Pro Phe Lys Cys His Leu Cys Asn Tyr Ala Cys
35 40 45

Gln Arg Arg Asp
50

<210> 1531
<211> 52
<212> PRT
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多肽"

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<400> 1531
Phe Leu Leu Thr Ile Ser Ile Phe Leu Gly Leu Gly Gln Pro Arg Ser
1 5 10 15

Pro Lys Ser Lys Arg Lys Gly Gln Gly Trp Trp Pro Gly Pro Leu Ala
20 25 30

Pro Gly Pro His Gln Val Pro Leu Asp Leu Val Ser Arg Met Lys Pro
35 40 45

Tyr Ala Arg Met
50

<210> 1532
<211> 99
<212> PRT
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<220>
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多肽"

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<400> 1532
Pro Tyr Glu Glu Glu Gln Arg Gln Ser Val Gln Ser Asp Gln Gly Tyr
1 5 10 15

Ile Ser Arg Ser Ser Pro Gln Pro Pro Arg Gly Thr His Gly Asn Gly
20 25 30

Gly Arg Gly Gly Arg Gly Ala Gly Pro Arg Glu Ala Gly Pro Ala Thr
35 40 45

Leu Ser Arg Gly Pro Gly Glu Pro Glu Glu Pro Pro Ala Ala Ala Ala
50 55 60

Phe Pro Pro Ala Ala Glu Glu Leu Gly Leu Gly His Asp Gly Val Arg
65 70 75 80

Val Arg Gly Ala Gln Cys Met Arg Ala Ala Pro Gln Gly Pro Pro Arg
85 90 95

Ser Gln Leu

<210> 1533
<211> 59
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 1533
Lys Glu Ala Ser Ser Thr Phe Ser Trp Gly Ile Val Leu Ala Pro Leu
1 5 10 15

Ser Leu Ala Phe Leu Val Leu Gly Gly Asn Met Asp Ala Gln Thr Val
20 25 30

Gln Thr Gln Asn Trp Lys Ser Arg Trp Ser Asp Cys Ala Met Ala Ser
35 40 45

Ser Ser Arg Leu Ser Ile Leu Ser Gln Val Lys
50 55

<210> 1534
<211> 52
<212> PRT
<213> 人工序列

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多肽"

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<400> 1534
Asp Asp Trp Gly Leu Asp Thr Met Arg Gln Ile Gln Val Phe Glu Asp
1 5 10 15

Glu Pro Ala Arg Ile Lys Cys Pro Leu Cys Cys Glu His Phe Leu Lys
20 25 30

Phe Asn Tyr Ser Thr Ala His Ser Ala Gly Leu Thr Leu Ile Trp Tyr
35 40 45

Trp Thr Arg Gln
50

<210> 1535
<211> 52
<212> PRT

<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.T647M"

<400> 1535
Lys His Glu Ile Pro Ala Thr Thr Leu Pro Val Pro Ser Leu Gly Asn
1 5 10 15

His His Thr Tyr Cys Asn Leu Pro Leu Met Met Leu Leu Asn Gly Gln
20 25 30

Leu Pro Leu Asn Asn Thr Leu Lys Asp Thr Gln Glu Phe His Arg Asn
35 40 45

Ser Ser Leu Leu
50

<210> 1536
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R103M"

<400> 1536
Cys Leu Glu Glu Glu Leu Lys Pro Leu Glu Glu Val Leu Asn Leu Ala
1 5 10 15

Gln Ser Lys Asn Phe His Leu Arg Pro Met Met Asp Leu Ile Ser Asn
20 25 30

Ile Asn Val Ile Val Leu Glu Leu Lys Gly Ser Glu Thr Thr Phe Met
35 40 45

Cys Glu Tyr Ala
50

<210> 1537
<211> 65
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1537
His Gly Glu Lys Gly Thr His Lys Gly Tyr Cys Leu Glu Arg Arg Leu
1 5 10 15

Tyr Arg Val Ser Leu Ala Cys Val Cys Ala Ala Pro Cys Asp Gly Leu
20 25 30

Ala Gly Pro Ala Gly Gly Trp Ser Leu Phe Gly Lys Pro Gly Ala Arg
35 40 45

Cys Thr Thr Thr Cys His Glu Gly Pro Gly Cys Pro Asp Ala Trp Pro
50 55 60

Leu
65

<210> 1538
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.A90T"

<400> 1538
Asp Ile Leu Met Glu Asn Asn Leu Arg Arg Pro Asn Leu Glu Ala Phe
1 5 10 15

Asn Arg Ala Val Lys Ser Leu Gln Asn Thr Thr Ser Ala Ile Glu Ser
20 25 30

Ile Leu Lys Asn Leu Leu Pro Cys Leu Pro Leu Ala Thr Ala Ala Pro
35 40 45

Thr Arg His Pro
50

<210> 1539
<211> 46
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.P215T"

<400> 1539
Leu Trp Lys Gln Phe Gln Ser Phe Cys Cys Ser Leu Ser Glu Leu Phe
1 5 10 15

Met Ser Ser Phe Gln Ser Tyr Gly Ala Thr Thr Arg Gly Asp Lys Glu
20 25 30

Glu Leu Thr Pro Gln Lys Cys Ser Glu Pro Gln Ser Ser Lys
35 40 45

<210> 1540
<211> 36
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1540
Gln Phe Gln Ser Phe Cys Cys Ser Leu Ser Glu Leu Phe Met Ser Ser
1 5 10 15

Phe Gln Ser Tyr Gly Ala Pro Arg Gly Glu Gln Gly Gly Ala Asp Thr
20 25 30

Pro Glu Val Leu
35

<210> 1541
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1541
Leu Leu Pro Asp Glu Lys Ile Ser Leu Leu Pro Pro Val Asn Phe Thr
1 5 10 15

Ile Lys Val Thr Gly Leu Ala Gln Val Ile Ile Leu Gln Trp Lys Pro
20 25 30

Asn Pro Asp Gln Glu Gln Arg Asn Val Asn Leu Glu Tyr Gln Val Lys
35 40 45

Ile Asn Ala Pro
50

<210> 1542
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.P216H"

<400> 1542
Phe Val Asn Ile Glu Val Trp Val Glu Ala Glu Asn Ala Leu Gly Lys
1 5 10 15

Val Thr Ser Asp His Ile Asn Phe Asp His His Val Tyr Lys Val Lys
20 25 30

Pro Asn Pro Pro His Asn Leu Ser Val Ile Asn Ser Glu Glu Leu Ser
35 40 45

Ser Ile Leu Lys
50

<210> 1543
<211> 52
<212> PRT

<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.S54L"

<400> 1543
Asp Leu Glu Asp Ala Glu Leu Asp Asp Tyr Ser Phe Ser Cys Tyr Ser
1 5 10 15

Gln Leu Glu Val Asn Gly Ser Gln His Leu Leu Leu Thr Cys Ala Phe
20 25 30

Glu Asp Pro Asp Val Asn Ile Thr Asn Leu Glu Phe Glu Ile Cys Gly
35 40 45

Ala Leu Val Glu
50

<210> 1544
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.E484K"

<400> 1544
Val Lys Val Leu Gln Asp Met Gly Leu Pro Thr Gly Ala Glu Gly Arg
1 5 10 15

Asp Ser Ser Lys Gly Glu Asp Ser Ala Lys Lys Glu Thr Glu Ala Lys
20 25 30

Pro Ala Val Val Ala Pro Ala Pro Val Val Glu Ala Val Ser Thr Pro
35 40 45

Ser Ala Ala Phe
50

<210> 1545
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.P1340A"

<400> 1545
Lys Leu Val Phe Ile Arg Asn Glu Asp Ala Val Asn Gln Met Ala Val
1 5 10 15

Thr Pro Phe Pro Val Pro Ser Ser Ser Ala Ala Ser Ser Ile Glu Asp
20 25 30

Gln Ser Gly Thr Glu Pro Ile Ser Ser Glu Glu Asp Gly Ser Val Glu
35 40 45

Val Gly Ile Lys
50

<210> 1546
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.S527fs"

<400> 1546
Pro Leu Leu Pro Gly Met Gly Trp Gly Pro Pro Pro Pro Pro Pro Pro
1 5 10 15

Leu Leu Pro Cys Thr Cys Ser Pro Pro Trp Arg Glu Ala Trp Arg Arg
20 25 30

Ser Ser Trp Pro Arg Trp Thr Met Ala Trp Ala Gln His Gly Ser Pro
35 40 45

Ala Ile Gly Gly
50

<210> 1547
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.A220S"

<400> 1547
Asp Glu Cys Tyr Glu Arg Phe Ser Arg Glu Thr Asp Gly Ala Gln Lys
1 5 10 15

Arg Arg Met Leu His Cys Val Gln Arg Ser Ser Leu Ile Arg Ser Gln
20 25 30

Glu Leu Gly Asp Glu Lys Ile Gln Ile Val Ser Gln Met Val Glu Leu
35 40 45

Val Glu Asn Arg
50

<210> 1548
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.G56V"

<400> 1548
Pro Ser Pro Glu Ala Glu Met Leu Lys Phe Asn Leu Glu Cys Leu His
1 5 10 15

Lys Thr Phe Gly Pro Gly Gly Leu Gln Val Val Asp Thr Leu Ile Asp
20 25 30

Ile Gly Ser Gly Pro Thr Ile Tyr Gln Val Leu Ala Ala Cys Asp Ser
35 40 45

Phe Gln Asp Ile
50

<210> 1549
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S212F"

<400> 1549
Leu Lys Pro Gly Gly His Leu Val Thr Thr Val Thr Leu Arg Leu Pro
1 5 10 15

Ser Tyr Met Val Gly Lys Arg Glu Phe Phe Phe Cys Val Ala Leu Glu
20 25 30

Lys Glu Glu Val Glu Gln Ala Val Leu Asp Ala Gly Phe Asp Ile Glu
35 40 45

Gln Leu Leu His
50

<210> 1550
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<223> /注釋="p.R523Q"

<400> 1550
Ser Phe Met Phe Asn Gly Thr Ser Leu Gly Phe Val Asn Ser His Leu
1 5 10 15

Thr Ser Gly Ser Glu Lys Lys Leu Arg Gln Gln Asn Gln Asn Tyr Met
20 25 30

Asn Ile Leu Arg Phe Leu Ala Leu Gly Asp Lys Lys Leu Ser Pro Phe
35 40 45

Asn Ile Thr His
50

<210> 1551
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R263C"

<400> 1551
Glu Gly Arg Leu Leu Phe Pro Pro Thr Tyr Lys Phe Asp Arg Asn Ser
1 5 10 15

Asn Asp Tyr Asp Thr Ser Glu Lys Lys Cys Cys Lys Pro Ala Trp Thr
20 25 30

Asp Arg Ile Leu Trp Arg Leu Lys Arg Gln Pro Cys Ala Gly Pro Asp
35 40 45

Thr Pro Ile Pro
50

<210> 1552
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T493M"

<400> 1552
Val Phe Gly Thr Gln Glu Asn Ser Val Gly Asp Arg Glu Trp Leu Asp
1 5 10 15

Leu Leu Arg Gly Gly Leu Lys Glu Leu Met Met Asp Leu Asp Tyr Arg
20 25 30

Pro Ile Ala Met Gln Ser Leu Trp Asn Ile Lys Val Ala Val Leu Val
35 40 45

Lys Pro Glu His
50

<210> 1553
<211> 179
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A974fs"

<400> 1553
Ala Pro Arg Glu Glu Pro Leu Thr Pro Arg Leu Lys Pro Glu Gly Ala
1 5 10 15

Pro Glu Pro Glu Gly Val Ala Ala Pro His Pro Arg Thr Ala Ser Ile
20 25 30

Thr Leu Pro Thr Thr Ser Leu Lys Gly Ser Arg Thr Ser Cys Cys Pro
35 40 45

Arg Ser His Pro Arg Leu Pro Gly Pro Leu Ser His Leu Pro Pro Arg
50 55 60

Thr Lys Trp Pro Leu Gln Cys Leu Leu His Ser Leu Gly Thr Thr Gly
65 70 75 80

Thr Leu Val Trp Glu Arg Gly Val Leu Gln Met Arg Ser Leu Glu Ala
85 90 95

His Cys Pro Leu Gln Thr Phe His Leu His His Cys Arg Thr Gln Pro
100 105 110

Ser Ser Cys Pro Pro Ala Trp Ile Leu Tyr Gln Gly Gln Trp Ser Gly
115 120 125

Ala Val Val Gly Leu Arg Pro Val Ala His His Leu Pro Arg Pro Ile
130 135 140

Gln Gly Leu His Cys Pro Gln Ala Pro His Gln Pro Ala Leu Ser Trp
145 150 155 160

Gly Lys Trp Pro Val Gly Met Thr Gly Pro Ala Arg Cys Cys Arg Trp
165 170 175

Pro Arg Arg

<210> 1554
<211> 70
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.P1154fs"

<400> 1554
Ser Glu Val Asp Tyr Ala Pro Ala Gly Pro Ala Arg Ser Ala Leu Leu
1 5 10 15

Pro Gly Pro Leu Glu Leu Gln Pro Pro Gly Asp Cys Pro Arg Thr Met
20 25 30

Ala Gly Pro Ser Ala Ser Leu His Pro Ala Ser Gly Arg Ala Ser Arg
35 40 45

Lys Thr Trp Gln Arg Arg Leu Arg Ala Cys Arg Ala Gly Gly Pro Ala
50 55 60

Gly Trp Ala Arg Gln Ala
65 70

<210> 1555
<211> 27
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
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<223> /注釋="p.M1V"

<400> 1555
Val Val Ala Ala Thr Val Asn Leu Glu Leu Asp Pro Ile Phe Leu Lys
1 5 10 15

Ala Leu Gly Phe Leu His Ser Lys Ser Lys Asp
20 25

<210> 1556
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.S460A"

<400> 1556
Met Arg Lys Ile Ser Asn Asn Ile Thr Leu Arg Glu Asp Gln Leu Asp
1 5 10 15

Thr Val Leu Ala Val Leu Glu Asp Ser Ala Ala Arg Asp Ile Arg Glu
20 25 30

Ala Leu His Glu Leu Leu Cys Cys Thr Asn Val Ser Thr Lys Glu Gly
35 40 45

Ile His Leu Ala
50

<210> 1557
<211> 49
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R940C"

<400> 1557
Gly Ile Val Trp Lys Thr Gly Pro Arg Thr Thr Ile Phe Val Lys Ser
1 5 10 15

Leu Glu Asp Pro Tyr Ser Gln Gln Ile Cys Cys Leu Gln Gln Gln Gln
20 25 30

Ala Gln Gln Pro Leu Gln Gln Gln Gln Gln Arg Asn Ala Tyr Thr Arg
35 40 45

Phe

<210> 1558
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R106I"

<400> 1558
Leu Cys Val Leu Lys Val Thr Gln Gln Ser Glu Lys His Leu Glu Lys
1 5 10 15

Ile Leu Asn Val Asp Glu Phe Val Lys Ile Ile Ile Phe Ser Val Ile
20 25 30

His Ser Asn Asp Pro Val Ala Arg Ala Ile Thr Leu Arg Met Leu Gly
35 40 45

Ser Leu Ala Ser
50

<210> 1559
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<223> /注釋="p.R799K"

<400> 1559
Trp Lys Pro Ser Arg Arg His Asp Thr Glu Pro Lys Ala Lys Cys Ala
1 5 10 15

Pro Gln Lys Arg Arg Thr Gln Glu Leu Lys Lys Gly Gly Arg Cys Ser
20 25 30

Pro Ala Gly Ser Ser Arg Pro Gly Ser Ala Arg Gly Glu Ala Val His
35 40 45

Ala Gly Gln Asn
50

<210> 1560
<211> 43
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.R815fs"

<400> 1560
Lys Arg Arg Thr Gln Glu Leu Arg Gly Gly Arg Cys Ser Pro Ala Gly
1 5 10 15

Ser Ser Arg Pro Gly Ser Ala Arg Gly Arg Arg Ser Met Leu Gly Arg
20 25 30

Ile Leu Pro Thr Ile Val His Gln Glu Thr Lys
35 40

<210> 1561
<211> 46
<212> PRT
<213> 人工序列

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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 1561
Glu Arg Tyr Pro Val Val Met Ser Thr Tyr Leu Gly Val Met Gly Arg
1 5 10 15

Val Leu Leu Gln Asn Thr Ser Phe Phe Leu His Tyr Leu Met Arg Trp
20 25 30

Pro Ile Asn Leu Ile Arg Arg Trp Thr Ser Phe Trp Glu Ile
35 40 45

<210> 1562
<211> 52
<212> PRT
<213> 人工序列

<220>
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<400> 1562
Pro Tyr Met Arg Asn Gly Thr Leu Phe Asp Arg Leu Gln Cys Val Gly
1 5 10 15

Asp Thr Ala Pro Leu Pro Trp His Ile Gln Gln Ile Gly Ile Leu Ile
20 25 30

Gly Ile Ser Lys Ala Ile His Tyr Leu His Asn Val Gln Pro Cys Ser
35 40 45

Val Ile Cys Gly
50

<210> 1563
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<400> 1563
His Leu Glu His Thr Gly Phe Ser Lys Ala Lys Leu Glu Ser Met Glu
1 5 10 15

Thr Tyr Leu Lys Ala Val Lys Leu Phe Gln Gln Asn Asp Gln Asn Ser
20 25 30

Ser Gly Glu Pro Glu Tyr Ser Gln Val Ile Gln Ile Asn Leu Asn Ser
35 40 45

Ile Val Pro Ser
50

<210> 1564
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.K123R"

<400> 1564
Arg Cys Ala Leu Asn Lys Ser Asn Asp Phe Glu Glu Leu Val Glu Arg
1 5 10 15

Ser Gln Leu Asp Ile Ser Asp Pro Tyr Arg Arg Val Tyr Arg Ile Val
20 25 30

Pro Glu Gly Ala Lys Lys Gly Ala Lys Gln Leu Thr Leu Glu Asp Pro
35 40 45

Gln Met Ser Met
50

<210> 1565
<211> 36
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.G591fs"

<400> 1565
Gly His Gly Ser Gly Gly Gly Gln Gly Pro Gly Asp Gly His Gly Ser
1 5 10 15

Gly Gly Gly Lys Asn Ser Gly Gly Gly Gln Arg Leu Arg Lys Trp Glu
20 25 30

Arg Ile Arg Trp
35

<210> 1566
<211> 53
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

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<223> /注釋="p.21_22AA>A"

<400> 1566
Met Ala Ser Cys Ser Phe Thr Arg Asp Gln Ala Thr Arg Arg Leu Arg
1 5 10 15

Gly Ala Ala Ala Ala Ala Ala Ala Ala Leu Ala Ala Val Val Thr Thr
20 25 30

Pro Leu Leu Ser Ser Gly Thr Pro Thr Ala Leu Ile Gly Thr Gly Ser
35 40 45

Ser Cys Pro Gly Ala
50

<210> 1567
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L422P"

<400> 1567
Leu Val Ser Ala Pro Leu Gly Lys Phe Pro Ala Trp Thr Asn Arg Pro
1 5 10 15

Phe Pro Gly Pro Pro Pro Gly Pro Arg Pro Pro His Pro Leu Ser Leu
20 25 30

Leu Gly Ser Ala Pro Pro His Leu Leu Gly Leu Pro Gly Ala Ala Gly
35 40 45

His Pro Ala Ala
50

<210> 1568
<211> 48
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A425V"

<400> 1568
Cys Asp Glu Ser Ser Cys Ile Pro Lys Ala Phe Gly Asn Pro Lys Phe
1 5 10 15

Ala Leu Gln Gly Leu Pro Leu Asn Cys Val Val Pro Cys Pro Arg Arg
20 25 30

Ser Glu Pro Val Val Gln Cys Gln Tyr Pro Ser Gly Ala Glu Ala Gly
35 40 45

<210> 1569
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R86C"

<400> 1569
Ala Ala Ser Gly Ser Gly Leu Glu Lys Pro Pro Lys Asp Gln Pro Gln
1 5 10 15

Glu Gly Arg Lys Ser Lys Arg Arg Val Cys Cys Thr Thr Phe Thr Thr
20 25 30

Glu Gln Leu His Glu Leu Glu Lys Ile Phe His Phe Thr His Tyr Pro
35 40 45

Asp Val His Ile
50

<210> 1570
<211> 28
<212> PRT
<213> 人工序列

<220>
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肽"

<220>
<221> 來源
<223> /注釋="p.C2F"

<400> 1570
Met Phe Phe Ala Glu Val Gly Pro Ala Leu Cys Arg Gly Met Glu Arg
1 5 10 15

Asn Ser Leu Gly Cys Cys Glu Ala Pro Lys Lys Leu
20 25

<210> 1571
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R669Q"

<400> 1571
Pro Ile Val His Leu Thr Pro Ser Leu Glu Val Thr Pro Gln Ala Ile
1 5 10 15

Ser Val Val Gln Arg Asp Cys Arg Arg Gln Gln Gly Gln Glu Ala Val
20 25 30

Cys Leu Thr Ala Ala Leu Cys Phe Gln Val Thr Ser Arg Thr Pro Gly
35 40 45

Arg Trp Asp His
50

<210> 1572
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T673M"

<400> 1572
Tyr Leu Ala Val Gly Ser Met Lys Thr Leu Met Leu Asn Val Ser Leu
1 5 10 15

Phe Asn Ala Gly Asp Asp Ala Tyr Glu Met Met Thr Leu His Val Lys
20 25 30

Leu Pro Val Gly Leu Tyr Phe Ile Lys Ile Leu Glu Leu Glu Glu Lys
35 40 45

Gln Ile Asn Cys
50

<210> 1573
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F900L"

<400> 1573
Gly Ile Val Arg Phe Leu Ser Lys Thr Asp Lys Arg Leu Leu Tyr Cys
1 5 10 15

Ile Lys Ala Asp Pro His Cys Leu Asn Leu Leu Leu Cys Asn Phe Gly
20 25 30

Lys Met Glu Ser Gly Lys Glu Ala Ser Val His Ile Gln Leu Glu Gly
35 40 45

Arg Pro Ser Ile
50

<210> 1574
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A48D"

<400> 1574
Pro Pro Leu Leu Pro Leu Leu Leu Leu Leu Leu Pro Pro Pro Pro Arg
1 5 10 15

Val Gly Gly Phe Asn Leu Asp Ala Glu Asp Asp Pro Ala Val Leu Ser
20 25 30

Gly Pro Pro Gly Ser Phe Phe Gly Phe Ser Val Glu Phe Tyr Arg Pro
35 40 45

Gly Thr Asp Gly
50

<210> 1575
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G616C"

<400> 1575
Thr Glu Phe Arg Asp Lys Leu Ser Pro Ile Asn Ile Ser Leu Asn Tyr
1 5 10 15

Ser Leu Asp Glu Ser Thr Phe Lys Glu Cys Cys Leu Glu Val Lys Pro
20 25 30

Ile Leu Asn Tyr Tyr Arg Glu Asn Ile Val Ser Glu Gln Ala His Ile
35 40 45

Leu Val Asp Cys
50

<210> 1576
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R685H"

<400> 1576
Lys Arg Ser Lys Asn Leu Leu Gly Ser Arg Asp Leu Gln Ser Ser Val
1 5 10 15

Thr Leu Asp Leu Ala Leu Asp Pro Gly His His Leu Ser Pro Arg Ala
20 25 30

Thr Phe Gln Glu Thr Lys Asn Arg Ser Leu Ser Arg Val Arg Val Leu
35 40 45

Gly Leu Lys Ala
50

<210> 1577
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R283H"

<400> 1577
Thr Asp Gly Lys Lys Glu Gly Asp Ser Leu Asp Tyr Lys Asp Val Ile
1 5 10 15

Pro Met Ala Asp Ala Ala Gly Ile Ile His His Tyr Ala Ile Gly Val
20 25 30

Gly Leu Ala Phe Gln Asn Arg Asn Ser Trp Lys Glu Leu Asn Asp Ile
35 40 45

Ala Ser Lys Pro
50

<210> 1578
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.L378I"

<400> 1578
Pro Lys Ser Ala Val Gly Thr Leu Ser Ala Asn Ser Ser Asn Val Ile
1 5 10 15

Gln Leu Ile Ile Asp Ala Tyr Asn Ser Ile Ile Ser Ser Glu Val Ile
20 25 30

Leu Glu Asn Gly Lys Leu Ser Glu Gly Val Thr Ile Ser Tyr Lys Ser
35 40 45

Tyr Cys Lys Asn
50

<210> 1579
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D158N"

<400> 1579
Leu Lys Phe Lys Arg Ala Glu Asp Tyr Pro Ile Asp Leu Tyr Tyr Leu
1 5 10 15

Met Asp Leu Ser Tyr Ser Met Lys Asp Asn Asn Leu Glu Asn Val Lys
20 25 30

Ser Leu Gly Thr Asp Leu Met Asn Glu Met Arg Arg Ile Thr Ser Asp
35 40 45

Phe Arg Ile Gly
50

<210> 1580
<211> 42
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A7fs"

<400> 1580
Met Cys Gly Ser Ala Leu Ala Phe Phe Tyr Arg Cys Ile Cys Leu Pro
1 5 10 15

Ala Lys Arg Pro Ala Arg Ser Arg Leu Val Pro Leu Gly Ser Leu Gly
20 25 30

Val Phe Thr Cys Ser Trp Thr Gly Pro Arg
35 40

<210> 1581
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.G254W"

<400> 1581
Lys Gly His Val Leu Phe Arg Pro Thr Val Ser Gln Gln Gln Ser Cys
1 5 10 15

Pro Thr Cys Ser Thr Ser Leu Leu Asn Trp Trp His Phe Lys Val Thr
20 25 30

Tyr Asp Val Ser Arg Asp Lys Ile Cys Asp Leu Leu Val Ala Asn Asn
35 40 45

His Phe Ala His
50

<210> 1582
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.L842V"

<400> 1582
Thr Leu Asp Lys Glu Met Ser Phe Ser Val Leu Leu His Arg Val Trp
1 5 10 15

Lys Lys His Pro Val Asn Val Asp Phe Val Val Gly Ile Tyr Ile Pro
20 25 30

Pro Thr Asn Lys Phe Ser Pro Lys Ala His Gly Leu Ile Gly Gln Phe
35 40 45

Met Gln Glu Pro
50

<210> 1583
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.E196K"

<400> 1583
Pro Glu Glu Thr Val Val Ile Ala Leu Tyr Asp Tyr Gln Thr Asn Asp
1 5 10 15

Pro Gln Glu Leu Ala Leu Arg Arg Asn Lys Lys Glu Tyr Cys Leu Leu
20 25 30

Asp Ser Ser Glu Ile His Trp Trp Arg Val Gln Asp Arg Asn Gly His
35 40 45

Glu Gly Tyr Val
50

<210> 1584
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R29L"

<400> 1584
Phe Ile Leu Leu Glu Glu Gln Leu Ile Lys Lys Ser Gln Gln Lys Arg
1 5 10 15

Arg Thr Ser Pro Ser Asn Phe Lys Val Leu Leu Phe Phe Val Leu Thr
20 25 30

Lys Ala Ser Leu Ala Tyr Phe Glu Asp Arg His Gly Lys Lys Arg Thr
35 40 45

Leu Lys Gly Ser
50

<210> 1585
<211> 52
<212> PRT

<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.E167K"

<400> 1585
Ala Asp Ile Ile His Asp Phe Gln Arg Gly Leu Thr Ala Tyr His Asp
1 5 10 15

Ile Ser Leu Asp Lys Cys Tyr Val Ile Lys Lys Leu Asn Thr Thr Ile
20 25 30

Val Leu Pro Pro Arg Asn Phe Trp Glu Leu Leu Met Asn Val Lys Arg
35 40 45

Gly Thr Tyr Leu
50

<210> 1586
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.M1569I"

<400> 1586
Cys Gly Leu Glu Arg Asp Lys Phe Asp Asn Lys Thr Val Thr Phe Glu
1 5 10 15

Glu His Ile Lys Glu Glu His Asn Met Ile Cys His Tyr Leu Cys Phe
20 25 30

Ile Val Leu Val Lys Val Lys Asp Ser Thr Glu Tyr Thr Gly Pro Glu
35 40 45

Ser Tyr Val Ala
50

<210> 1587
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P358Q"

<400> 1587
Arg Asp Gly Val Pro Pro Thr Ser Lys Lys Lys Arg Gln Ala Gly Glu
1 5 10 15

Lys Ile Met Tyr Thr Leu Val Ser Val Gln Gln His Gly Asn Asp Ile
20 25 30

Ala Ser Leu Phe Glu Leu Asp Ala Thr Thr Leu Gln Arg Ala Asp Cys
35 40 45

Leu Val Pro Arg
50

<210> 1588
<211> 31
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S802fs"

<400> 1588
Phe Gln Ala Thr Ser Lys Lys Gly Ile Ser Arg Leu Asp Lys Gln Met
1 5 10 15

Arg Lys Phe Thr Asp Ile Arg Lys Lys Ala Asp Leu His Thr Gln
20 25 30

<210> 1589
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.A462T"

<400> 1589
Asp Cys Leu Pro Gly Trp Met Gly Gln Asn Cys Asp Ile Asn Ile Asn
1 5 10 15

Asp Cys Leu Gly Gln Cys Gln Asn Asp Thr Thr Ser Cys Arg Asp Leu
20 25 30

Val Asn Gly Tyr Arg Cys Ile Cys Pro Pro Gly Tyr Ala Gly Asp His
35 40 45

Cys Glu Arg Asp
50

<210> 1590
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.V310I"

<400> 1590
Ile Phe Glu Thr Ser Met Leu Leu Ile Ser Ser Glu Asn Glu Met Asn
1 5 10 15

Trp Phe His Ser Asn Asp Gly Gly Asn Ile Ile Leu Tyr Tyr Glu Val
20 25 30

Met Val Thr Gly Asn Leu Gly Ile Gln Trp Arg His Lys Pro Asn Val
35 40 45

Val Ser Val Glu
50

<210> 1591
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.R283I"

<400> 1591
Met Ser Ser Pro Lys Arg Glu Ile Pro Gly Arg Ala Gly Asp Gly Ser
1 5 10 15

Glu His Cys Ser Ser Pro Asp Leu Arg Ile Ile Asn Gln Lys Arg Ile
20 25 30

Ala Glu Leu Asn Ala Thr Ile Arg Lys Leu Glu Asp Arg Asn Thr Leu
35 40 45

Leu Gly Asp Glu
50

<210> 1592
<211> 49
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.G394fs"

<400> 1592
Val Asn His Thr Ile Ser Gly Lys Thr Glu Ser Ser Asn Ala Lys Thr
1 5 10 15

Arg Lys Gln Val Leu Ser Leu Gly Gly Gly Val Gln Val His Trp Ala
20 25 30

Arg Arg Gln Trp Pro Gln Gly Gln Trp Gln Val Glu Pro Lys Val Met
35 40 45

His

<210> 1593
<211> 60
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V422fs"

<400> 1593
Thr Gly Pro Ala Val Asn Gly Leu Lys Val Ser Gly Arg Leu Asn Pro
1 5 10 15

Lys Ser Cys Thr Lys Glu Val Gly Gly Gly Ser Cys Gly Arg Ala Cys
20 25 30

Ser Cys Gly Arg Gly Cys Gly Thr Pro Arg Gly Asp Trp Lys Arg His
35 40 45

Thr Arg Arg Arg Ser Arg Ser Arg Pro Pro Arg Arg
50 55 60

<210> 1594
<211> 65
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R97fs"

<400> 1594
His His Ala Val Asp Ile Asp Leu Tyr His Cys Pro Asn Cys Ala Val
1 5 10 15

Leu His Gly Ser Ser Leu Met Lys Lys Gly Gly Thr Gly Thr Asp Met
20 25 30

Thr Thr Gln Lys Leu Met Met Val Pro Asn Gln Cys Lys Leu Glu Leu
35 40 45

Glu Leu Ser Leu Arg Asn Tyr Ala Leu Glu Ser Ser Gln Val Pro Met
50 55 60

Lys
65

<210> 1595
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R313H"

<400> 1595
Thr Ser Val Trp Tyr His Val Leu Trp Gly Glu Lys Ile Phe Tyr Leu
1 5 10 15

Ile Lys Pro Thr Asp Glu Asn Leu Ala His His Tyr Glu Ser Trp Ser
20 25 30

Ser Ser Val Thr Gln Ser Glu Val Phe Phe Gly Asp Lys Val Asp Lys
35 40 45

Cys Tyr Lys Cys
50

<210> 1596
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R1198S"

<400> 1596
Ser His Ser Val Thr Thr Phe Arg Asn Asp Cys Arg Ser Pro Thr His
1 5 10 15

Leu Thr Val Ser Ser Thr Asn Thr Leu Ser Ser Ser Met Pro Ala Leu
20 25 30

His Arg Ala Pro Val Phe His Pro Pro Ile His His Ser Leu Glu Arg
35 40 45

Lys Glu Gly Ser
50

<210> 1597
<211> 37
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A11V"

<400> 1597
Met Arg Ala Gly Pro Glu Pro Gln Ala Leu Val Val Gly Gln Lys Arg
1 5 10 15

Gly Ala Leu Arg Leu Leu Val Pro Arg Leu Val Leu Thr Val Ser Ala
20 25 30

Pro Ala Glu Val Arg
35

<210> 1598
<211> 86
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.PPPPPPPPPPPP811del"

<400> 1598
Leu Asn Asn Asn Leu Glu Pro Cys Ser Val Thr Ile Asn Pro Leu Pro
1 5 10 15

Ser Pro Leu Pro Pro Thr Pro Pro Pro Leu Pro Val Ala Lys Asp Ser
20 25 30

Gly Pro Glu Thr Leu Glu Lys Asp Leu Pro Arg Lys Glu Gly Asn Glu
35 40 45

Lys Arg Ile Pro Lys Ser Ala Ser Ala Pro Ser Ala His Leu Phe Asp
50 55 60

Ser Ser Gln Leu Val Ser Ala Arg Lys Lys Leu Arg Lys Thr Ala Glu
65 70 75 80

Gly Leu Gln Arg Arg Arg
85

<210> 1599
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A395T"

<400> 1599
Ala Arg Thr Lys Val Glu Ile Ala Asn Ser Arg Thr Ala His Ala Arg
1 5 10 15

Ala Lys Ala Asp Ala Ala Asp Gln Ala Thr Thr Leu Ala Ala Arg Gln
20 25 30

Glu Cys Asp Ile Ala Arg Ala Val Ala Arg Glu Leu Ser Pro Asp Phe
35 40 45

Tyr Gln Pro Gly
50

<210> 1600
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q433H"

<400> 1600
Glu Ala Arg Ile Ala Arg Ile Thr Ala Lys Glu Phe Ser Pro Ser Phe
1 5 10 15

Gln His Arg Glu Asn Gly Leu Glu Tyr His His Arg Pro Lys Arg Gln
20 25 30

Thr Ser Cys Asp Asp Ile Glu Val Leu Ser Thr Gly Thr Pro Leu Gln
35 40 45

Gln Glu Ser Pro
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<210> 1601
<211> 52
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多肽"

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<400> 1601
Glu Lys Glu Pro Ala Ala Arg Gly Thr Pro Gly Thr Gly Lys Glu Arg
1 5 10 15

Leu Lys Ala Gly Ala Ser Pro Arg Ser Ala Ala Pro Ala Arg Lys Lys
20 25 30

Ala Gln Thr Ala Pro Pro Leu Gln Pro Pro Pro Pro Pro Pro Ala Leu
35 40 45

Ser Glu Glu Leu
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<210> 1602
<211> 52
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多肽"

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<400> 1602
Arg Val Ala Ala Gly Val Leu Cys Glu Leu Ala Gln Asp Lys Glu Ala
1 5 10 15

Ala Asp Ala Ile Asp Ala Glu Gly Ala Leu Leu Ala Pro Leu Met Glu
20 25 30

Leu Leu His Ser Arg Asn Glu Gly Thr Ala Thr Tyr Ala Ala Ala Val
35 40 45

Leu Phe Arg Ile
50

<210> 1603
<211> 52
<212> PRT
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多肽"

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<400> 1603
Ser Lys His Phe Arg Ser Ser Lys Asp Pro Ser Ala Pro Pro Ala Pro
1 5 10 15

Ala Asn Leu Arg Leu Ala Asn Ser Thr Ile Ile Asn Ser Asp Gly Ser
20 25 30

Val Thr Val Thr Ile Val Trp Asp Leu Pro Glu Glu Pro Asp Ile Pro
35 40 45

Val His His Tyr
50

<210> 1604
<211> 52
<212> PRT
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多肽"

<220>
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<400> 1604
Val Glu Ala Asp Ala Trp Val Thr Glu Ala Leu Leu Gly Leu Pro Ala
1 5 10 15

Ala Ala Glu Arg Glu Leu Glu Leu Leu His His Ala Ser Leu Glu His
20 25 30

Gln Arg Gly Val Ser Glu Leu Leu Arg Gly Arg Leu Arg Glu Leu Glu
35 40 45

Glu Ala Arg Glu
50

<210> 1605
<211> 52
<212> PRT
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多肽"

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<400> 1605
Val Gln Glu Gly Ala Glu Pro Pro Glu Gly Val Val Lys Val Pro Asn
1 5 10 15

His Leu Pro Leu Pro Gly Pro Pro Phe Pro Pro Phe Gln Asn Val Leu
20 25 30

Val Val Leu Glu Asp Lys Glu Asp Glu His Asn Ala Arg Glu Ala Glu
35 40 45

Val Leu Phe Thr
50

<210> 1606
<211> 52
<212> PRT

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多肽"

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<400> 1606
Ile Gly Trp Asn Thr Gly Ala Leu Val Ala Cys His Val Ser Val Met
1 5 10 15

Glu Tyr Val Thr Ala Val Val Cys Leu Glu Glu Phe Pro Leu Leu Thr
20 25 30

Val Asp Gly Pro Arg Gly Asp Val Asp Asp Pro Leu Leu Asp Met Lys
35 40 45

Thr Pro Val Leu
50

<210> 1607
<211> 52
<212> PRT
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多肽"

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<400> 1607
Gly Gly Phe Arg Ala Thr Leu Gln Val Leu Arg Gly Asp Arg Pro Ala
1 5 10 15

Leu Ala Ala Glu Asp Glu Leu Leu Gln Val Val Val Glu Cys Ala Ala
20 25 30

Phe Leu Gln Ala Pro Ala Leu Ala Arg Phe Leu Glu His Asn Leu Thr
35 40 45

Ser Asp Asn Cys
50

<210> 1608
<211> 32
<212> PRT
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多肽"

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<400> 1608
Leu Ala Asp Arg Leu Leu Cys Arg Glu Gly Met Asp Val Ala Tyr Leu
1 5 10 15

Asn Gly Tyr Ile Tyr Ile Leu Gly Gly Ala Arg Pro Tyr Tyr Trp Ser
20 25 30

<210> 1609
<211> 52
<212> PRT
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多肽"

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<223> /注釋="p.V549I"

<400> 1609
Tyr Leu Lys Leu Val Leu Phe Gln Asn Lys Leu His Leu Phe Val Arg
1 5 10 15

Ala Thr Gln Val Thr Val Glu Glu His Ile Ile Phe Arg Thr Ser Arg
20 25 30

Lys Asn Ser Leu Tyr Gln Tyr Asp Asp Ile Ala Asp Gln Trp Met Lys
35 40 45

Val Tyr Glu Thr
50

<210> 1610
<211> 52
<212> PRT
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多肽"

<220>
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<400> 1610
Glu Ala Glu Ser His Phe Ser Ser Ile Pro Asp Ala Phe Trp Trp Ala
1 5 10 15

Val Val Ser Met Thr Thr Val Gly Tyr Cys Cys Asp Met Tyr Pro Val
20 25 30

Thr Ile Gly Gly Lys Ile Val Gly Ser Leu Cys Ala Ile Ala Gly Val
35 40 45

Leu Thr Ile Ala
50

<210> 1611
<211> 52
<212> PRT
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多肽"

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<400> 1611
Thr Leu Lys Ala Ser Met Arg Glu Leu Gly Leu Leu Ile Phe Phe Leu
1 5 10 15

Phe Ile Gly Val Ile Leu Phe Ser Ser Val Val Val Tyr Phe Ala Glu
20 25 30

Ala Asp Asp Pro Thr Ser Gly Phe Ser Ser Ile Pro Asp Ala Phe Trp
35 40 45

Trp Ala Val Val
50

<210> 1612
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R231H"

<400> 1612
Ser Thr Ile Ala Leu Ser Leu Asn Thr Leu Pro Glu Leu Gln Glu Thr
1 5 10 15

Asp Glu Phe Gly Gln Leu Asn Asp Asn His His Gln Leu Ala His Val
20 25 30

Glu Ala Val Cys Ile Ala Trp Phe Thr Met Glu Tyr Leu Leu Arg Phe
35 40 45

Leu Ser Ser Pro
50

<210> 1613
<211> 44
<212> PRT
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<220>
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多肽"

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<400> 1613
Val Pro Val Ile Val Asn Asn Phe Gly Met Tyr Tyr Ser Leu Ala Met
1 5 10 15

Ala Lys Gln Lys Leu Pro Lys Lys Lys Arg Ser Ile Phe Arg Gly His
20 25 30

Arg Ser Trp Asp Leu Pro Ile Ile Val Asn Leu Ser
35 40

<210> 1614
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<223> /注釋="p.S438L"

<400> 1614
Asn Gln Arg Ala Asp Lys Arg Arg Ala Gln Lys Lys Ala Arg Leu Ala
1 5 10 15

Arg Ile Arg Val Ala Lys Thr Gly Ser Leu Leu Asn Ala Tyr Leu His
20 25 30

Ser Lys Arg Asn Gly Leu Leu Asn Glu Ala Leu Glu Leu Thr Gly Thr
35 40 45

Pro Glu Glu Glu
50

<210> 1615
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1615
Met Phe Ile Leu Asn Phe Glu Val Val Met Glu Lys Asp Met Val Gly
1 5 10 15

Ser Pro Ala His Asp Thr Asn His Arg Ala Ala Pro Pro Thr Ser Trp
20 25 30

Leu Ala Pro Gly Arg Ala Lys Thr Phe Arg Leu Lys Leu Pro Ala Leu
35 40 45

Leu Ala Leu Thr
50

<210> 1616
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.M455I"

<400> 1616
Ser Ser Leu Thr Ser Val Gly Phe Gly Asn Val Ser Ala Asn Thr Asp
1 5 10 15

Ala Glu Lys Ile Phe Ser Ile Cys Thr Ile Ile Leu Ile Gly Ala Leu
20 25 30

Met His Ala Leu Val Phe Gly Asn Val Thr Ala Ile Ile Gln Arg Met
35 40 45

Tyr Ser Arg Trp
50

<210> 1617
<211> 120
<212> PRT
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多肽"

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<223> /注釋="p.P102fs"

<400> 1617
Gly Thr Trp Phe Leu Phe Gly Val Val Trp Tyr Leu Val Ala Val Ala
1 5 10 15

His Gly Asp Leu Leu Glu Leu Asp Pro Arg Pro Thr Thr Pro Pro Val
20 25 30

Trp Tyr Arg Cys Thr His Ser Leu Glu Pro Ser Ser Ser Pro Leu Asn
35 40 45

Pro Lys Pro Pro Leu Ala Met Ala Ser Ala Thr Ser Val Arg Asn Val
50 55 60

His Trp Pro Leu Cys Phe Leu Leu Pro Ser Trp Cys Ser Pro Pro Ser
65 70 75 80

Trp Lys Ser Ser Ser Gln Val Pro Ser Trp Arg Arg Leu Pro Gly Pro
85 90 95

Arg Ser Gly Leu Arg Pro Phe Val Ser Ala Ser Met Gln Leu Trp Pro
100 105 110

Pro Thr Met Ala Ser Pro Ala Ser
115 120

<210> 1618
<211> 52
<212> PRT
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多肽"

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<400> 1618
Lys Ile Thr Gly Arg Glu Asp Phe Pro Lys Lys Leu Leu Arg Met Ser
1 5 10 15

Ser Thr Thr Ser Glu Lys Ala Tyr Ser Phe Phe Gly Asp Leu Pro Met
20 25 30

Lys Leu Gln Arg Ile Ser Ser Val Pro Gly Asn Ser Glu Glu Lys Leu
35 40 45

Val Ser Lys Thr
50

<210> 1619
<211> 47
<212> PRT

<213> 人工序列

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多肽"

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<400> 1619
Met Tyr Arg Pro Arg Ala Arg Ala Ala Pro Glu Gly Arg Val Arg Gly
1 5 10 15

Cys Ala Val Pro Gly Gly Thr Val Leu Leu Leu Leu Ala Tyr Leu Ala
20 25 30

Tyr Leu Ala Leu Gly Thr Gly Val Phe Trp Thr Leu Glu Gly Arg
35 40 45

<210> 1620
<211> 49
<212> PRT
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多肽"

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<223> /注釋="p.G23V"

<400> 1620
Met Glu Val Ser Gly His Pro Gln Ala Arg Arg Cys Cys Pro Glu Ala
1 5 10 15

Leu Gly Lys Leu Phe Pro Val Val Leu Cys Phe Leu Cys Phe Leu Val
20 25 30

Thr Tyr Ala Leu Val Gly Ala Val Val Phe Ser Ala Ile Glu Asp Gly
35 40 45

Gln

<210> 1621
<211> 32
<212> PRT
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多肽"

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<223> /注釋="p.S6W"

<400> 1621
Met Leu Pro Ser Ala Trp Trp Arg Glu Arg Pro Gly Tyr Arg Ala Gly
1 5 10 15

Val Ala Ala Pro Asp Leu Leu Asp Pro Lys Ser Ala Ala Gln Asn Ser
20 25 30

<210> 1622
<211> 52
<212> PRT

<213> 人工序列

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多肽"

<220>
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<223> /注釋="p.R166L"

<400> 1622
His Trp Asp Leu Gly Ser Ser Phe Phe Phe Ala Gly Thr Val Ile Thr
1 5 10 15

Thr Ile Gly Phe Gly Asn Ile Ser Pro Leu Leu Thr Glu Gly Gly Lys
20 25 30

Ile Phe Cys Ile Ile Tyr Ala Leu Leu Gly Ile Pro Leu Phe Gly Phe
35 40 45

Leu Leu Ala Gly
50

<210> 1623
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 1623
Lys Leu Leu Leu Tyr His Thr Glu Glu Thr Ile Lys Ile Asn Gln Lys
1 5 10 15

Cys Ser Tyr Ile Pro Lys Cys Gly Lys Lys Lys Phe Glu Glu Ser Met
20 25 30

Ser Leu Val Asn Val Val Met Glu Asn Phe Arg Lys Tyr Gln His Phe
35 40 45

Ser Cys Tyr Ser
50

<210> 1624
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.D211N"

<400> 1624
Ser Arg Val Phe Ser Ile Leu Ser Ile Leu Val Val Met Gly Ser Ile
1 5 10 15

Ile Thr Met Cys Leu Asn Ser Leu Pro Asn Asn Phe Gln Ile Pro Asp
20 25 30

Ser Gln Gly Asn Pro Gly Glu Asp Pro Arg Phe Glu Ile Val Glu His
35 40 45

Phe Gly Ile Ala
50

<210> 1625
<211> 88
<212> PRT
<213> 人工序列

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多肽"

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<223> /注釋="p.L314fs"

<400> 1625
Lys Leu Tyr Arg Phe Phe Lys Tyr Ile Glu Asn Arg Asp Val Ala Lys
1 5 10 15

Thr Val Leu Lys Glu Arg Gly Leu Lys Thr Phe Ala Leu Glu Leu Lys
20 25 30

Val Thr Leu Pro Val Lys Lys Lys Leu Arg Glu Gly Leu Ala Ala Gly
35 40 45

Leu Lys Ser Ser Ile Ile Met Tyr Asn Ala Pro Ser Ser Arg Cys His
50 55 60

Gly Lys Arg Lys Lys Gly Arg Val Ala Met Trp Ile Ser Ser Val Phe
65 70 75 80

Glu Ala Asn Pro Ser Arg Ile Trp
85

<210> 1626
<211> 32
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 1626
Met Ser Asp Pro Ile Met Met Leu Asn Val Gly Gly Lys Leu Tyr Thr
1 5 10 15

Thr Ser Leu Ala Thr Leu Thr Ser Phe Pro Asp Ser Met Leu Gly Ala
20 25 30

<210> 1627
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.L447I"

<400> 1627
Leu Lys Trp Ala Lys Asp His Asp Glu Glu Ala Lys Lys Ile Ala Lys
1 5 10 15

Ala Gly Gln Glu Phe Ala Arg Asn Asn Ile Ile Met Gly Asp Asp Ile
20 25 30

Phe Cys Tyr Tyr Phe Lys Leu Phe Gln Glu Tyr Ala Asn Leu Gln Val
35 40 45

Ser Glu Pro Gln
50

<210> 1628
<211> 52
<212> PRT
<213> 人工序列

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多肽"

<220>
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<223> /注釋="p.F361L"

<400> 1628
His Leu Ser Asn Leu Glu Tyr Ala Cys Gly Ser Asn Leu His Gln Val
1 5 10 15

Ser Ala Arg Ser Trp Asp His Asn Glu Leu Leu Phe Ala Gln Phe Ala
20 25 30

Gly Asp His Thr Leu Leu Thr Pro Gly Tyr Ser Val Ile Ile Glu Lys
35 40 45

Leu Ala Glu Gly
50

<210> 1629
<211> 34
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.P1316fs"

<400> 1629
Ser Leu Arg Asp Leu Leu His Ser Gly Pro Gly Lys Leu Pro Gln Thr
1 5 10 15

Pro Leu Asp Thr Gly Ile Pro Phe Pro Arg Ser Ser Leu His Pro Gln
20 25 30

Gln Glu

<210> 1630
<211> 52
<212> PRT

<213> 人工序列

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多肽"

<220>
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<223> /注釋="p.P423S"

<400> 1630
Val Ser Ser Ile Glu Glu Asp Val Ile Val Glu Tyr Gly Ala Asp Ile
1 5 10 15

Ser Ser Lys Asp Phe Gly Ser Gly Phe Ser Ser Val Lys Asp Gly Arg
20 25 30

Arg Lys Ile Leu Pro Glu Glu Glu Glu Tyr Ala Leu Ser Gly Trp Asn
35 40 45

Leu Asn Asn Met
50

<210> 1631
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R470C"

<400> 1631
Pro Glu Arg Asp Glu Trp His Leu Val Ala Pro Met Leu Thr Arg Arg
1 5 10 15

Ile Gly Val Gly Val Ala Val Leu Asn Cys Cys Leu Leu Tyr Ala Val
20 25 30

Gly Gly Phe Asp Gly Thr Asn Arg Leu Asn Ser Ala Glu Cys Tyr Tyr
35 40 45

Pro Glu Arg Asn
50

<210> 1632
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.G480W"

<400> 1632
Pro Met Leu Thr Arg Arg Ile Gly Val Gly Val Ala Val Leu Asn Arg
1 5 10 15

Leu Leu Tyr Ala Val Gly Gly Phe Asp Trp Trp Thr Asn Arg Leu Asn
20 25 30

Ser Ala Glu Cys Tyr Tyr Pro Glu Arg Asn Glu Trp Arg Met Ile Thr
35 40 45

Ala Met Asn Thr
50

<210> 1633
<211> 48
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.G603W"

<400> 1633
Leu Asp Ser Val Glu Cys Tyr Asp Pro Asp Thr Asp Thr Trp Ser Glu
1 5 10 15

Val Thr Arg Met Thr Ser Gly Arg Ser Trp Trp Val Gly Val Ala Val
20 25 30

Thr Met Glu Pro Cys Arg Lys Gln Ile Asp Gln Gln Asn Cys Thr Cys
35 40 45

<210> 1634
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.S144F"

<400> 1634
Gly Met Glu Val Val Ser Ile Glu Gly Ile His Pro Lys Val Met Glu
1 5 10 15

Arg Leu Ile Glu Phe Ala Tyr Thr Ala Phe Phe Ile Ser Met Gly Glu
20 25 30

Lys Cys Val Leu His Val Met Asn Gly Ala Val Met Tyr Gln Ile Asp
35 40 45

Ser Val Val Arg
50

<210> 1635
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.V155F"

<400> 1635
Pro Lys Val Met Glu Arg Leu Ile Glu Phe Ala Tyr Thr Ala Ser Ile
1 5 10 15

Ser Met Gly Glu Lys Cys Val Leu His Phe Phe Met Asn Gly Ala Val
20 25 30

Met Tyr Gln Ile Asp Ser Val Val Arg Ala Cys Ser Asp Phe Leu Val
35 40 45

Gln Gln Leu Asp
50

<210> 1636
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R260L"

<400> 1636
Asp Asp Leu Asn Val Arg Cys Glu Ser Glu Val Phe His Ala Cys Ile
1 5 10 15

Asn Trp Val Lys Tyr Asp Cys Glu Gln Leu Leu Arg Phe Tyr Val Gln
20 25 30

Ala Leu Leu Arg Ala Val Arg Cys His Ser Leu Thr Pro Asn Phe Leu
35 40 45

Gln Met Gln Leu
50

<210> 1637
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.V411M"

<400> 1637
Arg Lys Leu Ser Gln Lys Leu Arg Glu Leu Thr Glu Gln Pro Pro Met
1 5 10 15

Pro Ala Arg Pro Arg Trp Met Lys Cys Met Met Glu Glu Thr Gly Thr
20 25 30

Phe Phe Glu Pro Thr Leu Ala Ala Leu Phe Val Arg Glu Ala Phe Gly
35 40 45

Pro Ser Thr Arg
50

<210> 1638
<211> 52
<212> PRT

<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S203L"

<400> 1638
Leu Asn Gly Ser Glu Asp Ser Gly Arg Gly Arg Gly Ile Arg Gly Arg
1 5 10 15

Gly Ile Arg Ile Ala Pro Thr Ala Pro Leu Leu Arg Gly Arg Gly Gly
20 25 30

Ala Ile Pro Pro Pro Pro Pro Pro Gly Arg Gly Val Leu Thr Pro Arg
35 40 45

Gly Ser Thr Val
50

<210> 1639
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.K63R"

<400> 1639
Arg Lys Val Ala Lys Glu Gly Gly Pro Lys Val Thr Ser Arg Asn Phe
1 5 10 15

Glu Lys Ser Ile Thr Lys Leu Gly Lys Arg Arg Gly Val Lys Gln Phe
20 25 30

Lys Asn Lys Gln Gln Gly Asp Lys Ser Pro Lys Asn Lys Phe Gln Pro
35 40 45

Ala Asn Lys Phe
50

<210> 1640
<211> 41
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.T120fs"

<400> 1640
Ser Thr Pro Lys Arg Val Pro Met Gly Pro Ile Ile Val Pro Pro Gly
1 5 10 15

Gly His Ser Val Pro Ser Thr Pro Pro Arg Gly Asp His Arg Ser Asn
20 25 30

Gln Asn Arg Glu Trp Cys Leu Glu Glu
35 40

<210> 1641
<211> 37
<212> PRT
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 1641
Gly Leu Glu Thr Gly Trp Asn Cys His Ile Ser Leu Thr Pro Asn Gly
1 5 10 15

Asp Met Pro Gly Ser Glu Ile Pro Pro Pro Ala Pro Ala Thr Gln Ala
20 25 30

Pro Cys Met Met Thr
35

<210> 1642
<211> 32
<212> PRT
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多肽"

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<400> 1642
Pro Met Asn His Asp Gln Phe His Leu Val Pro Asn His Ile Val Val
1 5 10 15

Ser Ala Glu Gly Asn Ile Ser Lys Lys Gln Asn Ala Leu Ala Glu His
20 25 30

<210> 1643
<211> 52
<212> PRT
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多肽"

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<400> 1643
Tyr Arg Ala Val Ile Ile His Gly Phe Val Glu Glu Leu Val Val Asn
1 5 10 15

Glu Asp Pro Glu Tyr Gln Trp Ile Asp Gln Gln Ile Arg Thr Pro Arg
20 25 30

Ala Ser Asn Glu Ala Arg Gln Arg Leu Ile Ser Leu Met Ser Gly Glu
35 40 45

Leu Gln Arg Lys
50

<210> 1644
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<400> 1644
Ser His Ser Ile Thr Ile Asp Phe Thr His Pro Cys His Val Ala Leu
1 5 10 15

Ile Arg Ile Trp Asn Tyr Asn Lys Ser Trp Trp Ile His Ser Phe Arg
20 25 30

Gly Val Lys Asp Ile Thr Met Leu Leu Asp Thr Gln Cys Ile Phe Glu
35 40 45

Gly Glu Ile Ala
50

<210> 1645
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.L330I"

<400> 1645
Phe Pro Asp Gln Glu Arg Met Cys Ser Arg Pro Gly Ser Arg Arg Glu
1 5 10 15

Arg Pro Leu Ser Ala Thr Arg Lys Thr Ile Ile Cys Glu Ala Glu Tyr
20 25 30

Pro Glu Glu Asp Ala Ser Ala Val Leu Gln Ala Ile Gln Val Glu Asn
35 40 45

Ala Ala Leu Gln
50

<210> 1646
<211> 51
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<400> 1646
Pro Arg Trp Glu Ser Ser Ala Thr Leu Arg Phe Thr Asp Ala Pro Cys
1 5 10 15

Gln Asp Val Ser Asp Ala Ala Val Ser Asp Leu Glu Asp Cys Ser Gln
20 25 30

Ser Leu Ser Leu Ser Thr Met Gln Glu Asp Met Glu Ser Ser Gly Ala
35 40 45

Asp Thr Phe
50

<210> 1647
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.Q446P"

<400> 1647
Gly Gln Ser Pro Met Gly Gly Pro Phe Ile Pro Ala Ala Pro Val Lys
1 5 10 15

Thr Ala Leu Pro Ala Gly Pro Gln Pro Pro Pro Pro Gln Pro Gln Pro
20 25 30

Pro Leu Pro Ser Gln Pro Gln Ala Gln Lys Arg Arg Phe Thr Glu Glu
35 40 45

Leu Pro Asp Glu
50

<210> 1648
<211> 45
<212> PRT
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<220>
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多肽"

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<400> 1648
Thr Gly Phe Ser Ser Gln Asn Glu Ile Glu Gly Ala Gly Ser Lys Pro
1 5 10 15

Ala Ser Ser Ser Gly Lys Glu Arg Glu Gly Gln Ala Val Asp Ala Ser
20 25 30

Thr Ser Leu Ser Ser Asp Trp Asn Lys Asn Arg Val Arg
35 40 45

<210> 1649
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<400> 1649
Ser Met Ser Leu His Gly Asn His Met Thr Leu Ala Cys Phe His Gly
1 5 10 15

Pro Asn Phe Arg Ser Lys Ser Trp Ala Pro Pro Phe His Leu Glu Glu
20 25 30

Pro Asn Ile Ala Phe Trp Thr Glu Ala Gln Lys Ile Trp Glu Asp Gly
35 40 45

Ser Ser Asp His
50

<210> 1650
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<400> 1650
Ile Thr Tyr Thr Thr Val Asp Trp Arg Asp Phe Met Cys Asn Thr Trp
1 5 10 15

His Leu Glu Pro Thr Leu Arg Leu Ile Tyr Tyr Trp Thr Gly Arg Lys
20 25 30

Ile Asp Pro Val Gly Val Asp Tyr Ile Leu Gln Lys Leu Gly Phe His
35 40 45

His Ala Arg Thr
50

<210> 1651
<211> 35
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 1651
Ala Asn Ser Leu Leu Asp Arg Gly Met Gln Leu Ser Gly Ser Thr Ser
1 5 10 15

Asn Thr Pro Tyr Thr Pro Leu Glu Lys Asn Ser Leu Ile Thr Gln Met
20 25 30

Met Lys His
35

<210> 1652
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<223> /注釋="p.A149V"

<400> 1652
Tyr Phe Arg Lys Gly Pro Phe Phe Gly Leu Ala Cys Phe Ala Asn Met
1 5 10 15

Pro Val Glu Ser Glu Leu Glu Arg Gly Val Val Arg Met Lys Ser Val
20 25 30

Gly Ile Leu Ser Pro Ser Tyr Thr Leu Leu Tyr Arg Tyr Met His Phe
35 40 45

Leu Glu Asn Gln
50

<210> 1653
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P1203Q"

<400> 1653
Ser Val Thr Val Glu Ile Ser Asp Ser Ala Pro Pro Ala Pro Leu Val
1 5 10 15

Lys Glu Val Thr Lys Arg Phe Ser Thr Gln Gln Asp Ala Ala Pro Val
20 25 30

Ser Thr Glu Pro Ala Trp Leu Ala Leu Ala Lys Arg Lys Ala Lys Ala
35 40 45

Trp Ser Asp Cys
50

<210> 1654
<211> 139
<212> PRT
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R308fs"

<400> 1654
Glu Arg Ala Pro Arg Glu Glu Gln Gln Arg Ser Leu Glu Ala Pro Gly
1 5 10 15

Trp Glu Asp Ala Glu Arg Arg Glu Arg Arg Ser Ala Ser Ala Trp Arg
20 25 30

Arg Arg Arg Ser Glu Gly Val Cys Arg Pro Arg Pro Lys Arg Arg Arg
35 40 45

Gly Gly Gly Trp Arg Arg Thr Pro Gly Trp Arg Ser Gly Gly Gly Arg
50 55 60

Arg Arg Arg Lys Glu Asp Ala Arg Arg Ser Ser Lys Gly Arg Arg Arg
65 70 75 80

Arg Arg Leu Arg Asp Gly Lys Ser Trp Asn Ser Arg Arg Arg Arg Cys
85 90 95

Arg Gly Arg Pro Arg Arg Trp Arg Arg Leu Gly Arg Ala Gly Gly Ala
100 105 110

Arg Arg Arg Arg Ile Trp Gly Lys Arg Arg Arg Arg Ala Arg Arg Thr
115 120 125

Trp Arg Thr Gly Gly Gly Ser Ser Val Ser Phe
130 135

<210> 1655
<211> 82
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.E309fs"

<400> 1655
Arg Ala Pro Arg Glu Glu Gln Gln Arg Ser Leu Glu Ala Pro Gly Trp
1 5 10 15

Glu Asp Ala Glu Arg Arg Glu Arg Glu Gly Ala Arg Ala Pro Gly Gly
20 25 30

Gly Gly Gly Ala Lys Ala Ser Ala Gly Pro Gly Pro Ser Gly Gly Glu
35 40 45

Ala Ala Ala Gly Gly Gly Arg Gln Ala Gly Gly Ala Glu Ala Ala Gly
50 55 60

Gly Gly Gly Arg Lys Met Arg Gly Gly Ala Gln Lys Ala Gly Gly Gly
65 70 75 80

Gly Gly

<210> 1656
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書：合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S138F"

<400> 1656
Leu Arg Gly Trp Tyr Asn Cys Leu Thr Leu Ala Ile Tyr Gly Ser Val
1 5 10 15

Asp Arg Val Ile Ser His Asp Arg Asp Phe Phe Pro Pro Pro Pro Pro
20 25 30

Pro Pro Pro Pro Pro Pro Gln Pro Gln Pro Ser Leu Lys Arg Asn Pro
35 40 45

Lys His Ala Asp
50

<210> 1657
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D1526N"

<400> 1657
Val Leu Ser Ala Pro Glu Ser Leu Gln Asn Leu Phe Asn Asn Arg Thr
1 5 10 15

Ala Tyr Val Leu Ala Asp Val Met Asp Asn Asn Gln Leu Lys Ser Met
20 25 30

Trp Phe Thr Pro Phe Gln Ala Glu Glu Ile Asp Thr Asp Leu Asp Leu
35 40 45

Val Lys Val Asp
50

<210> 1658
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L1272F"

<400> 1658
Asp Gly Glu Arg Leu Ser Ala Val Lys Ser Ser Asp Leu Ile Asn Lys
1 5 10 15

Met Asp Leu Gln Arg Ala Ala Ile Ile Phe Phe Gly Tyr Arg Ile Gln
20 25 30

Gly Val Ile Ala Gln Pro Val Asp Arg Val Lys Arg Pro Ser Pro Glu
35 40 45

Ser Gln Ser Asn
50

<210> 1659
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.L63F"

<400> 1659
Leu Gln Glu Ala Glu Asp Asp Val Asp Pro Gly His Ser Ser Ser Val
1 5 10 15

Lys Glu Leu Asp Thr Asp Ala Asp Lys Phe Phe Lys Lys Lys Thr Ala
20 25 30

Glu Asp Arg Thr Gln Ala Phe His Leu Arg Gln Asn Leu Ser Ala Leu
35 40 45

Asp Lys Met His
50

<210> 1660
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K97N"

<400> 1660
Thr Gln Ala Phe His Leu Arg Gln Asn Leu Ser Ala Leu Asp Lys Met
1 5 10 15

His Glu Glu Gln Glu Leu Phe Thr Glu Asn Asn Met Arg Gly Glu Leu
20 25 30

Arg Ala Cys Arg Gln Arg Arg Asp Leu Ile Asp Lys Gln Gln Glu Ala
35 40 45

Val Ala Ala Glu
50

<210> 1661
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q108H"

<400> 1661
Cys Leu Arg Asp Glu Val Val Val His Leu Ala Pro Leu Asn Pro Leu
1 5 10 15

Leu Leu Arg Gln Gly Asp Phe Tyr Leu His His Val Glu Pro Gln Glu
20 25 30

Glu Gln Ser Val Cys Ile Met Ile Lys Cys Leu Ser Leu Asp Leu Cys
35 40 45

Thr Val Asp Lys
50

<210> 1662
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V474M"

<400> 1662
Ala Ala Leu Gln Gln Lys Ser Gln Glu Glu Leu Leu Lys Arg Arg Glu
1 5 10 15

Gln Gln Leu Ala Glu Arg Glu Ile Asp Met Met Leu Glu Arg Glu Leu
20 25 30

Asn Ile Leu Ile Phe Gln Leu Asn Gln Glu Lys Pro Lys Val Lys Lys
35 40 45

Arg Lys Gly Lys
50

<210> 1663
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R477W"

<400> 1663
Gln Gln Lys Ser Gln Glu Glu Leu Leu Lys Arg Arg Glu Gln Gln Leu
1 5 10 15

Ala Glu Arg Glu Ile Asp Val Leu Glu Trp Trp Glu Leu Asn Ile Leu
20 25 30

Ile Phe Gln Leu Asn Gln Glu Lys Pro Lys Val Lys Lys Arg Lys Gly
35 40 45

Lys Phe Lys Arg
50

<210> 1664
<211> 113
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

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<221> 來源
<223> /注釋="p.P415fs"

<400> 1664
Thr Gly Ile Asp Leu Ser Gly Cys Thr Lys Trp Trp Arg Phe Ala Glu
1 5 10 15

Phe Gln Tyr Leu Gln Pro Gly Pro Pro Gly Gly Phe Arg Gln Trp Trp
20 25 30

Cys Thr Cys Arg Met Ser Gly Pro Ser Cys Leu Leu Trp Arg Ser Gly
35 40 45

Arg Pro Cys Ala Ser Arg Lys Leu Gln Arg Gln Leu Pro Gln Pro Arg
50 55 60

Arg His Lys Gly Lys Arg Ser Leu Leu Asn Arg His Leu Met Pro Trp
65 70 75 80

Ser Lys Gln Gln Thr Leu Leu Asp Gly Thr Gln Lys Leu Gln Arg Pro
85 90 95

Pro His Ser Arg Lys Arg Thr Leu Ile Ser Gln Arg Pro Leu His Pro
100 105 110

Pro

<210> 1665
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.C345F"

<400> 1665
Asn Val Arg Asp Lys Thr Thr Leu Leu Met Gln Glu Asp Ala Gln Phe
1 5 10 15

Asn Phe Phe Pro Ser Val Phe Thr Thr Phe Phe Pro Lys Arg Glu Ser
20 25 30

Lys Ser Gly Ala Leu Lys Gln Ser Ser Asp Phe Ser Gln Phe Lys Val
35 40 45

Pro Asp Val Ser
50

<210> 1666
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R574C"

<400> 1666
Pro Ala Lys Met Ile Leu Asp Asn His Asp Ile Ser Val Glu Met Gly
1 5 10 15

Val Lys Ser Asn Tyr Glu Ile Arg Ile Cys Cys Arg Pro Cys Glu Ile
20 25 30

Lys Lys Thr Asp Cys Cys Lys Glu Asn Leu Glu Lys Pro Arg Ser Pro
35 40 45

Gly Glu Val Thr
50

<210> 1667
<211> 27
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.K690fs"

<400> 1667
Leu Glu Gln Ser Leu Gln Ser His Lys Lys Leu Lys Leu Thr Lys Met
1 5 10 15

Arg Ala Lys Lys Lys Lys Lys Lys Arg Asn
20 25

<210> 1668
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.N851S"

<400> 1668
Ser Asn Ile Asn Gly His Asp Tyr Met Arg Asn Ile Val His Leu Pro
1 5 10 15

Val Phe Leu Asn Ser Arg Gly Leu Ser Ser Ser Ala Arg Lys Phe Leu
20 25 30

Val Thr Ser Ala Thr Asn Gly Asp Val Pro Cys Ser Asp Thr Thr Gly
35 40 45

Ile Gln Glu Asp
50

<210> 1669
<211> 47
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K1115fs"

<400> 1669
Leu Asn Cys Val Arg Glu Arg Trp Ser Asp Ala Leu Ile Lys Arg Arg
1 5 10 15

Glu Tyr Leu Asp Glu Gln Ile Lys Lys Ser Ala Ile Lys Gln Arg Lys
20 25 30

Gln Arg Thr Met Trp Ser Gly Lys Pro Ser Leu Trp Ser Ser Gly
35 40 45

<210> 1670
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R598Q"

<400> 1670
Val Phe Thr Leu Val Met Thr Gln Thr Lys Thr Glu Phe Val Glu Gly
1 5 10 15

Glu Glu His Asp His Arg Ile Thr Ser Gln Gln Ile Asn Leu Ile Asp
20 25 30

Leu Ala Gly Ser Glu Arg Cys Ser Thr Ala His Thr Asn Gly Asp Arg
35 40 45

Leu Lys Glu Gly
50

<210> 1671
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E252Q"

<400> 1671
Thr Ser Met Asn Arg Glu Ser Ser Arg Ser His Ala Val Phe Thr Ile
1 5 10 15

Thr Ile Glu Ser Met Glu Lys Ser Asn Gln Gln Ile Val Asn Ile Arg
20 25 30

Thr Ser Leu Leu Asn Leu Val Asp Leu Ala Gly Ser Glu Arg Gln Lys
35 40 45

Asp Thr His Ala
50

<210> 1672
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R145Q"

<400> 1672
Gly Leu Ile Pro Arg Ile Cys Glu Gly Leu Phe Ser Arg Ile Asn Glu
1 5 10 15

Thr Thr Arg Trp Asp Glu Ala Ser Phe Gln Gln Thr Glu Val Ser Tyr
20 25 30

Leu Glu Ile Tyr Asn Glu Arg Val Arg Asp Leu Leu Arg Arg Lys Ser
35 40 45

Ser Lys Thr Phe
50

<210> 1673
<211> 43
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R17C"

<400> 1673
Met Ser Val Thr Glu Glu Asp Leu Cys His His Met Lys Val Val Val
1 5 10 15

Cys Cys Val Arg Pro Glu Asn Thr Lys Glu Lys Ala Ala Gly Phe His
20 25 30

Lys Val Val His Val Val Asp Lys His Ile Leu
35 40

<210> 1674
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R1320W"

<400> 1674
Thr Val Thr Ile Ile His Glu Lys Gly Ser Glu Leu His Trp Lys Asp
1 5 10 15

Val Arg Glu Leu Val Val Gly Arg Ile Trp Trp Asn Lys Pro Glu Val
20 25 30

Asp Glu Ala Ala Val Asp Ala Ile Leu Ser Leu Asn Ile Ile Ser Ala
35 40 45

Lys Tyr Leu Lys
50

<210> 1675
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E54K"

<400> 1675
Asn Phe Asp Gly Ile Lys Leu Asp Leu Ser His Glu Phe Ser Leu Val
1 5 10 15

Ala Pro Asn Thr Glu Ala Asn Ser Phe Lys Lys Ser Lys Asp Tyr Leu
20 25 30

Gln Val Cys Leu Arg Ile Arg Pro Phe Thr Gln Ser Glu Lys Glu Leu
35 40 45

Glu Ser Glu Gly
50

<210> 1676
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E991K"

<400> 1676
Asn Glu Ile Glu Thr Ala Thr Arg Ser Ile Thr Asn Asn Val Ser Gln
1 5 10 15

Ile Lys Leu Met His Thr Lys Ile Asp Lys Lys Leu Arg Thr Leu Asp
20 25 30

Ser Val Ser Gln Ile Ser Asn Ile Asp Leu Leu Asn Leu Arg Asp Leu
35 40 45

Ser Asn Gly Ser
50

<210> 1677
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E350K"

<400> 1677
Lys Glu Gln Ile Thr Ile Ser Gln Leu Ser Leu Val Asp Leu Ala Gly
1 5 10 15

Ser Glu Arg Thr Asn Arg Thr Arg Ala Lys Lys Gly Asn Arg Leu Arg
20 25 30

Glu Ala Gly Asn Ile Asn Gln Ser Leu Met Thr Leu Arg Thr Cys Met
35 40 45

Asp Val Leu Arg
50

<210> 1678
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R150Q"

<400> 1678
Ser Pro Gly Glu Gly Gly Leu Leu Pro Arg Cys Leu Asp Met Ile Phe
1 5 10 15

Asn Ser Ile Gly Ser Phe Gln Ala Lys Gln Gln Tyr Val Phe Lys Ser
20 25 30

Asn Asp Arg Asn Ser Met Asp Ile Gln Cys Glu Val Asp Ala Leu Leu
35 40 45

Glu Arg Gln Lys
50

<210> 1679
<211> 29
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.W3R"

<400> 1679
Met Thr Arg Arg Thr Ser Gly Gln Leu Gln Arg Glu Lys Gln Ala Arg
1 5 10 15

Pro Gly Ser Gly Ala Val Leu Ala Phe Pro Asp Asp Lys
20 25

<210> 1680
<211> 89
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 1680
Ser Leu Gln Ser Ser Arg Glu Ser Leu Asn Ser Cys Gly Phe Val Glu
1 5 10 15

Gly Lys Pro Arg Pro Met Gly Ser Pro Gly Trp Ala Ser Pro Ala Cys
20 25 30

Pro Arg Pro Arg Ser Thr Ser His Pro Ala Leu Leu Pro Arg Asp Ala
35 40 45

Lys Ser Thr Pro Arg Arg Gly Ser Cys Arg Leu Pro Pro His Cys Leu
50 55 60

Pro Arg Ala Arg Ile Pro Ala Trp Arg Leu Gly Ser Pro Cys Cys Ser
65 70 75 80

Pro Arg Cys Val Arg Pro Arg Leu Glu
85

<210> 1681
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.V1113M"

<400> 1681
Arg Cys Lys Val Tyr Thr Gln Lys Gly Val Leu Pro Ser Pro Ala Pro
1 5 10 15

Leu Pro Pro Ser Ser Lys Asp Ser Gly Met Met Ala Ser Arg Glu Ser
20 25 30

Leu Leu Gln Pro Glu Val Arg Thr Pro Pro Val Gly Met Ser Pro Gln
35 40 45

Val Leu Lys Lys
50

<210> 1682
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.A1114V"

<400> 1682
Cys Lys Val Tyr Thr Gln Lys Gly Val Leu Pro Ser Pro Ala Pro Leu
1 5 10 15

Pro Pro Ser Ser Lys Asp Ser Gly Val Val Val Ser Arg Glu Ser Leu
20 25 30

Leu Gln Pro Glu Val Arg Thr Pro Pro Val Gly Met Ser Pro Gln Val
35 40 45

Leu Lys Lys Ser
50

<210> 1683
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.A2033T"

<400> 1683
Ser Lys Glu Ala Met Cys Phe Asn Ala Lys Leu Lys Ile Leu Glu His
1 5 10 15

Arg Gln Gln Arg Ile Ala Glu Val Arg Thr Thr Lys Tyr Glu Trp Leu
20 25 30

Met Lys Glu Leu Glu Ala Thr Lys Gln Tyr Leu Met Leu Asp Pro Asn
35 40 45

Lys Trp Leu Ser
50

<210> 1684
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.K925N"

<400> 1684
Leu Asp Ala Cys Asn Leu Lys Arg Arg Lys Gly Ser Phe Gly Ser Ile
1 5 10 15

Asp His Leu Gln Lys Leu Asp Glu Gln Asn Asn Lys Trp Leu Asp Glu
20 25 30

Glu Val Glu Lys Val Leu Asn Gln Arg Gln Glu Leu Glu Glu Leu Glu
35 40 45

Ala Asp Leu Lys
50

<210> 1685
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

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<221> 來源
<223> /注釋="p.G480R"

<400> 1685
Ile Ser Ala Ile Gln Lys Ala Gly Leu Val Asp Val Asp Gly His Leu
1 5 10 15

Val Gly Glu Pro Glu Gly Gln Asn Phe Arg Arg Leu Gly Val Ala Pro
20 25 30

Phe Ser Thr Lys Pro Gly Lys Lys Ala Lys Ser Lys Lys Thr Phe Lys
35 40 45

Glu Pro Leu Ser
50

<210> 1686
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R594Q"

<400> 1686
Ile Arg Pro Asp Thr Pro Pro Ser Lys Pro Val Ala Phe Glu Glu Phe
1 5 10 15

Lys Asn Glu Gln Gly Ser Glu Ile Asn Gln Gln Ile Phe Lys Glu Asn
20 25 30

Lys Ser Ile Leu Asn Glu Arg Arg Lys Arg Ala Ser Glu Thr Thr Gln
35 40 45

His Ile Asn Ala
50

<210> 1687
<211> 38
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P335fs"

<400> 1687
Val Asp Pro Lys Pro Thr Thr Thr Asp Ile Gly Ser Asp Val Thr Leu
1 5 10 15

Thr Cys Val Trp Val Gly Asn Pro Pro Ser Leu Ser Pro Gly Pro Lys
20 25 30

Arg Thr Gln Ile Trp Ser
35

<210> 1688
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G604C"

<400> 1688
Val Asp Leu Lys Gln Asp Leu Arg Cys Asp Thr Ile Asp Thr Arg Glu
1 5 10 15

Glu Tyr Glu Met Lys Asp Pro Thr Asn Cys Cys Tyr Tyr Asn Val Arg
20 25 30

Ala His Glu Asp Arg Pro Ser Ser Arg Ala Val Leu Tyr Ala Asp Tyr
35 40 45

Arg Ala Pro Gly
50

<210> 1689
<211> 103
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V649fs"

<400> 1689
Pro Pro Ser Pro Leu Gly Pro Pro Gly Thr Pro Thr Phe Tyr Asp Phe
1 5 10 15

Asn Pro His Leu Gly Met Val Pro Pro Ala Asp Phe Thr Glu Pro Gly
20 25 30

Gln Ala Ile Ser Pro His Pro Thr Leu Glu Leu Ser Pro Ala Thr Ser
35 40 45

Asn Pro His Pro Leu Gly Pro Gln Ile Trp Pro Pro Gly Leu Pro Pro
50 55 60

Ser His Met Leu Pro Ser Pro His Leu Ala Thr Arg Val Ser Arg Leu
65 70 75 80

Thr Cys Asp Ile Phe Pro Met Glu Glu Ser Trp Asp Leu Gln Leu Ala
85 90 95

Ile Met Asp Cys Ser Asp Phe
100

<210> 1690
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.W557G"

<400> 1690
Val Ala Gly Met Met Cys Ile Ile Val Met Ile Leu Thr Tyr Lys Tyr
1 5 10 15

Leu Gln Lys Pro Met Tyr Glu Val Gln Gly Gly Lys Val Val Glu Glu
20 25 30

Ile Asn Gly Asn Asn Tyr Val Tyr Ile Asp Pro Thr Gln Leu Pro Tyr
35 40 45

Asp His Lys Trp
50

<210> 1691
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D816H"

<400> 1691
Arg Asp Leu Ala Ala Arg Asn Ile Leu Leu Thr His Gly Arg Ile Thr
1 5 10 15

Lys Ile Cys Asp Phe Gly Leu Ala Arg His His Ile Lys Asn Asp Ser
20 25 30

Asn Tyr Val Val Lys Gly Asn Ala Arg Leu Pro Val Lys Trp Met Ala
35 40 45

Pro Glu Ser Ile
50

<210> 1692
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D816Y"

<400> 1692
Arg Asp Leu Ala Ala Arg Asn Ile Leu Leu Thr His Gly Arg Ile Thr
1 5 10 15

Lys Ile Cys Asp Phe Gly Leu Ala Arg Tyr Tyr Ile Lys Asn Asp Ser
20 25 30

Asn Tyr Val Val Lys Gly Asn Ala Arg Leu Pro Val Lys Trp Met Ala
35 40 45

Pro Glu Ser Ile
50

<210> 1693
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成多肽"

<220>
<221> 來源
<223> /注釋="p.D816V"

<400> 1693
Arg Asp Leu Ala Ala Arg Asn Ile Leu Leu Thr His Gly Arg Ile Thr
1 5 10 15

Lys Ile Cys Asp Phe Gly Leu Ala Arg Val Val Ile Lys Asn Asp Ser
20 25 30

Asn Tyr Val Val Lys Gly Asn Ala Arg Leu Pro Val Lys Trp Met Ala
35 40 45

Pro Glu Ser Ile
50

<210> 1694
<211> 52
<212> PRT
<213> 人工序列

<220>
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<220>
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<223> /注釋="p.N822Y"

<400> 1694
Asn Ile Leu Leu Thr His Gly Arg Ile Thr Lys Ile Cys Asp Phe Gly
1 5 10 15

Leu Ala Arg Asp Ile Lys Asn Asp Ser Tyr Tyr Tyr Val Val Lys Gly
20 25 30

Asn Ala Arg Leu Pro Val Lys Trp Met Ala Pro Glu Ser Ile Phe Asn
35 40 45

Cys Val Tyr Thr
50

<210> 1695
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成多肽"

<220>
<221> 來源
<223> /注釋="p.N822K"

<400> 1695
Asn Ile Leu Leu Thr His Gly Arg Ile Thr Lys Ile Cys Asp Phe Gly
1 5 10 15

Leu Ala Arg Asp Ile Lys Asn Asp Ser Lys Lys Tyr Val Val Lys Gly
20 25 30

Asn Ala Arg Leu Pro Val Lys Trp Met Ala Pro Glu Ser Ile Phe Asn
35 40 45

Cys Val Tyr Thr
50

<210> 1696
<211> 32
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T568fs"

<400> 1696
Ser Phe Gly Lys Leu Arg Asp Ala Leu Arg Arg Ser Ser Glu Met Leu
1 5 10 15

Val Lys Lys Leu Gln Gly Gly Thr Pro Arg Ser Pro Leu Thr Pro Gly
20 25 30

<210> 1697
<211> 45
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.I104fs"

<400> 1697
Ser Leu Lys Phe Pro Ser Ser His Arg Arg Ala Ser Pro Gly Leu Ser
1 5 10 15

Met Pro Ser Ser Ser Pro Pro Ile Lys Asn Thr His Pro Leu Leu Gln
20 25 30

Ala Cys Ser Pro Ser Ala Cys Arg Cys Pro Cys His Gln
35 40 45

<210> 1698
<211> 61
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S224fs"

<400> 1698
Gly Ile Glu Pro Gln Arg Thr Asp Tyr Tyr Pro Glu Glu Met Ser Pro
1 5 10 15

Pro Leu Met Asn Ser Val Ser Pro Pro Ala Ser Ile Val Ala Arg Glu
20 25 30

Ser Pro Phe Gly His Arg Ala Ala Trp Glu Glu Thr Phe Thr Cys Gly
35 40 45

Ile Pro Gly Tyr Ser Lys Glu Ala Glu Asp Thr Gln Met
50 55 60

<210> 1699
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.K434Q"

<400> 1699
Gly Arg Arg Ser Trp Pro Arg Lys Arg Thr Ala Thr His Thr Cys Asp
1 5 10 15

Tyr Ala Gly Cys Gly Lys Thr Tyr Thr Gln Gln Ser Ser His Leu Lys
20 25 30

Ala His Leu Arg Thr His Thr Gly Glu Lys Pro Tyr His Cys Asp Trp
35 40 45

Asp Gly Cys Gly
50

<210> 1700
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.E419Q"

<400> 1700
Leu Arg Thr His Thr Gly Glu Lys Pro Tyr Lys Cys Thr Trp Glu Gly
1 5 10 15

Cys Asp Trp Arg Phe Ala Arg Ser Asp Gln Gln Leu Thr Arg His Tyr
20 25 30

Arg Lys His Thr Gly Ala Lys Pro Phe Gln Cys Gly Val Cys Asn Arg
35 40 45

Ser Phe Ser Arg
50

<210> 1701
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.S118L"

<400> 1701
Glu Lys Tyr Leu Thr Pro Gln Leu Pro Pro Val Pro Ile Ile Pro Glu
1 5 10 15

His Lys Lys Tyr Arg Arg Asp Ser Ala Leu Leu Val Val Asp Gln Phe
20 25 30

Phe Thr Asp Thr Glu Gly Leu Pro Tyr Ser Ile Asn Met Asn Val Phe
35 40 45

Leu Pro Asp Ile
50

<210> 1702
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.W321S"

<400> 1702
Asp Ala Trp Thr Tyr Cys Ile Ser Lys Asn Glu Trp Ile Gln Phe Asn
1 5 10 15

His Pro Tyr Thr Glu Lys Pro Arg Leu Ser Ser His Thr Ala Cys Ala
20 25 30

Ser Asp Glu Gly Glu Val Ile Val Phe Gly Gly Cys Ala Asn Asn Leu
35 40 45

Leu Val His His
50

<210> 1703
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E635K"

<400> 1703
Asp Arg Trp Asp Phe Ala Pro Pro Leu Pro Ser Asp Thr Phe Ala Leu
1 5 10 15

Ala His Thr Ala Thr Val Arg Ala Lys Lys Lys Ile Phe Val Thr Gly
20 25 30

Gly Ser Leu Arg Phe Leu Leu Phe Arg Phe Ser Ala Gln Glu Gln Arg
35 40 45

Trp Trp Ala Gly
50

<210> 1704
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E213K"

<400> 1704
Phe Leu Ile Ser Gly Val Thr Leu Asp Asn Cys Val Glu Val Gly Arg
1 5 10 15

Ile Ala Asn Thr Tyr Asn Leu Thr Glu Lys Met Asp Lys Tyr Val Asn
20 25 30

Ser Phe Val Leu Lys Asn Phe Pro Ala Leu Leu Ser Thr Gly Glu Phe
35 40 45

Leu Lys Leu Pro
50

<210> 1705
<211> 54
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P231fs"

<400> 1705
Lys Tyr Leu Val Glu Asp Val Leu Leu Leu Asn Phe Glu Glu Met Arg
1 5 10 15

Ala Leu Leu Asp Ser Leu Pro Pro Pro Trp Ser Arg Ser Trp Arg Ser
20 25 30

Ser Arg Cys Pro Cys Cys Gly Trp Ser Thr Thr Ala Arg Pro Ala Cys
35 40 45

Ser Met Arg Leu Thr Ser
50

<210> 1706
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D185G"

<400> 1706
Asp Asn Phe Val Pro Leu Met Ser Arg Pro Asp Phe Leu Ser Tyr Leu
1 5 10 15

Ser Phe Glu Lys Leu Met Ser Tyr Leu Gly Gly Asn Asp His Leu Ser
20 25 30

Arg Phe Pro Glu Ile Glu Leu Tyr Glu Ala Val Gln Ser Trp Leu Arg
35 40 45

His Asp Arg Arg
50

<210> 1707
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E33K"

<400> 1707
Tyr Met Leu Ala Asn Leu Thr His Leu His Ser Glu Gln Leu Leu Gln
1 5 10 15

Gly Leu Asn Leu Leu Arg Gln His His Lys Lys Leu Cys Asp Ile Ile
20 25 30

Leu Arg Val Gly Asp Val Lys Ile His Ala His Lys Val Val Leu Ala
35 40 45

Ser Val Ser Pro
50

<210> 1708
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R326C"

<400> 1708
Gln Leu Ser Gln Val Val Glu Ala Cys Cys Lys Phe Leu Met Lys Gln
1 5 10 15

Leu His Pro Ser Asn Cys Leu Gly Ile Cys Cys Ser Phe Ala Asp Ala
20 25 30

Gln Gly Cys Thr Asp Leu His Lys Val Ala His Asn Tyr Thr Met Glu
35 40 45

His Phe Met Glu
50

<210> 1709
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P57T"

<400> 1709
Glu Lys His Ser Gln Pro Trp Gln Val Ala Val Tyr Ser His Gly Trp
1 5 10 15

Ala His Cys Gly Gly Val Leu Val His Thr Thr Gln Trp Val Leu Thr
20 25 30

Ala Ala His Cys Leu Lys Lys Asn Ser Gln Val Trp Leu Gly Arg His
35 40 45

Asn Leu Phe Glu
50

<210> 1710
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E161K"

<400> 1710
Val Lys Val Leu Gly Leu Pro Thr Gln Glu Pro Ala Leu Gly Thr Thr
1 5 10 15

Cys Tyr Ala Ser Gly Trp Gly Ser Ile Lys Lys Pro Glu Glu Phe Leu
20 25 30

Arg Pro Arg Ser Leu Gln Cys Val Ser Leu His Leu Leu Ser Asn Asp
35 40 45

Met Cys Ala Arg
50

<210> 1711
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R120H"

<400> 1711
Gln Ser Ser Val Val Arg Ala Val Ile His Pro Asp Tyr Asp Ala Ala
1 5 10 15

Ser His Asp Gln Asp Ile Met Leu Leu His His Leu Ala Arg Pro Ala
20 25 30

Lys Leu Ser Glu Leu Ile Gln Pro Leu Pro Leu Glu Arg Asp Cys Ser
35 40 45

Ala Asn Thr Thr
50

<210> 1712
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R29Q"

<400> 1712
Asn Glu Lys Leu Asp Asn Gln Arg Leu Lys Asn Phe Lys Asn Lys Gly
1 5 10 15

Arg Asp Leu Glu Thr Met Arg Arg Gln Gln Gln Asn Glu Val Val Val
20 25 30

Glu Leu Arg Lys Asn Lys Arg Asp Glu His Leu Leu Lys Arg Arg Asn
35 40 45

Val Pro His Glu
50

<210> 1713
<211> 55
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E553fs"

<400> 1713
Tyr Cys Gly Pro Ser Ser Tyr Asn Gln Gly Gln Glu Ser Gly Ala Gly
1 5 10 15

Cys Gly Pro Gly Asp Val Phe Pro Glu Pro Glu Gly Ser Gly Trp Pro
20 25 30

Trp Arg Pro Arg Gln Cys Leu Cys Trp Ser Glu Arg Gly Ser Lys Glu
35 40 45

Cys Leu Phe Leu Lys Glu Arg
50 55

<210> 1714
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A59G"

<400> 1714
Pro Thr Ile Glu Asp Ser Tyr Arg Lys Gln Val Val Ile Asp Gly Glu
1 5 10 15

Thr Cys Leu Leu Asp Ile Leu Asp Thr Gly Gly Gly Gln Glu Glu Tyr
20 25 30

Ser Ala Met Arg Asp Gln Tyr Met Arg Thr Gly Glu Gly Phe Leu Cys
35 40 45

Val Phe Ala Ile
50

<210> 1715
<211> 53
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q61K"

<400> 1715
Ile Glu Asp Ser Tyr Arg Lys Gln Val Val Ile Asp Gly Glu Thr Cys
1 5 10 15

Leu Leu Asp Ile Leu Asp Thr Ala Gly Lys Lys Glu Glu Tyr Ser Ala
20 25 30

Met Arg Asp Gln Tyr Met Arg Thr Gly Glu Gly Phe Leu Cys Val Phe
35 40 45

Ala Ile Asn Asn Thr
50

<210> 1716
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q61R"

<400> 1716
Ile Glu Asp Ser Tyr Arg Lys Gln Val Val Ile Asp Gly Glu Thr Cys
1 5 10 15

Leu Leu Asp Ile Leu Asp Thr Ala Gly Arg Arg Glu Glu Tyr Ser Ala
20 25 30

Met Arg Asp Gln Tyr Met Arg Thr Gly Glu Gly Phe Leu Cys Val Phe
35 40 45

Ala Ile Asn Asn
50

<210> 1717
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q61L"

<400> 1717
Ile Glu Asp Ser Tyr Arg Lys Gln Val Val Ile Asp Gly Glu Thr Cys
1 5 10 15

Leu Leu Asp Ile Leu Asp Thr Ala Gly Leu Leu Glu Glu Tyr Ser Ala
20 25 30

Met Arg Asp Gln Tyr Met Arg Thr Gly Glu Gly Phe Leu Cys Val Phe
35 40 45

Ala Ile Asn Asn
50

<210> 1718
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q61H"

<400> 1718
Ile Glu Asp Ser Tyr Arg Lys Gln Val Val Ile Asp Gly Glu Thr Cys
1 5 10 15

Leu Leu Asp Ile Leu Asp Thr Ala Gly His His Glu Glu Tyr Ser Ala
20 25 30

Met Arg Asp Gln Tyr Met Arg Thr Gly Glu Gly Phe Leu Cys Val Phe
35 40 45

Ala Ile Asn Asn
50

<210> 1719
<211> 52
<212> PRT
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<400> 1719
Ile Glu Asp Ser Tyr Arg Lys Gln Val Val Ile Asp Gly Glu Thr Cys
1 5 10 15

Leu Leu Asp Ile Leu Asp Thr Ala Gly His His Glu Glu Tyr Ser Ala
20 25 30

Met Arg Asp Gln Tyr Met Arg Thr Gly Glu Gly Phe Leu Cys Val Phe
35 40 45

Ala Ile Asn Asn
50

<210> 1720
<211> 38
<212> PRT
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<400> 1720
Met Thr Glu Tyr Lys Leu Val Val Val Gly Ala Ser Ser Gly Val Gly
1 5 10 15

Lys Ser Ala Leu Thr Ile Gln Leu Ile Gln Asn His Phe Val Asp Glu
20 25 30

Tyr Asp Pro Thr Ile Glu
35

<210> 1721
<211> 38
<212> PRT
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<400> 1721
Met Thr Glu Tyr Lys Leu Val Val Val Gly Ala Arg Arg Gly Val Gly
1 5 10 15

Lys Ser Ala Leu Thr Ile Gln Leu Ile Gln Asn His Phe Val Asp Glu
20 25 30

Tyr Asp Pro Thr Ile Glu
35

<210> 1722
<211> 38
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<400> 1722
Met Thr Glu Tyr Lys Leu Val Val Val Gly Ala Cys Cys Gly Val Gly
1 5 10 15

Lys Ser Ala Leu Thr Ile Gln Leu Ile Gln Asn His Phe Val Asp Glu
20 25 30

Tyr Asp Pro Thr Ile Glu
35

<210> 1723
<211> 38
<212> PRT
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<400> 1723
Met Thr Glu Tyr Lys Leu Val Val Val Gly Ala Asp Asp Gly Val Gly
1 5 10 15

Lys Ser Ala Leu Thr Ile Gln Leu Ile Gln Asn His Phe Val Asp Glu
20 25 30

Tyr Asp Pro Thr Ile Glu
35

<210> 1724
<211> 38
<212> PRT
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多肽"

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<400> 1724
Met Thr Glu Tyr Lys Leu Val Val Val Gly Ala Ala Ala Gly Val Gly
1 5 10 15

Lys Ser Ala Leu Thr Ile Gln Leu Ile Gln Asn His Phe Val Asp Glu
20 25 30

Tyr Asp Pro Thr Ile Glu
35

<210> 1725
<211> 38
<212> PRT
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<400> 1725
Met Thr Glu Tyr Lys Leu Val Val Val Gly Ala Val Val Gly Val Gly
1   5   10   15

Lys Ser Ala Leu Thr Ile Gln Leu Ile Gln Asn His Phe Val Asp Glu
            20   25   30

Tyr Asp Pro Thr Ile Glu
        35

<210> 1726
<211> 39
<212> PRT
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多肽"

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<223> /注釋="p.G13C"

<400> 1726
Met Thr Glu Tyr Lys Leu Val Val Val Gly Ala Gly Cys Cys Val Gly
1   5   10   15

Lys Ser Ala Leu Thr Ile Gln Leu Ile Gln Asn His Phe Val Asp Glu
            20   25   30

Tyr Asp Pro Thr Ile Glu Asp
        35

<210> 1727
<211> 39
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.G13D"

<400> 1727
Met Thr Glu Tyr Lys Leu Val Val Val Gly Ala Gly Asp Asp Val Gly
1   5   10   15

Lys Ser Ala Leu Thr Ile Gln Leu Ile Gln Asn His Phe Val Asp Glu
            20   25   30

Tyr Asp Pro Thr Ile Glu Asp
        35

<210> 1728
<211> 52
<212> PRT
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多肽"

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<400> 1728
Pro Ser Arg Thr Val Asp Thr Lys Gln Ala Gln Asp Leu Ala Arg Ser
1 5 10 15

Tyr Gly Ile Pro Phe Ile Glu Thr Ser Thr Thr Lys Thr Arg Gln Arg
20 25 30

Val Glu Asp Ala Phe Tyr Thr Leu Val Arg Glu Ile Arg Gln Tyr Arg
35 40 45

Leu Lys Lys Ile
50

<210> 1729
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 1729
Asp Arg Leu Ala Thr Ala Leu Ala Gly Leu Ala Gln Glu Val Ala Thr
1 5 10 15

Met Arg Thr Gln Val Asn Arg Leu Gly Gly Gly Arg Pro Gln Gly Pro
20 25 30

Gly Pro Met Gly Gln Ala Ser Trp Met Trp Thr Leu Pro Arg Gly Pro
35 40 45

Arg Trp Ala His
50

<210> 1730
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 1730
Lys Arg Thr Ala Ala Glu Asn Asp Phe Val Thr Leu Lys Lys Asp Val
1 5 10 15

Asp Asn Ala Tyr Met Ile Lys Val Glu Trp Trp Gln Ser Lys Val Asp
20 25 30

Leu Leu Asn Gln Glu Ile Glu Phe Leu Lys Val Leu Tyr Asp Ala Glu
35 40 45

Ile Ser Gln Ile
50

<210> 1731
<211> 40
<212> PRT
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<220>
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多肽"

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<400> 1731
Arg Gly Asn Lys Ser Ile Ser Met Ser Val Ala Gly Ser Arg Gln Gly
1 5 10 15

Ala Cys Phe Gly Gly Ala Gly Gly Phe Arg His Trp Trp Leu Trp Trp
20 25 30

Trp Ile Trp Gly Leu Leu Gln Trp
35 40

<210> 1732
<211> 52
<212> PRT
<213> 人工序列

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多肽"

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<400> 1732
Asn Lys Phe Ala Ser Phe Ile Asp Lys Val Arg Phe Leu Glu Gln Gln
1 5 10 15

Asn Lys Val Leu Asp Thr Lys Trp Thr Pro Pro Leu Gln Glu Gln Gly
20 25 30

Thr Lys Thr Val Arg Gln Asn Leu Glu Pro Leu Phe Glu Gln Tyr Ile
35 40 45

Asn Asn Leu Arg
50

<210> 1733
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 1733
Thr Gln Lys Ser Tyr Lys Val Ser Thr Ser Gly Pro Arg Ala Phe Ser
1 5 10 15

Ser Arg Ser Tyr Thr Ser Gly Pro Gly Ala Ala Arg Ile Ser Ser Ser
20 25 30

Ser Phe Ser Arg Val Gly Ser Ser Asn Phe Arg Gly Gly Leu Gly Gly
35 40 45

Gly Tyr Gly Gly
50

<210> 1734
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<223> /注釋="p.I116V"

<400> 1734
Cys Gly Thr Gly Cys Gly Ile Gly Gly Gly Ile Gly Tyr Gly Gln Glu
1 5 10 15

Gly Ser Ser Gly Ala Val Ser Thr Arg Val Val Arg Trp Cys Arg Pro
20 25 30

Asp Cys Arg Val Glu Gly Thr Cys Leu Pro Pro Cys Cys Val Val Ser
35 40 45

Cys Thr Pro Pro
50

<210> 1735
<211> 52
<212> PRT
<213> 人工序列

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多肽"

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<400> 1735
Ala Cys Gln Ser Glu Ser Ser Ser Ala Gly Leu Ala Cys Val Ser Gln
1 5 10 15

Pro Cys Gln Ser Glu Ser Thr Gln Gln Ile Ile Gly Phe Val Ala Gln
20 25 30

Ser Cys Gln Pro Ala Ser Leu Lys Gly Asn Ser Cys Pro Pro Lys Thr
35 40 45

Ser Lys Ser Lys
50

<210> 1736
<211> 52
<212> PRT
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<220>
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多肽"

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<400> 1736
Thr Cys Cys Arg Pro Ser Cys Cys Glu Thr Thr Cys Cys Arg Thr Thr
1 5 10 15

Tyr Cys Arg Pro Ser Cys Cys Val Ser Arg Arg Cys Cys Arg Pro Gln
20 25 30

Cys Cys Gln Ser Val Cys Cys Gln Pro Thr Cys Cys Arg Pro Arg Cys
35 40 45

Cys Ile Ser Ser
50

<210> 1737
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1737
Val Cys Tyr Gln Pro Thr Cys Cys His Pro Ser Cys Cys Ile Ser Ser
1 5 10 15

Cys Cys Arg Pro Tyr Cys Cys Glu Ser Cys Cys Cys Cys Arg Pro Cys
20 25 30

Cys Cys Gln Thr Thr Cys Cys Arg Thr Thr Cys Cys Arg Thr Thr Cys
35 40 45

Cys Cys Pro Ser
50

<210> 1738
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.C91F"

<400> 1738
Cys Arg Pro Tyr Cys Cys Glu Ser Ser Cys Cys Arg Pro Cys Cys Cys
1 5 10 15

Gln Thr Thr Cys Cys Arg Thr Thr Cys Phe Phe Arg Thr Thr Cys Cys
20 25 30

Cys Pro Ser Cys Cys Val Ser Ser Cys Cys Arg Pro Gln Cys Cys Gln
35 40 45

Ser Val Cys Cys
50

<210> 1739
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1739
Thr Cys Tyr Arg Pro Ser Tyr Ser Val Ser Cys Cys Cys Arg Pro Gln
1 5 10 15

Cys Cys Gln Ser Val Cys Cys Gln Pro Ser Ser Cys Cys Arg Pro Ser
20 25 30

Cys Cys Val Ser Ser Cys Cys Lys Pro Gln Cys Cys Gln Ser Val Cys
35 40 45

Cys Gln Pro Thr
50

<210> 1740
<211> 44
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<400> 1740
Met Val Ser Ser Cys Cys Gly Ser Val Cys Ser Asp Gln Gly Cys Gly
1 5 10 15

Gln Val Val Leu Cys Gln Glu Thr Cys Cys Arg Pro Ser Cys Cys Glu
20 25 30

Thr Thr Cys Cys Arg Thr Thr Cys Cys Arg Pro Ser
35 40

<210> 1741
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.S193Y"

<400> 1741
Gly Ser Cys Gly Gly Ser Lys Gly Gly Cys Gly Ser Cys Gly Gly Cys
1 5 10 15

Lys Gly Gly Cys Gly Ser Cys Gly Gly Tyr Tyr Lys Gly Gly Cys Gly
20 25 30

Ser Gly Cys Gly Gly Cys Gly Ser Gly Cys Gly Val Pro Val Cys Cys
35 40 45

Cys Ser Cys Ser
50

<210> 1742
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 1742
Phe Asn Leu Pro Ala Ser His Tyr Tyr Lys Tyr Lys Gln Gln Phe Ile
1 5 10 15

Phe Pro Asp Val Val Pro Val Pro Glu Met Met Pro Thr Arg Ala Pro
20 25 30

Gln Val Ile Leu His Pro Val Thr Ser Asn Pro Ile Leu Glu Gly Asn
35 40 45

Pro Leu Leu Gln
50

<210> 1743
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R632S"

<400> 1743
Leu Val Val Gly Ser Pro Gly Pro Val Pro Arg Leu Val Leu Ser Asp
1 5 10 15

Leu His Leu Leu Thr Gln Ser Gln Val Ser Ser Val Ser Trp Ser Pro
20 25 30

Ala Glu Asp His Asn Ala Pro Ile Glu Lys Tyr Asp Ile Glu Phe Glu
35 40 45

Asp Lys Glu Met
50

<210> 1744
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<223> /注釋="p.T186M"

<400> 1744
Pro Pro Ser Ala Glu Pro Leu Arg Ile Tyr Trp Met Asn Ser Lys Ile
1 5 10 15

Leu His Ile Lys Gln Asp Glu Arg Val Met Met Met Gly Gln Asn Gly
20 25 30

Asn Leu Tyr Phe Ala Asn Val Leu Thr Ser Asp Asn His Ser Asp Tyr
35 40 45

Ile Cys His Ala
50

<210> 1745
<211> 47
<212> PRT
<213> 人工序列

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多肽"

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<223> /注釋="p.P441del"

<400> 1745
Val Glu Asp Phe Val Phe Asp Ala Gly Val Gly Asp Ile Gly Asn Arg
1 5 10 15

Ile Leu His Val Arg Asn Ala Pro Ser Ala Ala Thr Ser Ser Ile Ala
20 25 30

Ile Ser Gly Met Ile Ala Asp Glu Val Gln Gln Arg Phe Glu Leu
35 40 45

<210> 1746
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.W162L"

<400> 1746
His Pro Val Gly Trp Cys Glu Lys Thr Lys His Glu Leu His Ile Pro
1 5 10 15

Lys Gly Tyr Arg Lys Asp Lys Phe Val Leu Leu Met Asp Tyr Leu Lys
20 25 30

Ala Cys Lys Leu Gln Asn Ala Pro Lys Lys Leu Phe Arg Asn Arg Ser
35 40 45

Pro Asn Gly Pro
50

<210> 1747
<211> 31
<212> PRT

<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.M5L"

<400> 1747
Met Tyr Arg Leu Leu Leu Ser Ala Val Thr Ala Arg Ala Ala Ala Pro
1 5 10 15

Gly Gly Leu Ala Ser Ser Cys Gly Arg Arg Gly Val His Gln Arg
20 25 30

<210> 1748
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.A41T"

<400> 1748
Ala Ile Leu Ala Lys Gln Phe Thr Lys Cys Glu Leu Ser Gln Leu Leu
1 5 10 15

Lys Asp Ile Asp Gly Tyr Gly Gly Ile Thr Thr Leu Pro Glu Leu Ile
20 25 30

Cys Thr Met Phe His Thr Ser Gly Tyr Asp Thr Gln Ala Ile Val Glu
35 40 45

Asn Asn Glu Ser
50

<210> 1749
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<223> /注釋="p.D1030Y"

<400> 1749
Asn Thr Cys Asp Pro Glu Thr Gly Glu Cys Val Cys Pro Pro His Thr
1 5 10 15

Gln Gly Val Lys Cys Glu Glu Cys Glu Tyr Tyr Gly His Trp Gly Tyr
20 25 30

Asp Ala Glu Val Gly Cys Gln Ala Cys Asn Cys Ser Leu Val Gly Ser
35 40 45

Thr His His Arg
50

<210> 1750
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.A558V"

<400> 1750
Ser Leu Ser Thr Ser Ala Asp Ser Leu Thr Thr Pro Arg Leu Thr Leu
1 5 10 15

Ser Glu Leu Asp Asp Ile Ile Lys Asn Val Val Ser Gly Ile Tyr Ala
20 25 30

Glu Ile Asp Gly Ala Lys Ser Glu Leu Gln Val Lys Leu Ser Asn Leu
35 40 45

Ser Asn Leu Ser
50

<210> 1751
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 1751
Asn Gly Leu Val Gln Lys Ala Leu Asp Ala Ser Asn Val Tyr Glu Asn
1 5 10 15

Ile Val Asn Tyr Val Ser Glu Ala Asn Lys Lys Thr Ala Glu Phe Ala
20 25 30

Leu Asn Thr Thr Asp Arg Ile Tyr Asp Ala Val Ser Gly Ile Asp Thr
35 40 45

Gln Ile Ile Tyr
50

<210> 1752
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1752
Pro Asn Gly Leu Leu Phe Tyr Tyr Ala Ser Gly Ser Asp Val Phe Ser
1 5 10 15

Ile Ser Leu Asp Asn Gly Thr Val Ile Ile Ile Asp Val Lys Gly Ile
20 25 30

Lys Val Gln Ser Val Asp Lys Gln Tyr Asn Asp Gly Leu Ser His Phe
35 40 45

Val Ile Ser Ser
50

<210> 1753
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.L2223R"

<400> 1753
Ser Ser Met Ala Trp Ala Arg Leu His Arg Leu Asn Ala Ser Ile Ala
1 5 10 15

Asp Leu Gln Ser Gln Leu Arg Ser Pro Arg Arg Gly Pro Arg His Glu
20 25 30

Thr Ala Gln Gln Leu Glu Val Leu Glu Gln Gln Ser Thr Ser Leu Gly
35 40 45

Gln Asp Ala Arg
50

<210> 1754
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.G588W"

<400> 1754
Gly Leu Ala Pro Leu Gly Ser Glu Thr Phe Gly Gln Ser Pro Ala Val
1 5 10 15

His Val Val Leu Gly Glu Pro Val Pro Trp Trp Asn Pro Val Thr Trp
20 25 30

Thr Gly Pro Gly Phe Ala Arg Val Leu Pro Gly Ala Gly Leu Arg Phe
35 40 45

Ala Val Asn Asn
50

<210> 1755
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G1239W"

<400> 1755
Glu Ala Asp Phe Lys Asp Leu Arg Gly Asn Val Ser Glu Ile Glu Arg
1 5 10 15

Ile Leu Lys His Pro Val Phe Pro Ser Trp Trp Lys Phe Leu Lys Val
20 25 30

Lys Asp Tyr His Asp Ser Val Arg Arg Gln Ile Met Gln Leu Asn Glu
35 40 45

Gln Leu Lys Ala
50

<210> 1756
<211> 53
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.P174Q"

<400> 1756
Lys Arg Ser Arg Ala Asp Gly Pro Trp Glu Pro Tyr Gln Phe Tyr Ser
1 5 10 15

Ala Ser Cys Gln Lys Thr Tyr Gly Arg Gln Gln Glu Gly Gln Tyr Leu
20 25 30

Arg Pro Gly Glu Asp Glu Arg Val Ala Phe Cys Thr Ser Glu Phe Ser
35 40 45

Asp Ile Ser Pro Leu
50

<210> 1757
<211> 43
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<223> /注釋="p.A223fs"

<400> 1757
Pro Arg His Ile Pro Ala Asn Arg Gly Glu Ile Lys Gly Ser Glu Ser
1 5 10 15

Ala Thr Tyr Val Pro Val Ala Pro Pro His Pro Ser Leu Ala Thr Arg
20 25 30

Asp Gln Thr Gly Ala Cys Leu Ala Arg Pro Gly
35 40

<210> 1758
<211> 71
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T163fs"

<400> 1758
Pro Glu Asn Ser Glu Thr Gly Gly Asn Glu Ser Gln Pro Asp Ser Gln
1 5 10 15

Glu Asp Pro Arg Glu Val Leu Lys Lys His Trp Asn Ser Ala Tyr Leu
20 25 30

Gly Arg Thr Leu Leu Val Thr Cys Ile Leu Tyr His Arg Trp Ile Val
35 40 45

Thr Ser Met Cys Gln Ser Gln Arg Trp Leu Thr Ser Thr Thr Ser Arg
50 55 60

Ser Ser Ala Leu Met Trp Thr
65 70

<210> 1759
<211> 48
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.P185fs"

<400> 1759
Met Lys Ser Leu Gly Leu Ser Asp Glu Glu Ile Val Lys Phe Ser Glu
1 5 10 15

Ala Glu His Trp Leu Asp Tyr Phe Pro Ala Thr Gly Tyr Ser Gly Phe
20 25 30

Lys Lys Asn Gly Phe Glu Gly Arg Leu Ala Ser Phe Leu His His His
35 40 45

<210> 1760
<211> 44
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
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<400> 1760
Met Ser Ser Gly Thr Glu Leu Leu Trp Pro Gly Ala Ala Leu Leu Val
1 5 10 15

Leu Trp Trp Gly Val Ala Ala Ser Leu Cys Val Arg Cys Ser Arg Pro
20 25 30

Gly Ala Lys Arg Ser Glu Lys Ile Tyr Gln Gln Arg
35 40

<210> 1761
<211> 52
<212> PRT
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<400> 1761
Ser Pro Ala Asp Arg Asp Gln Ile Ala Gln Gln Leu Gly Leu Thr Asn
1 5 10 15

Ala Gln Val Ile Thr Trp Phe Gln Asn Trp Trp Arg Ala Lys Leu Lys
20 25 30

Arg Asp Leu Glu Glu Met Lys Ala Asp Val Glu Ser Ala Lys Lys Leu
35 40 45

Gly Pro Ser Gly
50

<210> 1762
<211> 37
<212> PRT
<213> 人工序列

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多肽"

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<400> 1762
Ser Asp Ala Leu Val Ile Phe Gln Leu Tyr Glu Lys Ile Lys Val Pro
1 5 10 15

Val Asp Trp Asn Arg Val Asn Lys Pro Ala Ile Pro Gln Thr Gly Arg
20 25 30

Gln Tyr Glu Glu Ala
35

<210> 1763
<211> 42
<212> PRT
<213> 人工序列

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<400> 1763
Met Lys Gln Arg Phe Ser Ala Leu Gln Leu Leu Lys Leu Leu Leu Gln
1 5 10 15

Gln Leu Gln Pro Pro Leu Pro Arg Ala Leu Arg Glu Ala Leu Cys Pro
20 25 30

Glu Pro Cys Asn Cys Val Pro Asp Gly Ala
35 40

<210> 1764
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 1764
Ser Pro Val Thr Ser Ala His Ser Gly Thr Tyr Arg Cys Tyr Gly Ser
1 5 10 15

Leu Ser Ser Asn Pro Tyr Leu Leu Ser Tyr Tyr Pro Ser Asp Ser Leu
20 25 30

Glu Leu Met Val Ser Gly Ala Ala Glu Thr Leu Ser Pro Pro Gln Asn
35 40 45

Lys Ser Asp Ser
50

<210> 1765
<211> 53
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<400> 1765
Gly Leu Gly Arg His Leu Gly Val Val Ile Gly Ile Leu Val Ala Val
1 5 10 15

Ile Leu Leu Leu Leu Leu Leu Leu Leu Phe Leu Ile Leu Arg His Arg
20 25 30

Arg Gln Gly Lys His Trp Thr Ser Thr Gln Arg Lys Ala Asp Phe Gln
35 40 45

His Pro Ala Gly Ala
50

<210> 1766
<211> 51
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<223> /注釋="p.S598P"

<400> 1766
Thr Lys Asp Arg Gln Ala Glu Glu Asp Arg Gln Met Asp Thr Glu Arg
1 5 10 15

Val Leu Ser Ser Pro Gly Pro Gln Ala Pro Pro Pro Pro Pro Pro Arg
20 25 30

Ser Leu Pro Leu Thr Leu Pro Arg Cys Arg Leu Leu His Leu Lys Pro
35 40 45

Pro Arg Met
50

<210> 1767
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 1767
Ile Met Ala Phe Ala His Gln Pro Thr Phe Ser Arg Ile Ser Arg Pro
1 5 10 15

Phe Ser Ala Gly Ile Met Phe Phe Ser Thr Thr Thr Leu Phe Val Val
20 25 30

Leu Ala Leu Ala Ile Tyr Thr Gly Val Thr Val Ser Phe Leu Gly Arg
35 40 45

Arg Phe Gly Asp
50

<210> 1768
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<400> 1768
Thr Thr Val Gln Val Lys Glu Val Asn Arg Met His Ile Ser Pro Asn
1 5 10 15

Asn Arg Asn Ala Ile His Pro Gly Asp His His Ile Leu Glu Ile Asn
20 25 30

Gly Thr Pro Val Arg Thr Leu Arg Val Glu Glu Val Glu Asp Ala Ile
35 40 45

Ser Gln Thr Ser
50

<210> 1769
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成多肽"

<220>
<221> 來源
<223> /注釋="p.R183W"

<400> 1769
Phe Cys Val Cys Leu Lys Glu Ser Phe Pro Asn Leu Lys Thr Arg Lys
1 5 10 15

Leu Thr Arg Val Glu Trp Gly Lys Ile Trp Trp Arg Leu Met Gly Lys
20 25 30

Pro Arg Arg Cys Ser Ser Ala Phe Phe Glu Glu Glu Arg Ser Ala Leu
35 40 45

Lys Gln Lys Arg
50

<210> 1770
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成多肽"

<220>
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<223> /注釋="p.E231K"

<400> 1770
Gln Lys Arg Gln Lys Ile Arg Leu Leu Gln Gln Arg Lys Val Ala Asp
1 5 10 15

Val Ser Gln Phe Lys Asp Leu Pro Asp Lys Lys Ile Pro Leu Pro Leu
20 25 30

Val Ile Gly Thr Lys Val Thr Ala Arg Leu Arg Gly Val His Asp Gly
35 40 45

Leu Phe Thr Gly
50

<210> 1771
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成多肽"

<220>
<221> 來源
<223> /注釋="p.P410T"

<400> 1771
Pro Asp Thr Ile Arg Glu Arg Ser Phe Lys Asp Phe His Ser Thr Ala
1 5 10 15

Leu Ser Phe Tyr Phe Thr Cys Lys Lys Thr Thr Lys Ile Arg Glu Lys
20 25 30

Lys Leu Gln His Leu Leu Val Asp Glu Gly Gln Thr Val Gln Leu Glu
35 40 45

Cys Ser Ala Asp
50

<210> 1772
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P236Q"

<400> 1772
Gly Ser Lys Leu Cys Pro Leu Gln Ile Phe Asp Lys Ile Cys Leu Asn
1 5 10 15

Ile Leu Phe Met Met Phe Gly Tyr Asp Gln Gln Lys Asn Leu Asn Met
20 25 30

Ser Arg Leu Asp Val Tyr Phe Ser His Asn Pro Ala Gly Thr Ser Val
35 40 45

Gln Asn Met Leu
50

<210> 1773
<211> 35
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P955fs"

<400> 1773
Pro Arg Cys Leu Val Asp Ser Ala Glu Thr Lys Asn His Arg Pro Gly
1 5 10 15

Asn Gly Ala Gly Pro Lys Lys Ala Pro Glu Pro Ser Gln Glu Leu Arg
20 25 30

Asp Ser Glu
35

<210> 1774
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.G199C"

<400> 1774
Pro Val Ile Val Pro Glu Glu His Leu Gln Gln Cys Arg Val Tyr Arg
1 5 10 15

Gly Gly Lys Trp Pro His Gly Ala Val Cys Cys Val Pro Asp Gln Glu
20 25 30

Gly Ile Ser Asp Ala Asp Phe Val Leu Tyr Val Gly Ala Leu Ala Thr
35 40 45

Glu Arg Cys Ser
50

<210> 1775
<211> 53
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<400> 1775
Arg His Gln Gln Gln Gln Glu Gln Gln Asn Ser Gln Arg Leu Gly Gln
1 5 10 15

Gly Glu Pro Gly Pro Gly Gln Gly Leu Gln Glu Val Leu Ser Ser Arg
20 25 30

Met Glu Gly Met Met Ala Ser Tyr Thr Pro Leu Ala Pro Pro Gln Gln
35 40 45

Gln Ile Val Ala Met
50

<210> 1776
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.T532P"

<400> 1776
Ala Asp Asp Asn Leu Lys Thr Pro Ser Glu Arg Gln Leu Thr Ala Leu
1 5 10 15

Pro Pro Ser Ala Asp Asp Asn Ile Lys Pro Pro Pro Ala Glu Arg Leu
20 25 30

Arg Gly Pro Leu Pro Pro Ser Ala Asp Asp Asn Leu Lys Thr Pro Ser
35 40 45

Glu Arg Gln Leu
50

<210> 1777
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<223> /注釋="p.P90S"

<400> 1777
Ala Glu Gly Ile Ala Met Leu Leu Gly Thr Ala Gly Pro Ser Arg Leu
1 5 10 15

Pro Ala Ala Pro Asp Ala Ser Gln Ala Ser Ser Leu Arg Ser Pro Trp
20 25 30

Ala Leu Ser Val Ala Ala Ala Leu Cys Ser Pro Val Ser Cys His Pro
35 40 45

Cys Gly Arg His
50

<210> 1778
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.L144M"

<400> 1778
Cys Val Leu Ala Pro Gly Ser Gly Ser Arg Pro Thr Pro His Ile Val
1 5 10 15

Tyr Ser Val Pro Ala Ala Arg Thr Cys Met Met Gly Ala Pro Gly Ser
20 25 30

Leu Ser Pro Cys His Leu Cys Val His Ile Cys Ala His Thr Tyr Ser
35 40 45

Gly Thr Pro Val
50

<210> 1779
<211> 61
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.RAPWMEQ147del"

<400> 1779
Leu Ser Val Gly Asp Val Asp Asp Thr Gln Cys Val Arg Leu Asp Ser
1 5 10 15

Asp Ala Thr Ser Pro Arg Met Glu Pro Glu Gly Pro Glu Tyr Trp Glu
20 25 30

Glu Glu Thr Gly Thr Ala Lys Ala Lys Ala Gln Phe Tyr Arg Val Asn
35 40 45

Leu Arg Thr Leu Ser Gly Tyr Tyr Asn Gln Ser Glu Ala
50 55 60

<210> 1780
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G93E"

<400> 1780
Ala Gly Glu Asp Gly Arg Met Ile Ala Ser Gln Val Val Asp Ile Asn
1 5 10 15

Leu Ala Ala Glu Pro Lys Val Asn Arg Glu Glu Asn Ala Gly Val Lys
20 25 30

Arg Ser Ala Ala Glu Met Tyr Gly Ser Ser Phe Asp Leu Asp Tyr Gly
35 40 45

Phe Gln Arg Asp
50

<210> 1781
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F906I"

<400> 1781
Glu Phe Ile Phe Leu Ile Gly Ile Asp Lys Thr Lys Tyr Ala Ile Ala
1 5 10 15

Cys Pro Ile Phe Ala Gly Leu Leu His Ile Ile Phe Phe Leu Ala Ala
20 25 30

Phe Ala Trp Met Cys Leu Glu Gly Val Gln Leu Tyr Leu Met Leu Val
35 40 45

Glu Val Phe Glu
50

<210> 1782
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E740D"

<400> 1782
Phe Pro Glu Asn Met Gly His Gly Ser Thr Ile Gln Leu Ser Ala Asn
1 5 10 15

Thr Leu Lys Gln Asn Gly Arg Asn Gly Asp Asp Ile Arg Val Ala Phe
20 25 30

Val Leu Tyr Asn Asn Leu Gly Pro Tyr Leu Ser Thr Glu Asn Ala Ser
35 40 45

Met Lys Leu Gly
50

<210> 1783
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
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<223> /注釋="p.R826H"

<400> 1783
Val Phe Thr Val Lys His Ile Lys Gln Ser Glu Glu Asn Phe Asn Pro
1 5 10 15

Asn Cys Ser Phe Trp Ser Tyr Ser Lys His His Thr Met Thr Gly Tyr
20 25 30

Trp Ser Thr Gln Gly Cys Arg Leu Leu Thr Thr Asn Lys Thr His Thr
35 40 45

Thr Cys Ser Cys
50

<210> 1784
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R1183Q"

<400> 1784
Ser Gly Ser Arg Thr Pro Gly Arg Tyr Ser Thr Gly Ser Gln Ser Arg
1 5 10 15

Ile Arg Arg Met Trp Asn Asp Thr Val Gln Gln Lys Gln Ser Glu Ser
20 25 30

Ser Phe Ile Thr Gly Asp Ile Asn Ser Ser Ala Ser Leu Asn Arg Glu
35 40 45

Gly Leu Leu Asn
50

<210> 1785
<211> 28
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

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<223> /注釋="p.S974L"

<400> 1785
Ser Asp Thr Phe Ser Asn Phe Thr Phe Trp Arg Glu Pro Leu Pro Pro
1 5 10 15

Phe Glu Asn Gln Asp Ile His Ser Ala Leu Leu Ala
20 25

<210> 1786
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A186S"

<400> 1786
Thr Asp Gln Gly Ala Cys Ala Gly Ser Pro Ser Leu Val Ala Ala Ala
1 5 10 15

Arg Arg Ala Phe Pro Cys Lys Asp Ala Ser Ser Leu Cys Ala Tyr Ala
20 25 30

Val Thr Tyr Thr Ala Met Tyr Val Thr Leu Val Phe Arg Val Lys Gly
35 40 45

Ser Arg Leu Val
50

<210> 1787
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R527S"

<400> 1787
Leu Lys Ile Gln Pro Gly Ala Val Pro Gly Cys Asn Asn Ser Met Pro
1 5 10 15

Gly Gly Pro Arg Val Ser Ile Gln Ser Ser Ser Pro Gly Ser Ser Gln
20 25 30

Leu Val His Ile Pro Glu Glu Thr Gln Glu Asn Ile Ser Thr Ser Pro
35 40 45

Lys Ser Ser Ser
50

<210> 1788
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E2103K"

<400> 1788
Val Ser Leu Ser Thr Pro Ala Gln Leu Val Ala Pro Ser Val Val Val
1 5 10 15

Lys Gly Thr Leu Ser Val Thr Ser Ser Lys Lys Leu Tyr Phe Glu Val
20 25 30

Asp Glu Glu Asp Pro Asn Phe Lys Lys Ile Asp Pro Lys Ile Leu Ala
35 40 45

Tyr Thr Glu Gly
50

<210> 1789
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D717G"

<400> 1789
Ser Ile His Val Pro Ser Pro Ala Val Pro Lys Leu Ser Met Ala Lys
1 5 10 15

Cys Arg Arg Asn Val Glu Asn Phe Leu Gly Gly Ala Cys Lys Lys Leu
20 25 30

Gly Val Ser Gln Glu Arg Leu Cys Leu Pro His His Ile Leu Glu Glu
35 40 45

Arg Gly Leu Val
50

<210> 1790
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.N132K"

<400> 1790
Asn Ser Asn Arg Leu Thr Lys Ile Thr Asn Asp Met Phe Ser Gly Leu
1 5 10 15

Ser Asn Leu His His Leu Ile Leu Asn Lys Lys Asn Gln Leu Thr Leu
20 25 30

Ile Ser Ser Thr Ala Phe Asp Asp Val Phe Ala Leu Glu Glu Leu Asp
35 40 45

Leu Ser Tyr Asn
50

<210> 1791
<211> 50
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L24V"

<400> 1791
Met Ala Arg Pro Val Arg Gly Gly Leu Gly Ala Pro Arg Arg Ser Pro
1 5 10 15

Cys Leu Leu Leu Leu Trp Leu Val Val Leu Leu Arg Leu Glu Pro Val
20 25 30

Thr Ala Ala Ala Gly Pro Arg Ala Pro Cys Ala Ala Ala Cys Thr Cys
35 40 45

Ala Gly
50

<210> 1792
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L26V"

<400> 1792
Met Ala Arg Pro Val Arg Gly Gly Leu Gly Ala Pro Arg Arg Ser Pro
1 5 10 15

Cys Leu Leu Leu Leu Trp Leu Leu Leu Val Val Arg Leu Glu Pro Val
20 25 30

Thr Ala Ala Ala Gly Pro Arg Ala Pro Cys Ala Ala Ala Cys Thr Cys
35 40 45

Ala Gly Asp Ser
50

<210> 1793
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P1058T"

<400> 1793
Thr Cys Asp Gly Asp Asn Asp Cys Gly Asp Tyr Ser Asp Glu Thr His
1 5 10 15

Ala Asn Cys Thr Asn Gln Ala Thr Arg Thr Thr Pro Gly Gly Cys His
20 25 30

Thr Asp Glu Phe Gln Cys Arg Leu Asp Gly Leu Cys Ile Pro Leu Arg
35 40 45

Trp Arg Cys Asp
50

<210> 1794
<211> 30
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G1488fs"

<400> 1794
Gly Ser Gly His Met Glu Val Leu Arg Gly His Glu Phe Leu Ser His
1 5 10 15

Pro Phe Ala Val Thr Leu Tyr Gly Gly Gly Gly Leu Leu Asp
20 25 30

<210> 1795
<211> 104
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G1488fs"

<400> 1795
Gly Ser Gly His Met Glu Val Leu Arg Gly His Glu Phe Leu Ser His
1 5 10 15

Pro Phe Ala Val Thr Leu Tyr Gly Gly Arg Ser Thr Gly Leu Thr Gly
20 25 30

Glu Gln Thr His Trp Leu Arg Pro Thr Ser Gly Pro Ala Thr Met Ser
35 40 45

Pro Trp Tyr Arg Gly Pro Thr Pro Ser Pro Leu Thr Cys Arg Cys Thr
50 55 60

Thr Pro Pro Ala Ser Pro Trp Leu Pro Ile Pro Val Arg Pro Met Gly
65 70 75 80

Ala Arg Ala Pro Ala Pro Thr Cys Val Ser Ser Thr Thr Thr Gly Pro
85 90 95

Cys Pro Ala Pro Ala Pro Thr Ser
100

<210> 1796
<211> 38
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L11del"

<400> 1796
Met Leu Leu Ala Thr Leu Leu Leu Leu Leu Gly Gly Ala Leu Ala His
1 5 10 15

Pro Asp Arg Ile Ile Phe Pro Asn His Ala Cys Glu Asp Pro Pro Ala
20 25 30

Val Leu Leu Glu Val Gln
35

<210> 1797
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P92R"

<400> 1797
Gln Gln Glu Arg Pro Gln Glu Glu Leu Glu Leu Glu Leu Arg Ala Gly
1 5 10 15

Gly Gly Pro Gln Glu Asp Cys Pro Gly Arg Arg Gly Ser Gly Gly Tyr
20 25 30

Ser Ala Met Pro Asp Ala Ile Ile Arg Thr Lys Asp Ser Leu Ala Ala
35 40 45

Gly Ala Ser Phe
50

<210> 1798
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G310C"

<400> 1798
Cys Thr Trp Leu Ile Asp Thr Gly Asp His Arg Lys Val Ile Leu Arg
1 5 10 15

Phe Thr Asp Phe Lys Leu Asp Gly Thr Cys Cys Tyr Gly Asp Tyr Val
20 25 30

Lys Ile Tyr Asp Gly Leu Glu Glu Asn Pro His Lys Leu Leu Arg Val
35 40 45

Leu Thr Ala Phe
50

<210> 1799
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G3563C"

<400> 1799
Phe Asp Cys Ala Asp Gly Ser Asp Glu Arg Asn Cys Glu Thr Ser Cys
1 5 10 15

Ser Lys Asp Gln Phe Arg Cys Ser Asn Cys Cys Gln Cys Ile Pro Ala
20 25 30

Lys Trp Lys Cys Asp Gly His Glu Asp Cys Lys Tyr Gly Glu Asp Glu
35 40 45

Lys Ser Cys Glu
50

<210> 1800
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L1392F"

<400> 1800
Ser Leu Arg Thr Thr Leu Ile Ala Gly Ala Met Glu His Pro Arg Ala
1 5 10 15

Ile Ala Leu Asp Pro Arg Tyr Gly Ile Phe Phe Phe Trp Thr Asp Trp
20 25 30

Asp Ala Asn Phe Pro Arg Ile Glu Ser Ala Ser Met Ser Gly Ala Gly
35 40 45

Arg Lys Thr Ile
50

<210> 1801
<211> 52
<212> PRT
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<400> 1801
Phe Gly Thr Cys Pro Gln His Cys Arg Asn Thr Lys Gly Ser Tyr Glu
1 5 10 15

Cys Val Cys Ala Asp Gly Phe Thr Ser Ile Ile Ser Asp Arg Pro Gly
20 25 30

Lys Arg Cys Ala Ala Glu Gly Ser Ser Pro Leu Leu Leu Leu Pro Asp
35 40 45

Asn Val Arg Ile
50

<210> 1802
<211> 52
<212> PRT
<213> 人工序列

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多肽"

<220>
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<223> /注釋="p.A516V"

<400> 1802
Ile Asp Met Val Asn Leu Asp Gly Ser Tyr Arg Val Thr Leu Ile Thr
1 5 10 15

Glu Asn Leu Gly His Pro Arg Gly Ile Val Val Val Asp Pro Thr Val
20 25 30

Gly Tyr Leu Phe Phe Ser Asp Trp Glu Ser Leu Ser Gly Glu Pro Lys
35 40 45

Leu Glu Arg Ala
50

<210> 1803
<211> 52
<212> PRT
<213> 人工序列

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多肽"

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<400> 1803
Ile Phe Ser Ser Gln Val Ala Ile Arg Gly Ile Pro Phe Thr Leu Ser
1 5 10 15

Thr Gln Glu Asp Val Met Val Pro Val Leu Leu Gly Asn Pro Ser Phe
20 25 30

Phe Val Gly Ile Asp Phe Asp Ala Gln Asp Ser Thr Ile Phe Phe Ser
35 40 45

Asp Met Ser Lys
50

<210> 1804
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<400> 1804
Asn His Ser Pro Pro Phe Gln Thr Ile Asn Val Glu Arg Thr Val Met
1 5 10 15

Ser Leu Asp Tyr Asp Ser Val Ser Asp Ile Ile Ile Tyr Phe Thr Gln
20 25 30

Asn Leu Ala Ser Gly Val Gly Gln Ile Ser Tyr Ala Thr Leu Ser Ser
35 40 45

Gly Ile His Thr
50

<210> 1805
<211> 52
<212> PRT
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<220>
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多肽"

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<223> /注釋="p.R3043C"

<400> 1805
Cys Gly Asp Tyr Ser Asp Glu Arg Gly Cys Leu Tyr Gln Thr Cys Gln
1 5 10 15

Gln Asn Gln Phe Thr Cys Gln Asn Gly Cys Cys Cys Ile Ser Lys Thr
20 25 30

Phe Val Cys Asp Glu Asp Asn Asp Cys Gly Asp Gly Ser Asp Glu Leu
35 40 45

Met His Leu Cys
50

<210> 1806
<211> 33
<212> PRT
<213> 人工序列

<220>
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多肽"

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<223> /注釋="p.S1609P"

<400> 1806
Leu Ser Ala Glu Asp Ser Cys Pro Pro Ser Pro Ala Thr Glu Arg Ser
1 5 10 15

Tyr Phe His Leu Phe Pro Pro Pro Pro Pro Pro Cys Thr Asp Ser
20 25 30

Ser

<210> 1807
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

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<223> /注釋="p.R675Q"

<400> 1807
Asn Asn Asn Asn Val Ala Ile Pro Leu Thr Gly Val Lys Glu Ala Ser
1 5 10 15

Ala Leu Asp Phe Asp Val Thr Asp Asn Gln Gln Ile Tyr Trp Thr Asp
20 25 30

Ile Ser Leu Lys Thr Ile Ser Arg Ala Phe Met Asn Gly Ser Ala Leu
35 40 45

Glu His Val Val
50

<210> 1808
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.D227N"

<400> 1808
Leu Asp His Arg Asp Leu Ile Pro Ile Ile Ala Ala Leu Glu Tyr Asn
1 5 10 15

Gln Trp Phe Thr Lys Leu Ser Ser Lys Asn Asn Leu Lys Leu Ser Thr
20 25 30

Asp Val Cys Glu Gln Ile Leu Arg Val Val Ser Arg Ser Asn Arg Leu
35 40 45

Glu Glu Leu Val
50

<210> 1809
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<400> 1809
Ala Val Asp Lys Glu Leu Gln Val Ile Leu Glu Ser Met Val Ser Leu
1 5 10 15

Thr Gln Glu Leu Cys Pro Val Ala Met Trp Trp Val Ala Glu Gly His
20 25 30

Asn Lys Met Leu Ser Asn Val Ala Glu Arg Val Thr Val Pro Arg Asn
35 40 45

Phe Ile Arg Gly
50

<210> 1810
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R218W"

<400> 1810
Arg Arg Leu Glu Asn Leu Tyr Val Val Glu Glu Lys Asp Leu Cys Ala
1 5 10 15

Ala Cys Leu Arg Lys Cys Gln Asn Ala Trp Trp Asp Asn Leu Asn Arg
20 25 30

Ile Lys Asn Met Ala Thr Thr Thr Pro Arg Lys Thr Ile Phe Pro Asn
35 40 45

Leu Ile Ser Pro
50

<210> 1811
<211> 49
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
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<400> 1811
Arg Lys Lys Thr Ser Ser Glu Gly Glu Thr Lys Pro Gln Thr Ser Thr
1 5 10 15

Val Asn Lys Phe Leu Arg Thr Ala Ser Asn Ala Glu Ser Arg Lys Glu
20 25 30

Asp Asn Asp Leu Lys Thr Ser Asp Ser Gln Pro Ser Asp Trp Ile Gln
35 40 45

Lys

<210> 1812
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T102S"

<400> 1812
Glu Leu Glu Gln Pro His Thr Gln Gln Gly Pro Glu Lys Leu Ala Gly
1 5 10 15

Asn Ala Ile Tyr Thr Lys Pro Ser Phe Ser Ser Gln Glu His Lys Ala
20 25 30

Ala Val Ser Val Leu Thr Pro Phe Ser Lys Gly Ala Pro Ser Thr Ser
35 40 45

Ser Pro Ala Lys
50

<210> 1813
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.A406D"

<400> 1813
Glu Thr Pro Gly Gln Pro Pro Glu His His Glu Val Thr Val Ser Pro
1 5 10 15

Pro Gly His His Gln Thr His His Leu Asp Asp Ser Pro Ser Val Ser
20 25 30

Val Lys Pro Pro Asp Val Gln Leu Thr Ile Ala Ala Glu Pro Ser Ala
35 40 45

Glu Val Gly Thr
50

<210> 1814
<211> 34
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D558fs"

<400> 1814
Lys Glu Pro Ala Lys Glu Trp Lys Val Leu Lys Lys Lys Lys Glu Pro
1 5 10 15

Pro Lys Glu Leu Arg Gln Asp Pro Pro Ser Ser Arg Cys Trp Ala Gly
20 25 30

Ala Trp

<210> 1815
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R1389H"

<400> 1815
Val Pro Pro Asp Thr Ile Thr Lys Lys Ala Gly Ser His Ile Gln Thr
1 5 10 15

Leu Met Gly Ser Gln Ser Leu Gln His His His Ser Arg Glu Gln Gln
20 25 30

Pro Tyr Glu Gly Asn Ile Asn Lys Val Thr Ile Gln Gln Phe Gln Ser
35 40 45

Pro Leu Pro Ile
50

<210> 1816
<211> 32
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.A6V"

<400> 1816
Met Glu Ala Ala Ala Val Val Val Val Ala Ala Glu Ala Glu Val Glu
1 5 10 15

Asn Glu Asp Gly Asp Ser Ser Cys Gly Asp Val Cys Phe Met Asp Lys
20 25 30

<210> 1817
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.W792L"

<400> 1817
Arg Lys Arg Pro Val Lys Cys Pro Ala Asn Met Thr Pro Ala Leu Asp
1 5 10 15

Lys Leu Glu Ile Leu Arg Cys Gly Pro Leu Leu Asp Thr Leu Gln Gln
20 25 30

Val Thr Thr Val Thr Phe Gln Asp Leu Pro Gly Cys Val Leu Ser Thr
35 40 45

Leu Ala Glu Cys
50

<210> 1818
<211> 31
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K244fs"

<400> 1818
Leu Ile Val Gln Arg Trp Ile Arg Gly Phe Leu Val Arg Lys Asn Leu
1 5 10 15

Ser Pro Val Phe Phe His Lys Lys Lys Thr Ala Gly Lys Asn Tyr
20 25 30

<210> 1819
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S243Y"

<400> 1819
Ser Lys Ile Asn Phe Ala His Phe Pro Arg Leu Phe Asn Leu Arg Ser
1 5 10 15

Ile Tyr Leu Gln Trp Asn Arg Ile Arg Tyr Tyr Ile Ser Gln Gly Leu
20 25 30

Thr Trp Thr Trp Ser Ser Leu His Asn Leu Asp Leu Ser Gly Asn Asp
35 40 45

Ile Gln Gly Ile
50

<210> 1820
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S139L"

<400> 1820
Asp Leu Thr Asn Leu Thr Glu Leu Gln Leu Arg Asn Asn Ser Ile Arg
1 5 10 15

Thr Leu Asp Arg Asp Leu Leu Arg His Leu Leu Pro Leu Leu Arg His
20 25 30

Leu Asp Leu Ser Ile Asn Gly Leu Ala Gln Leu Pro Pro Gly Leu Phe
35 40 45

Asp Gly Leu Leu
50

<210> 1821
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.L176V"

<400> 1821
Gly Leu Ala Gln Leu Pro Pro Gly Leu Phe Asp Gly Leu Leu Ala Leu
1 5 10 15

Arg Ser Leu Ser Leu Arg Ser Asn Arg Val Val Gln Asn Leu Asp Arg
20 25 30

Leu Thr Phe Glu Pro Leu Ala Asn Leu Gln Leu Leu Gln Val Gly Asp
35 40 45

Asn Pro Trp Glu
50

<210> 1822
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R517L"

<400> 1822
Ile Thr Pro Arg Glu Asp Glu Asp Pro His Arg Pro Pro Thr Ser Glu
1 5 10 15

Glu Leu Leu Thr Ala Tyr Gly Tyr Met Leu Leu Gly Phe Met Thr Ala
20 25 30

His Gly Gln Pro Asp Gln Pro Arg Ser Ala Arg Tyr Ile Leu Lys Asp
35 40 45

Tyr Val Ser Gly
50

<210> 1823
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F107L"

<400> 1823
Tyr Lys Gly Ser Pro Met Glu Ile Ser Leu Pro Ile Ala Leu Ser Lys
1 5 10 15

Asn Gln Glu Ile Val Ile Glu Ile Ser Leu Leu Glu Thr Ser Pro Lys
20 25 30

Ser Ser Ala Leu Gln Trp Leu Thr Pro Glu Gln Thr Ser Gly Lys Glu
35 40 45

His Pro Tyr Leu
50

<210> 1824
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.F73L"

<400> 1824
Gln Lys Arg Ser Val Thr Ala Leu Met Val Leu Asn Leu Ala Leu Ala
1 5 10 15

Asp Leu Ala Val Leu Leu Thr Ala Pro Leu Leu Phe Leu His Phe Leu
20 25 30

Ala Gln Gly Thr Trp Ser Phe Gly Leu Ala Gly Cys Arg Leu Cys His
35 40 45

Tyr Val Cys Gly
50

<210> 1825
<211> 52
<212> PRT

<213> 人工序列

<220>
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多肽"

<220>
<221> 來源
<223> /注釋="p.S148T"

<400> 1825
Gly Lys Asn Glu Glu Lys Ile Gln Val Leu Thr Asp Lys Ile Asp Val
1 5 10 15

Leu Leu Gln Gln Ile Glu Glu Leu Gly Thr Thr Glu Gly Lys Val Glu
20 25 30

Glu Ala Gln Gly Met Met Lys Leu Val Glu Gln Leu Lys Glu Glu Arg
35 40 45

Glu Leu Leu Arg
50

<210> 1826
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R310L"

<400> 1826
Gln Leu Glu Lys Phe Asp Ile Lys Ser Phe Cys Lys Ile Leu Gly Pro
1 5 10 15

Leu Ser Tyr Ser Lys Ile Lys His Leu Leu Leu Leu Asp Gly Asn Arg
20 25 30

Ile Ser Glu Thr Ser Leu Pro Pro Asp Met Tyr Glu Cys Leu Arg Val
35 40 45

Ala Asn Glu Val
50

<210> 1827
<211> 35
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R330C"

<400> 1827
Lys Ile Lys His Leu Arg Leu Asp Gly Asn Arg Ile Ser Glu Thr Ser
1 5 10 15

Leu Pro Pro Asp Met Tyr Glu Cys Leu Cys Cys Val Ala Asn Glu Val
20 25 30

Thr Leu Asn
35

<210> 1828
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.I69L"

<400> 1828
Arg Ala Ser Gly Lys Asp Ser Ala Pro Thr Val Val Ser Gly Ile Leu
1 5 10 15

Gly Gly Ser Val Thr Leu Pro Leu Asn Leu Leu Ser Val Asp Thr Glu
20 25 30

Ile Glu Asn Val Ile Trp Ile Gly Pro Lys Asn Ala Leu Ala Phe Ala
35 40 45

Arg Pro Lys Glu
50

<210> 1829
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T64K"

<400> 1829
Ala Val Ala Phe His Asn Trp Lys Trp Leu Leu Met Arg Asn Met Val
1 5 10 15

Cys Lys Leu Gln Glu Gly Cys Glu Glu Lys Lys Leu Val Phe Ile Glu
20 25 30

Thr Gly Thr Ala Arg Gly Val Val Gly Phe Lys Gly Cys Ser Ser Ser
35 40 45

Ser Ser Tyr Pro
50

<210> 1830
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q710H"

<400> 1830
Asp Leu Leu Trp Lys Trp Asp Ala Leu Lys Ala Tyr Gln Asn Phe Val
1 5 10 15

Phe Glu Glu Asp Arg Leu His Ser Ile His His Ile Ala Asn His Ile
20 25 30

Cys Asn Leu Ile Gln Lys Gly Asn Ile Val Val Gln Trp Lys Leu Tyr
35 40 45

Asn Tyr Ile Phe
50

<210> 1831
<211> 98
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.RTQDLEGALRTKGLEL432del"

<400> 1831
Ala Lys Ala Ser Glu Ile Leu Gly Leu Lys Ala Gln Leu Lys Asp Thr
1 5 10 15

Arg Gly Lys Leu Glu Gly Leu Glu Leu Glu Val Cys Glu Asn Glu Leu
20 25 30

Gln Arg Lys Lys Asn Glu Ala Glu Leu Leu Arg Glu Lys Val Asn Leu
35 40 45

Leu Glu Gln Glu Leu Gln Glu Leu Arg Ala Gln Ala Ala Leu Ala Arg
50 55 60

Asp Met Gly Pro Pro Thr Phe Pro Glu Asp Val Pro Ala Leu Gln Arg
65 70 75 80

Glu Leu Glu Arg Leu Arg Ala Glu Leu Arg Glu Glu Arg Gln Gly His
85 90 95

Asp Gln

<210> 1832
<211> 65
<212> PRT
<213> 人工序列

<220>
<221> 來源
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多肽"

<220>
<221> 來源
<223> /注釋="p.P100fs"

<400> 1832
Val Pro Pro Arg Lys Ala Val Pro Val Thr Ser Phe Thr Tyr Ile Asn
1 5 10 15

Glu Asp Phe Arg Thr Glu Ser Pro Pro Ala Gln Ala Val Met Leu Arg
20 25 30

Met Pro Glu Ser Ser Gly His Thr Met Pro Thr Ser Ala Ala His His
35 40 45

Gln Ser Ser Ser Leu Ser Leu Glu Ser Trp Arg Arg Thr Trp Arg Arg
50 55 60

Ser
65

<210> 1833
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R345C"

<400> 1833
Glu Ala His Val Pro Leu Gln Asp Tyr Glu Ala Ser Asn Ser Val Thr
1 5 10 15

Pro Lys Met Val Val Leu Asp Ala Gly Cys Cys Tyr Gln Lys Leu Arg
20 25 30

Val Gly Ser Ser Gly Phe Ser His Phe Asn Ser Ser Asn Glu Glu Gln
35 40 45

Arg Ser Asn Thr
50

<210> 1834
<211> 32
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G53fs"

<400> 1834
Met Lys Phe Glu Val Lys Lys Glu Pro Val Glu Thr Asp Arg Ile Ile
1 5 10 15

Ser Gln Cys Gly Arg Leu Ile Ala Gly Ala Arg Cys Pro Pro Pro Pro
20 25 30

<210> 1835
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L609H"

<400> 1835
Pro Gln Gly Glu Asp Ser Leu Ser Pro His Tyr Phe Pro Gln Ser Pro
1 5 10 15

Pro Gln Gly Glu Asp Ser Met Ser Pro His His Tyr Phe Pro Gln Ser
20 25 30

Pro Leu Gln Gly Glu Glu Phe Gln Ser Ser Leu Gln Ser Pro Val Ser
35 40 45

Ile Cys Ser Ser
50

<210> 1836
<211> 53
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P239del"

<400> 1836
Phe Gln Ser Ser Pro Glu Arg Thr Gln Ser Thr Phe Glu Gly Phe Ala
1 5 10 15

Gln Ser Pro Leu Gln Ile Pro Val Ser Ser Ser Ser Ser Thr Leu Leu
20 25 30

Ser Leu Phe Gln Ser Phe Ser Glu Arg Thr Gln Ser Thr Phe Glu Gly
35 40 45

Phe Ala Gln Ser Ser
50

<210> 1837
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V380M"

<400> 1837
Ser Val Leu Pro Ile Pro Gly Glu Gly Leu Ser Thr Ser Val Pro Pro
1 5 10 15

Thr Ala Ser Asp Gly Ser Asp Thr Ser Met Met Pro Pro Thr Pro Gly
20 25 30

Glu Gly Ala Ser Thr Leu Val Gln Pro Thr Ala Pro Asp Gly Pro Gly
35 40 45

Ser Ser Val Leu
50

<210> 1838
<211> 51
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q45fs"

<400> 1838
Gly Asp Gly Arg Gly Glu Ile Gln Ala Thr Asn Ala Ser Gly Ser Pro
1 5 10 15

Thr Ser Met Leu Val Val Asp Ala Pro Ser Ala Leu Arg Arg Gln Ser
20 25 30

Thr Leu Ser Val Ser Thr Leu Pro Arg Pro Phe Arg Thr Arg Met Thr
35 40 45

Trp Arg Ser
50

<210> 1839
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G1156V"

<400> 1839
Lys Gly Phe Gly Phe Ser Leu Arg Gly Gly Arg Glu Tyr Asn Met Asp
1 5 10 15

Leu Tyr Val Leu Arg Leu Ala Glu Asp Val Val Pro Ala Glu Arg Cys
20 25 30

Gly Lys Met Arg Ile Gly Asp Glu Ile Leu Glu Ile Asn Gly Glu Thr
35 40 45

Thr Lys Asn Met
50

<210> 1840
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R1198C"

<400> 1840
Ile Asn Gly Glu Thr Thr Lys Asn Met Lys His Ser Arg Ala Ile Glu
1 5 10 15

Leu Ile Lys Asn Gly Gly Arg Arg Val Cys Cys Leu Phe Leu Lys Arg
20 25 30

Gly Asp Gly Ser Val Pro Glu Tyr Asp Pro Ser Ser Asp Arg His Gly
35 40 45

Pro Ala Thr Gly
50

<210> 1841
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L450M"

<400> 1841
Leu Ser Thr Thr Leu Lys Lys Ser Asn Met Gly Phe Gly Phe Thr Ile
1 5 10 15

Ile Gly Gly Asp Glu Pro Asp Glu Phe Met Met Gln Val Lys Ser Val
20 25 30

Ile Pro Asp Gly Pro Ala Ala Gln Asp Gly Lys Met Glu Thr Gly Asp
35 40 45

Val Ile Val Tyr
50

<210> 1842
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P1044T"

<400> 1842
Pro Ser Ser Glu Lys Gln Ser Pro Met Ala Gln Gln Ser Pro Leu Ala
1 5 10 15

Gln Gln Ser Pro Leu Ala Gln Pro Ser Thr Thr Ala Thr Pro Asn Ser
20 25 30

Pro Ile Ala Gln Pro Ala Pro Pro Gln Pro Leu Gln Leu Gln Gly His
35 40 45

Glu Asn Ser Tyr
50

<210> 1843
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q591K"

<400> 1843
Gln Ala Asn Gln Gln Met Pro Ser Val Leu Pro Ser Gln Asn Lys Pro
1 5 10 15

Ser Leu Leu His Tyr Thr Gln Gln Gln Lys Lys Gln Gln Gln Gln Gln
20 25 30

Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln
35 40 45

Gln Gln Gln Gln
50

<210> 1844
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q572L"

<400> 1844
Tyr Leu Gln Gln Pro Thr Pro Thr Gln Ala Ser Ser Ala Thr Ala Ser
1 5 10 15

Ser Thr Ala Thr Ala Thr Leu Gln Leu Leu Leu Gln Gln Gln Gln Gln
20 25 30

Gln Gln Gln Gln Pro Asp His Ser Ser Phe Leu Leu Gln Gln Met Met
35 40 45

Gln Gln Pro Gln
50

<210> 1845
<211> 33
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P162fs"

<400> 1845
Gln Pro His Pro Arg Met Lys Pro Ser Pro Leu Thr Pro Cys Pro Pro
1 5 10 15

Gly Val Pro Ser Pro Ser Pro Pro Pro Thr Gln Val Gly Thr Ser Asp
20 25 30

Pro

<210> 1846
<211> 91
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G431fs"

<400> 1846
Met Glu Ala Lys Asn Met Tyr Tyr Glu Ala Leu Glu Ala Ile Glu Thr
1 5 10 15

Tyr Leu Leu Asn Val Ser Pro Gly Gly Ala Asp Leu His Cys Arg Val
20 25 30

Ala Arg Gly Asp Ser Gly Pro Gln Asp Gly Ala Pro Gly Leu Phe Leu
35 40 45

Arg Gly His Asp Arg Pro Trp Arg Arg Gly Cys Gln Gly Arg Lys Glu
50 55 60

Gly Pro Leu Pro Arg Ala Arg Ser Pro Asp His Gln Asp Val Ser Arg
65 70 75 80

Val Ile Arg Pro Leu Arg His Gln Thr Trp Ala
85 90

<210> 1847
<211> 29
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.P2063fs"

<400> 1847
Gly Pro Thr Val Pro Pro Arg Pro Glu Pro Gly Pro Ser Met Glu Pro
1 5 10 15

Ser Leu Thr Pro Pro Ala Val Pro Pro Val Leu Leu Ser
20 25

<210> 1848
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E2046D"

<400> 1848
Glu Gly Tyr Ser Tyr Glu Thr Ser Thr Lys Thr Thr Arg Thr Pro Asp
1 5 10 15

Thr Ser Thr Tyr Cys Tyr Glu Thr Ala Asp Asp Lys Ile Thr Arg Thr
20 25 30

Pro Gln Ala Ser Thr Tyr Ser Tyr Glu Thr Ser Asp Leu Cys Tyr Thr
35 40 45

Ala Glu Lys Lys
50

<210> 1849
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S411C"

<400> 1849
Glu Lys Met Gly Val Gly Arg Leu Asp Met Tyr Val Leu His Pro Pro
1 5 10 15

Ser Ala Gly Ala Glu Arg Thr Leu Ala Cys Cys Val Cys Ala Leu Leu
20 25 30

Val Trp His Pro Ala Gly Pro Gly Glu Lys Val Val Arg Val Leu Phe
35 40 45

Pro Gly Cys Thr
50

<210> 1850
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K530N"

<400> 1850
Gln Ala Val Thr Asp Ser Ala Met Thr Ser Lys Thr Leu Glu Lys Ala
1 5 10 15

Met Thr Glu Pro Ser Ala Leu Ile Glu Asn Asn Ser Ser Ile Gln Glu
20 25 30

Leu Phe Glu Met Arg Val Asp Asp Lys Asp Lys Ile Glu Gly Val Gly
35 40 45

Ala Ala Thr Ser
50

<210> 1851
<211> 46
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K1472fs"

<400> 1851
Glu Pro Ser Thr Val Ser Arg Asp Glu Val Arg Arg Lys Lys Ala Val
1 5 10 15

Tyr Lys Lys Ala Glu Leu Ala Lys Lys Asn Arg Ser Ser Gly Pro Leu
20 25 30

Ser Leu Gln Glu Ile His Phe Lys Thr Cys Tyr Gln Ile Tyr
35 40 45

<210> 1852
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K57N"

<400> 1852
Ala Leu Gln Lys Lys Leu Glu Glu Leu Glu Leu Asp Glu Gln Gln Arg
1 5 10 15

Lys Arg Leu Glu Ala Phe Leu Thr Gln Asn Asn Gln Lys Val Gly Glu
20 25 30

Leu Lys Asp Asp Asp Phe Glu Lys Ile Ser Glu Leu Gly Ala Gly Asn
35 40 45

Gly Gly Val Val
50

<210> 1853
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K57N"

<400> 1853
Ala Leu Gln Lys Lys Leu Glu Glu Leu Glu Leu Asp Glu Gln Gln Arg
1 5 10 15

Lys Arg Leu Glu Ala Phe Leu Thr Gln Asn Asn Gln Lys Val Gly Glu
20 25 30

Leu Lys Asp Asp Asp Phe Glu Lys Ile Ser Glu Leu Gly Ala Gly Asn
35 40 45

Gly Gly Val Val
50

<210> 1854
<211> 52
<212> PRT

<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P124S"

<400> 1854
Ile His Leu Glu Ile Lys Pro Ala Ile Arg Asn Gln Ile Ile Arg Glu
1 5 10 15

Leu Gln Val Leu His Glu Cys Asn Ser Ser Ser Tyr Ile Val Gly Phe
20 25 30

Tyr Gly Ala Phe Tyr Ser Asp Gly Glu Ile Ser Ile Cys Met Glu His
35 40 45

Met Asp Gly Gly
50

<210> 1855
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S184L"

<400> 1855
Pro Tyr Ile Val Gln Phe Tyr Gly Ala Leu Phe Arg Glu Gly Asp Cys
1 5 10 15

Trp Ile Cys Met Glu Leu Met Ser Thr Leu Leu Phe Asp Lys Phe Tyr
20 25 30

Lys Tyr Val Tyr Ser Val Leu Asp Asp Val Ile Pro Glu Glu Ile Leu
35 40 45

Gly Lys Ile Thr
50

<210> 1856
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S251I"

<400> 1856
Ile His Arg Asp Ile Lys Pro Ser Asn Ile Leu Leu Asp Arg Ser Gly
1 5 10 15

Asn Ile Lys Leu Cys Asp Phe Gly Ile Ile Ile Gly Gln Leu Val Asp
20 25 30

Ser Ile Ala Lys Thr Arg Asp Ala Gly Cys Arg Pro Tyr Met Ala Pro
35 40 45

Glu Arg Ile Asp
50

<210> 1857
<211> 28
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.T261fs"

<400> 1857
Asp Arg Ser Gly Asn Ile Lys Leu Cys Asp Phe Gly Ile Ser Gly Gln
1 5 10 15

Leu Val Asp Ser Ile Ala Lys Thr Arg Cys Trp Leu
20 25

<210> 1858
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R287H"

<400> 1858
Arg Asp Ala Gly Cys Arg Pro Tyr Met Ala Pro Glu Arg Ile Asp Pro
1 5 10 15

Ser Ala Ser Arg Gln Gly Tyr Asp Val His His Ser Asp Val Trp Ser
20 25 30

Leu Gly Ile Thr Leu Tyr Glu Leu Ala Thr Gly Arg Phe Pro Tyr Pro
35 40 45

Lys Trp Asn Ser
50

<210> 1859
<211> 30
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q445R"

<400> 1859
Val Gln Phe Asn Asp Gly Asn Ala Ala Val Val Ser Met Trp Val Cys
1 5 10 15

Arg Ala Leu Glu Glu Arg Arg Ser Gln Arg Arg Gly Pro Pro
20 25 30

<210> 1860
<211> 59
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.I761fs"

<400> 1860
Leu Asn Cys Ile Leu Gly Asn Gln Thr Glu Ser Asn Asn Trp Gln Glu
1 5 10 15

Leu Leu Gly Arg Leu Cys Leu Ile Asp Cys Cys Trp Asn Phe Leu Leu
20 25 30

Asn Phe Ile Leu Ile Leu Ser Val Leu Met Phe His Lys Leu Ser Leu
35 40 45

Leu Lys Ser Gly Ile Arg Ser Cys Cys Pro Ser
50 55

<210> 1861
<211> 53
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V1346del"

<400> 1861
Leu Phe Ile Glu Trp Met Ala Gly Gly Ser Val Ala His Leu Leu Ser
1 5 10 15

Lys Tyr Gly Ala Phe Lys Glu Ser Val Ile Asn Tyr Thr Glu Gln Leu
20 25 30

Leu Arg Gly Leu Ser Tyr Leu His Glu Asn Gln Ile Ile His Arg Asp
35 40 45

Val Lys Gly Ala Asn
50

<210> 1862
<211> 59
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L1384fs"

<400> 1862
Leu His Glu Asn Gln Ile Ile His Arg Asp Val Lys Gly Ala Asn Leu
1 5 10 15

Leu Ile Asp Ser Thr Gly Gln Arg Leu Lys Asn Cys Arg Phe Trp Ser
20 25 30

Cys Ser Gln Val Gly Ile Lys Arg Asn Trp Cys Arg Arg Val Ser Gly
35 40 45

Thr Ile Thr Gly Asp Asn Cys Ile Tyr Gly Thr
50 55

<210> 1863
<211> 31
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L318fs"

<400> 1863
Asp Gly Phe Ser Pro Tyr Ser Pro Glu Glu Thr Asn Arg Arg Val Asn
1 5 10 15

Lys Val Met Arg Ala Arg Leu Tyr Leu Thr Ala Ala Asp Arg Ala
20 25 30

<210> 1864
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P324L"

<400> 1864
Tyr Ser Pro Glu Glu Thr Asn Arg Arg Val Asn Lys Val Met Arg Ala
1 5 10 15

Arg Leu Tyr Leu Leu Gln Gln Ile Gly Leu Leu Asn Ser Phe Leu Ile
20 25 30

Gly Gly Asp Ser Pro Asp Asn Lys Tyr Arg Val Phe Ile Gly Pro Gln
35 40 45

Asn Cys Ser Cys
50

<210> 1865
<211> 53
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R449del"

<400> 1865
Lys Leu His Phe Glu Lys Ile Lys Ser Glu Gly Thr Cys Leu His Arg
1 5 10 15

Leu Glu Glu Glu Leu Val Met Arg Arg Glu Glu Leu Arg His Ala Leu
20 25 30

Asp Ile Arg Glu His Tyr Glu Arg Lys Leu Glu Arg Ala Asn Asn Leu
35 40 45

Tyr Met Glu Leu Asn
50

<210> 1866
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R275Q"

<400> 1866
Glu Asn Thr Ser Gly Phe Trp Leu Asn Arg Ser Asn Glu Leu Ile Trp
1 5 10 15

Leu Glu Leu Gln Ala Trp His Ala Gly Gln Gln Thr Ile Asn Asp Gln
20 25 30

Asp Phe Phe Leu Tyr Thr Ala Arg Gln Ala Ile Pro Asp Ile Ile Asn
35 40 45

Glu Ile Leu Thr
50

<210> 1867
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E524Q"

<400> 1867
Ala Tyr Leu Thr Leu Asp His Gln Leu Gln Pro Leu Ala Pro Cys Pro
1 5 10 15

Asn Ser Lys Glu Ser Met Ala Val Phe Gln Gln Gln His Cys Lys Met
20 25 30

Ala Gln Glu Tyr Met Lys Val Gln Thr Glu Ile Ala Leu Leu Leu Gln
35 40 45

Arg Lys Gln Glu
50

<210> 1868
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R341G"

<400> 1868
Ser Arg Gly Gln His Gly Pro Ala Glu Arg Thr Pro Ser Glu Ile Gln
1 5 10 15

Phe His Gln Val Lys Phe Gly Ala Pro Gly Gly Arg Lys Glu Thr Asp
20 25 30

Pro Leu Asn Glu Pro Trp Glu Glu Glu Trp Thr Leu Leu Gly Lys Glu
35 40 45

Glu Leu Ser Gly
50

<210> 1869
<211> 46
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P657fs"

<400> 1869
Leu Phe Asp Tyr Ala Arg Gln Met Gln Lys Leu Pro Val Ala Ile Pro
1 5 10 15

Ala His Lys Leu Pro Asp Arg Ile Leu Gln Gly Asn Phe Leu Tyr Gln
20 25 30

Gln Lys Ser Leu Lys Pro Asn Gly Ala Arg Ser Val Val Leu
35 40 45

<210> 1870
<211> 32
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A80fs"

<400> 1870
Ala Thr Ser Ser Lys Gln Leu Pro Leu Glu Pro Glu Ser Pro Ser Gly
1 5 10 15

Gln Val Gly Pro Arg Pro Ala Pro Pro Ala Gly Arg Val Pro Phe Leu
20 25 30

<210> 1871
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R487C"

<400> 1871
Glu Arg Leu Glu Lys Glu Glu Gln Asp Arg Leu Glu Arg Glu Glu Leu
1 5 10 15

Lys Arg Lys Ala Glu Glu Glu Arg Leu Cys Cys Leu Glu Glu Glu Ala
20 25 30

Arg Lys Gln Glu Glu Glu Arg Lys Arg Gln Glu Glu Glu Lys Lys Lys
35 40 45

Gln Glu Gly Glu
50

<210> 1872
<211> 26
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.Q308fs"

<400> 1872
Pro Gln Thr Lys Val Glu Glu Ser Pro Leu Glu Lys Val Glu Thr Pro
1 5 10 15

Pro Lys Ala Ser Val Asp Ala Pro Pro Arg
20 25

<210> 1873
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K485N"

<400> 1873
Gln Lys Lys Ala Ala Lys Arg Glu Glu Ala Leu Ala Ser Phe Glu Ala
1 5 10 15

Trp Lys Ala Met Lys Glu Lys Glu Ala Asn Asn Lys Ile Ala Ala Lys
20 25 30

Lys Arg Leu Glu Glu Lys Asn Lys Lys Lys Thr Glu Glu Glu Asn Ala
35 40 45

Ala Arg Lys Gly
50

<210> 1874
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E322K"

<400> 1874
Asn Pro His Lys Arg Ile Glu Val Glu Gln Ala Leu Ala His Pro Tyr
1 5 10 15

Leu Glu Gln Tyr Tyr Asp Pro Ser Asp Lys Lys Pro Ile Ala Glu Ala
20 25 30

Pro Phe Lys Phe Asp Met Glu Leu Asp Asp Leu Pro Lys Glu Lys Leu
35 40 45

Lys Glu Leu Ile
50

<210> 1875
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.E315K"

<400> 1875
Glu Leu Asp Val Asp Lys Arg Leu Thr Ala Ala Gln Ala Leu Thr His
1 5 10 15

Pro Phe Phe Glu Pro Phe Arg Asp Pro Lys Lys Glu Glu Thr Glu Ala
20 25 30

Gln Gln Pro Phe Asp Asp Ser Leu Glu His Glu Lys Leu Thr Val Asp
35 40 45

Glu Trp Lys Gln
50

<210> 1876
<211> 127
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q511fs"

<400> 1876
Pro Pro Arg Leu Pro Pro Glu Ala Arg Pro Gly Arg Arg Met Phe Ser
1 5 10 15

Thr Ser Ala Leu Gln Gly Ala Gln Gly Val Pro Gly Leu Cys Leu Glu
20 25 30

Ala Thr Pro Lys Pro Thr Gly Leu Ser Ala Thr Arg His Trp Ala Thr
35 40 45

Cys Pro Cys Trp Arg Gly Thr Met Cys Glu Pro Pro Tyr Ser Leu His
50 55 60

Leu Ala Leu Cys Ser Cys Pro Ser Pro Phe Pro Arg Pro Leu Ser Ser
65 70 75 80

Leu Leu His Pro Leu Ala Leu Pro Ala Leu Pro Gly Pro Leu Lys Phe
85 90 95

Gln Gly Ala Cys Pro Gly Leu Leu Gly Gly Ala Asp Glu Gly Pro Ala
100 105 110

Pro Ala Pro Leu Thr Ser Ser Asn Lys Val Met Ser Ala Pro Asn
115 120 125

<210> 1877
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.V100M"

<400> 1877
Asp Asn Ile Val Lys Val Tyr Glu Val Leu Gly Pro Lys Gly Thr Asp
1 5 10 15

Leu Gln Gly Glu Leu Phe Lys Phe Ser Met Met Ala Tyr Ile Val Gln
20 25 30

Glu Tyr Met Glu Thr Asp Leu Ala Arg Leu Leu Glu Gln Gly Thr Leu
35 40 45

Ala Glu Glu His
50

<210> 1878
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A501D"

<400> 1878
Lys Ala Ala Leu Lys Ala Ala Leu Leu Lys Ser Leu Arg Ser Arg Leu
1 5 10 15

Arg Asp Gly Pro Ser Ala Pro Leu Glu Asp Asp Pro Glu Pro Arg Lys
20 25 30

Pro Val Thr Ala Gln Glu Arg Gln Arg Glu Arg Glu Glu Lys Arg Arg
35 40 45

Arg Arg Gln Glu
50

<210> 1879
<211> 81
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L217fs"

<400> 1879
Ser Ser Ser Pro Leu Lys Thr Gly Glu Gln Thr Pro Pro His Glu His
1 5 10 15

Ile Cys Leu Ser Asp Glu Leu Pro Pro Pro Arg Ala Ala Pro Pro Pro
20 25 30

Pro Gln Ile Glu Ala Pro Pro Pro Thr Ala Leu Ala Ala Ala Ala Gln
35 40 45

Pro Pro Arg Trp His Leu Arg Val Val Pro Leu Leu Pro Arg Leu Gly
50 55 60

Val Gly Ala Thr Arg Ile Glu Thr Glu Ser Thr Thr Arg Pro Met Cys
65 70 75 80

Asp

<210> 1880
<211> 51
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T214fs"

<400> 1880
Glu Asn Leu Leu Tyr Thr Ser Lys Arg Pro Asn Ala Ile Leu Lys Leu
1 5 10 15

Thr Asp Phe Gly Phe Ala Lys Glu Thr His Gln Pro Gln Leu Phe Asp
20 25 30

His Ser Leu Leu Tyr Thr Val Leu Cys Gly Ser Arg Ser Ala Gly Ser
35 40 45

Arg Glu Val
50

<210> 1881
<211> 52
<212> PRT
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<223> /注釋="人工序列的說明書: 合成
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<223> /注釋="p.R193L"

<400> 1881
Pro Ile Cys Lys Ile Cys Phe Gln Gly Ala Glu Gln Gly Glu Leu Leu
1 5 10 15

Asn Pro Cys Arg Cys Asp Gly Ser Val Leu Leu Tyr Thr His Gln Leu
20 25 30

Cys Leu Leu Lys Trp Ile Ser Glu Arg Gly Ser Trp Thr Cys Glu Leu
35 40 45

Cys Cys Tyr Arg
50

<210> 1882
<211> 52
<212> PRT
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<223> /注釋="p.R170C"

<400> 1882
Gly Leu Pro Thr Ile Pro Val Met Leu Ile Leu Gly Lys Met Ile Arg
1 5 10 15

Trp Glu Asp Tyr Val Leu Arg Leu Trp Cys Cys Lys Tyr Ser Asn Lys
20 25 30

Leu Gln Ile Leu Asn Ser Ile Phe Pro Gly Ile Gly Cys Pro Val Pro
35 40 45

Arg Ile Pro Ala
50

<210> 1883
<211> 36
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<223> /注釋="p.K152fs"

<400> 1883
Ala Ser Ser Thr Ser Ser Pro Lys Ala Glu Asp Gly Ala Thr Pro Ser
1 5 10 15

Pro Ser Asn Glu Thr Pro Lys Lys Lys Arg Ser Ala Phe Pro Ser Arg
20 25 30

Ser Leu Ser Ser
35

<210> 1884
<211> 52
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<223> /注釋="p.R481Q"

<400> 1884
Leu Pro Lys Gln Val Ala Asp His Tyr Asp Asn Phe Arg Ile Tyr Lys
1 5 10 15

Ala Leu Glu Ala Val Ser Ser Cys Val Gln Gln Gln Thr Asn Gly Phe
20 25 30

Val Gln Arg His Ala Pro Trp Lys Leu Asn Trp Glu Ser Pro Val Asp
35 40 45

Ala Pro Trp Leu
50

<210> 1885
<211> 52
<212> PRT
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<223> /注釋="p.R324G"

<400> 1885
Ile Ser Leu Phe Leu Ile Ile Asn Ser Ser Ala Asn Pro Ile Ile Tyr
1 5 10 15

Phe Phe Val Gly Ser Leu Arg Lys Lys Gly Gly Leu Lys Glu Ser Leu
20 25 30

Arg Val Ile Leu Gln Arg Ala Leu Ala Asp Lys Pro Glu Val Gly Arg
35 40 45

Asn Lys Lys Ala
50

<210> 1886
<211> 52
<212> PRT
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多肽"

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<223> /注釋="p.E166G"

<400> 1886
Tyr Ala Thr Asp Glu Thr Glu Glu Cys Met Pro Leu Thr Ile Val Leu
1 5 10 15

Ala His Lys Leu Asn Ala Lys Leu Ala Gly Gly Leu Arg Arg Asn Gly
20 25 30

Thr Leu Pro Trp Leu Arg Pro Asp Ser Lys Thr Gln Val Thr Val Gln
35 40 45

Tyr Met Gln Asp
50

<210> 1887
<211> 52
<212> PRT
<213> 人工序列

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<223> /注釋="人工序列的說明書: 合成
多肽"

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<223> /注釋="p.R36W"

<400> 1887
Ser Asp Glu Glu Gln Pro Arg Phe Gln Ser Ala Ala Asp Lys Arg Ala
1 5 10 15

His His Asn Ala Leu Glu Arg Lys Arg Trp Trp Asp His Ile Lys Asp
20 25 30

Ser Phe His Ser Leu Arg Asp Ser Val Pro Ser Leu Gln Gly Glu Lys
35 40 45

Ala Ser Arg Ala
50

<210> 1888
<211> 52
<212> PRT
<213> 人工序列

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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.H28R"

<400> 1888
Asp Asn Asp Asp Ile Glu Val Glu Ser Asp Glu Glu Gln Pro Arg Phe
1 5 10 15

Gln Ser Ala Ala Asp Lys Arg Ala His Arg Arg Asn Ala Leu Glu Arg
20 25 30

Lys Arg Arg Asp His Ile Lys Asp Ser Phe His Ser Leu Arg Asp Ser
35 40 45

Val Pro Ser Leu
50

<210> 1889
<211> 52
<212> PRT
<213> 人工序列

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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.Q311E"

<400> 1889
Glu Trp Arg Leu Ser Phe Ala Arg Ser Glu Val Gln Leu Lys Lys Cys
1 5 10 15

Ile Ser Ser Ser Leu Met Gln Ala Tyr Glu Glu Ala Cys Lys Ala Ile
20 25 30

Ile Ile Lys Leu Leu Ser Arg Pro Lys Ala Ile Ser Pro Tyr His Leu
35 40 45

Arg Ser Met Met
50

<210> 1890
<211> 42
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.P732fs"

<400> 1890
Ser Val Thr Thr Ala Thr Thr Asp Pro Gly Ala Ser Ser Leu Gly Lys
1 5 10 15

Ala Pro Ser Asn Ser Gly Arg Pro Pro Asn Ser Leu Ala Leu Cys Trp
20 25 30

Val Pro Ala Cys Trp Val Thr Cys Leu His
35 40

<210> 1891
<211> 34
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.G780fs"

<400> 1891
Leu Pro Ser Leu Leu Gln Pro Pro Gly Pro Leu Leu Ser Gly Gln Leu
1 5 10 15

Gly Leu Gln Leu Leu Pro Gly Gly Gly Ser Ser Ser Thr Pro Leu Arg
20 25 30

Gly Phe

<210> 1892
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R43Q"

<400> 1892
Ala Val Gln Leu Pro Ile Asp Gln Val Asn Phe Val Val Cys Gln Leu
1 5 10 15

Phe Ala Leu Leu Ala Ala Ile Trp Phe Gln Gln Thr Tyr Leu His Ser
20 25 30

Ser Lys Thr Ser Ser Phe Ile Arg His Val Val Ala Thr Leu Leu Gly
35 40 45

Leu Tyr Leu Ala
50

<210> 1893
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.R424W"

<400> 1893
His Trp Phe Leu Lys Met Arg Ala Tyr Asp Tyr Met Cys Met Gly Phe
1 5 10 15

Val Leu Leu Ser Leu Ala Asp Thr Leu Trp Trp Tyr Trp Ala Ser Ile
20 25 30

Tyr Phe Cys Ile His Phe Leu Ala Leu Ala Ala Leu Gly Leu Gly Leu
35 40 45

Ala Leu Gly Gly
50

<210> 1894
<211> 52
<212> PRT
<213> 人工序列

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<223> /注釋="人工序列的說明書: 合成
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<220>
<221> 來源
<223> /注釋="p.A109T"

<400> 1894
Leu Val Ser Met Ser Ser Ala Trp Glu Thr Ile Thr Ile Tyr Leu Leu
1 5 10 15

Asn Asn Lys His Leu Val Ile Ala Asp Thr Thr Phe Val Arg His Ile
20 25 30

Asp Asn Val Phe Asp Ser Met Ile Cys Ile Ser Val Val Ala Ser Met
35 40 45

Cys Ser Leu Leu
50

<210> 1895
<211> 52
<212> PRT
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多肽"

<220>
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<223> /注釋="p.R926Q"

<400> 1895
Lys Thr Met Lys Leu Met Thr Leu Ser Ile Arg Gln Leu Gly Arg Gly
1 5 10 15

Ser His Arg Lys Phe Glu Ile Ala Ser Gln Gln Asn Gly Leu Glu Lys
20 25 30

Tyr Ile Leu Gln Ala Ala Ser Lys Glu Ile Arg Asp Cys Trp Phe Ser
35 40 45

Glu Ile Ser Lys
50

<210> 1896
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.S306F"

<400> 1896
Gln Phe Phe Leu Ala Phe Ala Leu Pro Phe Val Val Ile Thr Ala Ala
1 5 10 15

Tyr Val Arg Ile Leu Gln Arg Met Thr Phe Phe Ser Val Ala Pro Ala
20 25 30

Ser Gln Arg Ser Ile Arg Leu Arg Thr Lys Arg Val Thr Arg Thr Ala
35 40 45

Ile Ala Ile Cys
50

<210> 1897
<211> 52
<212> PRT

<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.V141I"

<400> 1897
Val Tyr Thr Gln Ser Asp Val Tyr Asp Gln Leu Ile Phe Ala Val Asn
1 5 10 15

Gln Tyr Leu Gln Leu Tyr Asn Val Ser Ile Ile Gly Asn His Ala Tyr
20 25 30

Glu Asn Lys Gly Thr Lys Gln Ser Ala Met Ala Ile Cys Gln His Phe
35 40 45

Tyr Lys Arg Gly
50

<210> 1898
<211> 52
<212> PRT
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R915Q"

<400> 1898
Ser Glu Leu Leu Gln Ser Val Pro Ser Met Phe Asn Phe Arg Ala Pro
1 5 10 15

Pro Asn Ala Leu Pro Glu Asn Leu Leu Gln Gln Lys Gly Lys Glu Arg
20 25 30

Tyr Thr Cys Arg Tyr Cys Gly Lys Ile Phe Pro Arg Ser Ala Asn Leu
35 40 45

Thr Arg His Leu
50

<210> 1899
<211> 52
<212> PRT
<213> 人工序列

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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R969C"

<400> 1899
Thr Gly Glu Gln Pro Tyr Arg Cys Lys Tyr Cys Asp Arg Ser Phe Ser
1 5 10 15

Ile Ser Ser Asn Leu Gln Arg His Val Cys Cys Asn Ile His Asn Lys
20 25 30

Glu Lys Pro Phe Lys Cys His Leu Cys Asp Arg Cys Phe Gly Gln Gln
35 40 45

Thr Asn Leu Asp
50

<210> 1900
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L36R"

<400> 1900
His Arg Pro Leu Lys Arg Pro Arg Leu Gly Pro Pro Asp Val Tyr Pro
1 5 10 15

Gln Asp Pro Lys Gln Lys Glu Asp Glu Arg Arg Thr Ala Leu Asn Val
20 25 30

Lys Gln Gly Phe Asn Asn Gln Pro Ala Val Ser Gly Asp Glu His Gly
35 40 45

Ser Ala Lys Asn
50

<210> 1901
<211> 52
<212> PRT
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<220>
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多肽"

<220>
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<223> /注釋="p.G44S"

<400> 1901
Leu Gly Pro Pro Asp Val Tyr Pro Gln Asp Pro Lys Gln Lys Glu Asp
1 5 10 15

Glu Leu Thr Ala Leu Asn Val Lys Gln Ser Ser Phe Asn Asn Gln Pro
20 25 30

Ala Val Ser Gly Asp Glu His Gly Ser Ala Lys Asn Val Ser Phe Asn
35 40 45

Pro Ala Lys Ile
50

<210> 1902
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

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<223> /注釋="p.L1224F"

<400> 1902
Ile Arg Ser Ser Cys Asp Arg His Leu Leu Ala Ala Ser Gln Asn Arg
1 5 10 15

Ile Val Asp Gly Ala Val Phe Ala Val Phe Phe Lys Ala Val Phe Val
20 25 30

Leu Gly Asp Ala Glu Leu Lys Gly Ser Gly Phe Thr Val Thr Gly Gly
35 40 45

Thr Glu Glu Leu
50

<210> 1903
<211> 52
<212> PRT
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多肽"

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<223> /注釋="p.C1292Y"

<400> 1903
Leu Cys Thr Asp Lys Glu Leu Ile Leu Asp Pro Val Leu Ser Asn Met
1 5 10 15

Gln Ala Gln Lys Leu Leu Gln Leu Ile Tyr Tyr Tyr Pro His Gly Ile
20 25 30

Lys Glu Cys Thr Glu Gly Asp Asn Leu Gln Arg Gln His Ile Lys Arg
35 40 45

Ile Leu Gln Asn
50

<210> 1904
<211> 52
<212> PRT
<213> 人工序列

<220>
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多肽"

<220>
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<223> /注釋="p.P2071S"

<400> 1904
Gln Asp Pro Met Arg Pro Arg Gln Pro Gln Val Arg Gln Gln Gln Arg
1 5 10 15

Leu Leu Gln Met Gln Gln Pro Gln Gln Ser Ser Gln Pro Gln Gln Pro
20 25 30

Pro Gln Pro Gln Gln Ser Ser Gln Ser Gln Ser Gln Thr Leu Gly Leu
35 40 45

Gln Ala Met Gln
50

<210> 1905
<211> 53
<212> PRT
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多肽"

<220>
<221> 來源
<223> /注釋="p.Q2115del"

<400> 1905
Leu Gly Leu Gln Ala Met Gln Pro Gln Gln Pro Leu Phe Pro Arg Gln
1 5 10 15

Gly Leu Gln Gln Thr Gln Gln Gln Gln Thr Ala Ala Leu Val Arg Gln
20 25 30

Leu Gln Lys Gln Leu Ser Ser Asn Gln Pro Gln Gln Gly Val Thr Pro
35 40 45

Tyr Gly His Pro Ser
50

<210> 1906
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S35I"

<400> 1906
Trp Arg Ser Thr Ala Phe Arg Gln Lys Leu Val Ser Gln Ile Glu Asp
1 5 10 15

Ala Met Arg Lys Ala Gly Val Ala His Ile Ile Lys Ser Ser Lys Asp
20 25 30

Met Glu Ser His Val Phe Leu Lys Ala Lys Thr Arg Asp Glu Tyr Leu
35 40 45

Ser Leu Val Ala
50

<210> 1907
<211> 52
<212> PRT
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<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.H449Q"

<400> 1907
Thr Ala Gly Pro Ala Val His Leu Lys Ala Met Gln Leu Ser Trp Thr
1 5 10 15

Ser Leu Ala Leu Val Gly Ile Asp Ser Gln Gln Gly Lys Leu Ser Val
20 25 30

Leu Arg Leu Ser Pro Ser Met Gly His Pro Leu Glu Val Gly Leu Ala
35 40 45

Leu Arg His Leu
50

<210> 1908
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P99S"

<400> 1908
Glu Pro His Glu Ser Arg Thr Asn Ser Asp Ile Val Glu Ala Leu Asn
1 5 10 15

Lys Lys Glu His Arg Gly Cys Asp Ser Ser Ser Asp Pro Asp Thr Ser
20 25 30

Tyr Val Leu Thr Pro His Thr Glu Glu Lys Tyr Lys Lys Ile Asn Glu
35 40 45

Glu Phe Asp Asn
50

<210> 1909
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R127Q"

<400> 1909
Asp Thr Ser Tyr Val Leu Thr Pro His Thr Glu Glu Lys Tyr Lys Lys
1 5 10 15

Ile Asn Glu Glu Phe Asp Asn Met Met Gln Gln Asn His Lys Ile Ala
20 25 30

Pro Gly Leu Pro Pro Gln Asn Phe Ser Met Ser Val Thr Val Pro Val
35 40 45

Thr Ser Pro Asn
50

<210> 1910
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R377H"

<400> 1910
Cys Pro Arg Cys Gln Asp Ser His Glu Arg Lys Ser Pro Gly Ser Leu
1 5 10 15

Ser Pro Gln Pro Leu Pro Gln Cys Lys His His His Leu Lys Gln Val
20 25 30

Gln Leu Leu Phe Cys Glu Asp His Asp Glu Pro Ile Cys Leu Ile Cys
35 40 45

Ser Leu Ser Gln
50

<210> 1911
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S1053L"

<400> 1911
Asn Pro Tyr Ala Thr Ile Lys Asp Pro Pro Val Leu Ile Pro Lys Ser
1 5 10 15

Ser Glu Cys Gly Tyr Val Glu Met Lys Leu Leu Pro Ala Arg Arg Asp
20 25 30

Ser Pro Tyr Ala Glu Ile Asn Asn Ser Thr Ser Ala Asn Arg Asn Val
35 40 45

Tyr Glu Val Glu
50

<210> 1912
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Y393C"

<400> 1912
Arg Thr Cys Ile Asp Val Asp Asp Cys Ala Asp Ser Pro Cys Cys Gln
1 5 10 15

Gln Val Cys Thr Asn Asn Pro Gly Gly Cys Cys Glu Cys Gly Cys Tyr
20 25 30

Ala Gly Tyr Arg Leu Ser Ala Asp Gly Cys Gly Cys Glu Asp Val Asp
35 40 45

Glu Cys Ala Ser
50

<210> 1913
<211> 35
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.A582fs"

<400> 1913
Asp Thr Phe Gly Lys Asn Cys Ser Phe Ser Cys Ser Cys Gln Asn Gly
1 5 10 15

Gly Thr Cys Asp Ser Val Thr Gly Ala Leu Pro Leu Pro Pro Gly Cys
20 25 30

Gln Trp Asn
35

<210> 1914
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.H1094Y"

<400> 1914
Val Val Ile Gly Pro Ser Ser Leu Ile Val His Phe Asn Glu Val Ile
1 5 10 15

Gly Arg Gly His Phe Gly Cys Val Tyr Tyr Tyr Gly Thr Leu Leu Asp
20 25 30

Asn Asp Gly Lys Lys Ile His Cys Ala Val Lys Ser Leu Asn Arg Ile
35 40 45

Thr Asp Ile Gly
50

<210> 1915
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.M1250T"

<400> 1915
Leu Ala Arg Asp Met Tyr Asp Lys Glu Tyr Tyr Ser Val His Asn Lys
1 5 10 15

Thr Gly Ala Lys Leu Pro Val Lys Trp Thr Thr Ala Leu Glu Ser Leu
20 25 30

Gln Thr Gln Lys Phe Thr Thr Lys Ser Asp Val Trp Ser Phe Gly Val
35 40 45

Leu Leu Trp Glu
50

<210> 1916
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q53E"

<400> 1916
Val Trp Pro Asn Arg Ile His Thr Thr Ala Glu Lys Tyr Arg Glu Tyr
1 5 10 15

Glu Ala Arg Glu Gln Thr Asp Gln Thr Glu Glu Ala Gln Glu Leu His
20 25 30

Arg Ser Gln Asp Arg Asp Phe Glu Thr Met Ala Lys Leu His Ile Pro
35 40 45

Val Met Val Asp
50

<210> 1917
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R200Q"

<400> 1917
Glu Ile Ile Tyr Asp Phe Cys Met Cys Asn Pro Pro Phe Phe Ala Asn
1 5 10 15

Gln Leu Glu Ala Lys Gly Val Asn Ser Gln Gln Asn Pro Arg Arg Pro
20 25 30

Pro Pro Ser Ser Val Asn Thr Gly Gly Ile Thr Glu Ile Met Ala Glu
35 40 45

Gly Gly Glu Leu
50

<210> 1918
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R174Q"

<400> 1918
Glu Glu Thr Phe Thr Asp Leu Leu Gln Thr Leu Glu His Leu Cys Ser
1 5 10 15

Asn His Ser Val Ile Leu Leu Ala Cys Gln Gln Ile Arg Tyr Glu Arg
20 25 30

Asp Asn Asn Phe Leu Ala Met Leu Glu Arg Gln Phe Thr Val Arg Lys
35 40 45

Val His Tyr Asp
50

<210> 1919
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F56L"

<400> 1919
Asp Phe Lys Gln Gln Lys Leu Glu Gln Glu Ala Gln Lys Asn Trp Asp
1 5 10 15

Leu Phe Tyr Lys Arg Asn Ser Thr Asn Leu Leu Phe Lys Asp Arg His
20 25 30

Trp Thr Thr Arg Glu Phe Glu Glu Leu Arg Ser Cys Arg Glu Phe Glu
35 40 45

Asp Gln Lys Leu
50

<210> 1920
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Y57F"

<400> 1920
Leu Tyr Val Asn Met Thr Ser Gly Pro Gly Gly Pro Ala Ala Ala Ala
1 5 10 15

Gly Gly Arg Lys Glu Asn His Gln Trp Phe Phe Val Cys Asn Arg Glu
20 25 30

Lys Leu Cys Glu Ser Leu Gln Ala Val Phe Val Gln Ser Tyr Leu Asp
35 40 45

Gln Gly Thr Gln
50

<210> 1921
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R534S"

<400> 1921
Ile Trp Thr Pro Phe Glu Pro Val Asn Pro Leu Ser Gly Phe Gly Ser
1 5 10 15

Asp Pro Ser Gly Asn Met Lys Thr Gln Ser Ser Arg Gly Ser Gln Pro
20 25 30

Ser Thr Pro Arg Leu Ser Pro Thr Phe Pro Glu Ser Ile Glu His Pro
35 40 45

Leu Ala Arg Arg
50

<210> 1922
<211> 60
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.179_182AAAA>A"

<400> 1922
Ile Pro Gly Gly Ser Leu Gly Ser Val Leu Leu Pro Ala Ala Arg Phe
1 5 10 15

Asp Ala Arg Glu Ala Ala Ala Ala Ala Ala Gly Val Leu Tyr Gly Gly
20 25 30

Asp Asp Ala Gln Gly Met Met Ala Ala Met Leu Ser His Ala Tyr Gly
35 40 45

Pro Gly Gly Cys Gly Ala Ala Ala Ala Ala Leu Asn
50 55 60

<210> 1923
<211> 34
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S7F"

<400> 1923
Met Ser Lys Gly Thr Ser Phe Phe Asp Thr Ser Leu Gly Arg Val Ser
1 5 10 15

Arg Ala Ala Phe Pro Ser Pro Thr Ala Ala Glu Met Ala Glu Ile Ser
20 25 30

Arg Ile

<210> 1924
<211> 52
<212> PRT
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<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R162C"

<400> 1924
Thr Thr Pro Gln Asn Glu Glu Ile Arg Ala Val Gly Arg Leu Lys Arg
1 5 10 15

Glu Arg Ser Met Ser Glu Asn Ala Val Cys Cys Gln Asn Gly Gln Leu
20 25 30

Val Arg Asn Asp Ser Leu Trp His Arg Ser Asp Ser Ala Pro Arg Asn
35 40 45

Lys Ile Ser Arg
50

<210> 1925
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.D170N"

<400> 1925
Gly Ala Ser Arg Leu Ala Ser His Glu Tyr Leu Lys Ala Phe Lys Val
1 5 10 15

Ala Tyr Ser Leu Asn Gly His Glu Phe Asn Asn Phe Ile His Asp Val
20 25 30

Asn Lys Lys His Lys Glu Phe Val Gly Asn Trp Asn Lys Asn Ala Val
35 40 45

His Val Asn Leu
50

<210> 1926
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源

<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R280Q"

<400> 1926
Phe Glu Ala Trp Tyr Ile His Glu His Val Glu Arg His Asp Phe Pro
1 5 10 15

Ala Glu Trp Ile Pro Ala Thr Phe Ala Gln Gln Ala Ala Phe Trp Asn
20 25 30

His Val Leu Ala Val Val Ala Gly Val Ala Ala Glu Ala Val Ala Ser
35 40 45

Trp Ile Gly Leu
50

<210> 1927
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R2435Q"

<400> 1927
Trp Ser Asp Lys Leu Gln Lys Glu Ala Glu Ala Phe Ala Tyr Tyr Arg
1 5 10 15

Arg Thr His Thr Ala Asn Glu Arg Arg Gln Gln Arg Gly Glu Met Arg
20 25 30

Asp Leu Phe Glu Lys Leu Lys Ile Thr Leu Gly Leu Leu His Ser Ser
35 40 45

Lys Val Ser Lys
50

<210> 1928
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T444P"

<400> 1928
Ser Thr Ser Leu Lys Thr Tyr Gln His Phe Thr Leu Glu Lys Ala Tyr
1 5 10 15

Leu Arg Glu Asp Phe Phe Trp Ala Phe Pro Pro Pro Ala Ala Gly Asp
20 25 30

Phe Ile Arg Phe Arg Phe Phe Gln Pro Leu Arg Leu Glu Arg Phe Phe
35 40 45

Phe Arg Ser Gly
50

<210> 1929
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T345M"

<400> 1929
Leu Ala Gln Lys Asn Val Ile Arg Phe Lys Pro Ser Leu Phe Gln His
1 5 10 15

Met Gly Tyr Tyr Ser Ser Tyr Lys Gly Met Met Glu Asn Lys Leu Lys
20 25 30

Asp Asp Asp Phe Glu Glu Glu Ser Phe Asp Ile Pro Asp Asn Pro Pro
35 40 45

Ala Ser Leu Tyr
50

<210> 1930
<211> 32
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.K102fs"

<400> 1930
Phe Ala Thr Cys Leu Gly Leu Val Tyr Ile Tyr Gly Arg His Leu Tyr
1 5 10 15

Phe Trp Gly Tyr Ser Glu Ala Ala Lys Asn Gly Ser Pro Val Ser Asp
20 25 30

<210> 1931
<211> 48
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G143fs"

<400> 1931
Ser Ile Ala Leu Leu Gly Leu Val Gly Thr Thr Val Cys Ser Ala Phe
1 5 10 15

Gln His Leu Gly Trp Val Lys Ser Gly Phe Gly Gln Trp Thr Gln Met
20 25 30

Leu Pro Leu Lys Asn Tyr Arg Gly Leu Lys Thr Leu Ile His Phe Lys
35 40 45

<210> 1932
<211> 51
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G318fs"

<400> 1932
His Pro Val Pro Ser Gly Lys Val Leu Val Leu Gln Ser His Trp Gln
1 5 10 15

Thr Phe His Val Ser Ala Val Ala Ala Leu Leu Phe Leu Leu Leu Leu
20 25 30

Phe Ser Met Ser Val Val Val Arg Arg Lys His Gln Leu Gln Arg Val
35 40 45

Gln Ser Ser
50

<210> 1933
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L131F"

<400> 1933
Glu Ser Glu Gly Gly Asp Val Ala Pro Asn Leu Pro Asp Met Thr Leu
1 5 10 15

Asp Lys Glu Gln Ile Ala Lys Asp Leu Phe Phe Ser Gly Glu Glu Glu
20 25 30

Glu Glu Thr Gln Ser Ser Ala Asp Asp Leu Thr Pro Ser Val Thr Ser
35 40 45

His Glu Ala Ser
50

<210> 1934
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.R1081S"

<400> 1934
Arg Glu Pro Ala Gly Asp Gly Lys Ser Ile Arg Thr Phe Lys Glu Ser
1 5 10 15

Pro Lys Gln Ile Leu Asp Pro Ala Ala Ser Ser Val Thr Gly Met Lys
20 25 30

Lys Trp Pro Arg Thr Pro Lys Glu Glu Ala Gln Ser Leu Glu Asp Leu
35 40 45

Ala Gly Phe Lys
50

<210> 1935
<211> 34
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.T1664fs"

<400> 1935
Val Gly Val Lys Glu Glu Leu Leu Ala Val Gly Lys Leu Thr Gln Thr
1 5 10 15

Ser Gly Glu Thr Thr His Thr His Thr Lys Ser Gln Gln Glu Met Val
20 25 30

Arg Ala

<210> 1936
<211> 34
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.T1664fs"

<400> 1936
Val Gly Val Lys Glu Glu Leu Leu Ala Val Gly Lys Leu Thr Gln Thr
1 5 10 15

Ser Gly Glu Thr Thr His Thr His Thr Gln Ser Gln Gln Glu Met Val
20 25 30

Arg Ala

<210> 1937
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
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<223> /注釋="p.H2213D"

<400> 1937
Ala Gln Pro Leu Glu Asp Leu Ala Gly Leu Lys Glu Leu Phe Gln Thr
1   5   10   15

Pro Ile Cys Thr Asp Lys Pro Thr Thr Asp Asp Glu Lys Thr Thr Lys
            20   25   30

Ile Ala Cys Arg Ser Pro Gln Pro Asp Pro Val Gly Thr Pro Thr Ile
        35   40   45

Phe Lys Pro Gln
    50

<210> 1938
<211> 54
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P307fs"

<400> 1938
His His Asn Tyr Gln Ala Ile Leu Pro Ala Pro Pro Lys Ser Ala Gly
1   5   10   15

Glu Ala Leu Gly Ser Ser Gly Thr Pro Gln Tyr Ala Ala Ser Pro Leu
            20   25   30

Pro Ile Ala Ala Pro Ala Arg Ala Pro Leu Gly Pro Val Gly Trp His
        35   40   45

Val Arg Thr Ala Pro His
    50

<210> 1939
<211> 52
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F485L"

<400> 1939
Cys Met Leu Phe His Ser Lys Asn Arg Cys Leu Tyr Val Phe Gly Gly
1   5   10   15

Gln Arg Ser Lys Thr Tyr Leu Asn Asp Leu Leu Phe Ser Tyr Asp Val
            20   25   30

Asp Ser Asp His Val Asp Ile Ile Ser Asp Gly Thr Lys Lys Asp Ser
        35   40   45

Gly Met Val Pro
    50

<210> 1940
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P448H"

<400> 1940
Pro Glu Gly Trp Gly Asp Glu Pro Pro Gly Pro Gly Gly Gly Ser Phe
1 5 10 15

Ser Ala Tyr Trp His Gln Leu Val Glu His His Val Arg Met Gly Glu
20 25 30

Gly Asn Met Leu Tyr Lys Ser Ile Lys Lys Glu Leu Val Val Leu Arg
35 40 45

Leu Ala Ser Leu
50

<210> 1941
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.G270V"

<400> 1941
Tyr Tyr Ala Ser Arg Gly Val Cys Phe Arg Gly Glu Ser Cys Met Tyr
1 5 10 15

Leu His Gly Asp Ile Cys Asp Met Cys Val Val Leu Gln Thr Leu His
20 25 30

Pro Met Asp Ala Ala Gln Arg Glu Glu His Met Arg Ala Cys Ile Glu
35 40 45

Ala His Glu Lys
50

<210> 1942
<211> 26
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
肽"

<220>
<221> 來源
<223> /注釋="p.P647fs"

<400> 1942
Ala Ser Arg Leu Ser Pro Pro Pro Glu Asp Ser Pro Met Ser Pro Pro
1 5 10 15

Pro Glu Glu Ser Pro Met Ser Pro Pro Thr
20 25

<210> 1943
<211> 307
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書：合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P647fs"

<400> 1943
Glu Ala Ser Arg Leu Ser Pro Pro Pro Glu Asp Ser Pro Met Ser Pro
1 5 10 15

Pro Pro Glu Glu Ser Pro Met Ser Pro His Leu Arg Tyr Arg Ala Tyr
20 25 30

Pro Pro Cys Leu Trp Cys His Ala Cys Leu His Arg Leu Arg Asn Leu
35 40 45

Pro Cys Pro His Arg Leu Arg Ser Leu Pro Arg Pro Leu His Leu Arg
50 55 60

Leu His Ala Ser Pro His His Leu Arg Thr Pro Pro His Pro His His
65 70 75 80

Leu Arg Thr His Leu Leu Pro His His Arg Arg Thr Arg Ser Cys Pro
85 90 95

Cys Arg Trp Arg Ser His Pro Cys Cys His Tyr Leu Arg Ser Arg Asn
100 105 110

Ser Ala Pro Gly Pro Arg Gly Arg Thr Cys His Pro Gly Leu Arg Ser
115 120 125

Arg Thr Cys Pro Pro Gly Leu Arg Ser His Thr Tyr Leu Arg Arg Leu
130 135 140

Arg Ser His Thr Cys Pro Pro Ser Leu Arg Ser His Ala Tyr Ala Leu
145 150 155 160

Cys Leu Arg Ser His Thr Cys Pro Pro Arg Leu Arg Asp His Ile Cys
165 170 175

Pro Leu Ser Leu Arg Asn Cys Thr Cys Pro Pro Arg Leu Arg Ser Arg
180 185 190

Thr Cys Leu Leu Cys Leu Arg Ser His Ala Cys Pro Pro Asn Leu Arg
195 200 205

Asn His Thr Cys Pro Pro Ser Leu Arg Ser His Ala Cys Pro Pro Gly
210 215 220

Leu Arg Asn Arg Ile Cys Pro Leu Ser Leu Arg Ser His Pro Cys Pro
225 230 235 240

Leu Gly Leu Lys Ser Pro Leu Arg Ser Gln Ala Asn Ala Leu His Leu
245 250 255

Arg Ser Cys Pro Cys Ser Leu Pro Leu Gly Asn His Pro Tyr Leu Pro
260 265 270

Cys Leu Glu Ser Gln Pro Cys Leu Ser Leu Gly Asn His Leu Cys Pro
275 280 285

Leu Cys Pro Arg Ser Cys Arg Cys Pro His Leu Gly Ser His Pro Cys
290 295 300

Arg Leu Ser
305

<210> 1944
<211> 298
<212> PRT
<213> 人工序列

<220>
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<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.L656fs"

<400> 1944
Glu Asp Ser Pro Met Ser Pro Pro Pro Glu Glu Ser Pro Met Ser Pro
1 5 10 15

Pro Pro Glu Val Ser Arg Leu Ser Pro Cys Leu Trp Cys His Ala Cys
20 25 30

Leu His Arg Leu Arg Asn Leu Pro Cys Pro His Arg Leu Arg Ser Leu
35 40 45

Pro Arg Pro Leu His Leu Arg Leu His Ala Ser Pro His His Leu Arg
50 55 60

Thr Pro Pro His Pro His His Leu Arg Thr His Leu Leu Pro His His
65 70 75 80

Arg Arg Thr Arg Ser Cys Pro Cys Arg Trp Arg Ser His Pro Cys Cys
85 90 95

His Tyr Leu Arg Ser Arg Asn Ser Ala Pro Gly Pro Arg Gly Arg Thr
100 105 110

Cys His Pro Gly Leu Arg Ser Arg Thr Cys Pro Pro Gly Leu Arg Ser
115 120 125

His Thr Tyr Leu Arg Arg Leu Arg Ser His Thr Cys Pro Pro Ser Leu
130 135 140

Arg Ser His Ala Tyr Ala Leu Cys Leu Arg Ser His Thr Cys Pro Pro
145 150 155 160

Arg Leu Arg Asp His Ile Cys Pro Leu Ser Leu Arg Asn Cys Thr Cys
165 170 175

Pro Pro Arg Leu Arg Ser Arg Thr Cys Leu Leu Cys Leu Arg Ser His
180 185 190

Ala Cys Pro Pro Asn Leu Arg Asn His Thr Cys Pro Pro Ser Leu Arg
195 200 205

Ser His Ala Cys Pro Pro Gly Leu Arg Asn Arg Ile Cys Pro Leu Ser
210 215 220

Leu Arg Ser His Pro Cys Pro Leu Gly Leu Lys Ser Pro Leu Arg Ser
225 230 235 240

Gln Ala Asn Ala Leu His Leu Arg Ser Cys Pro Cys Ser Leu Pro Leu
245 250 255

Gly Asn His Pro Tyr Leu Pro Cys Leu Glu Ser Gln Pro Cys Leu Ser
260 265 270

Leu Gly Asn His Leu Cys Pro Leu Cys Pro Arg Ser Cys Arg Cys Pro
275 280 285

His Leu Gly Ser His Pro Cys Arg Leu Ser
290 295

<210> 1945
<211> 54
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.P2354fs"

<400> 1945
Ala Pro Leu Thr Pro Arg Ala Ser Gln Val Glu Pro Gln Ser Pro Gly
1 5 10 15

Leu Gly Leu Arg Pro Gln Glu Pro Pro Leu Pro Arg Leu Trp His Leu
20 25 30

Leu Leu Gln Val Thr Gln Thr Ser Phe Ala Leu Ala Pro Thr Leu Thr
35 40 45

His Met Leu Ser Pro His
50

<210> 1946
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Q356K"

<400> 1946
Ile Asp Gln Ala Pro Glu Arg Ser Lys Glu Asp Ala Asn Cys Ala Val
1 5 10 15

Cys Asp Ser Pro Gly Asp Leu Leu Asp Lys Lys Phe Phe Cys Thr Thr
20 25 30

Cys Gly Gln His Tyr His Gly Met Cys Leu Asp Ile Ala Val Thr Pro
35 40 45

Leu Lys Arg Ala
50

<210> 1947
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.N393K"

<400> 1947
Gly Met Cys Leu Asp Ile Ala Val Thr Pro Leu Lys Arg Ala Gly Trp
1 5 10 15

Gln Cys Pro Glu Cys Lys Val Cys Gln Lys Lys Cys Lys Gln Ser Gly
20 25 30

Glu Asp Ser Lys Met Leu Val Cys Asp Thr Cys Asp Lys Gly Tyr His
35 40 45

Thr Phe Cys Leu
50

<210> 1948
<211> 45
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.F4496fs"

<400> 1948
Thr Ser Gly Cys His Arg Phe Arg Cys Thr Asn Ile Tyr His Phe Thr
1 5 10 15

Cys Ala Ile Lys Ala Gln Cys Met Phe Leu Arg Thr Lys Leu Cys Phe
20 25 30

Ala Pro Cys Thr Asn Gln Arg Glu Phe Met Ser Lys Asn
35 40 45

<210> 1949
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.Y66C"

<400> 1949
Tyr Pro His Gln Leu Tyr Thr Ser Ser Ser His His Ser His Ser Tyr
1 5 10 15

Ile Gly Leu Pro Tyr Ala Asp His Asn Cys Cys Gly Ala Arg Pro Pro
20 25 30

Pro Thr Pro Pro Ala Ser Pro Pro Pro Ser Val Leu Ile Ser Lys Asn
35 40 45

Glu Val Gly Ile
50

<210> 1950
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.S790R"

<400> 1950
Asn Trp Lys Phe Trp Val Phe Ser Ile Leu Ile Arg Pro Leu Phe Glu
1 5 10 15

Ser Phe Asn Gly Met Val Ser Thr Ala Arg Arg Val His Thr Leu Arg
20 25 30

Gln Thr Ser Leu Ala Trp Leu Asp Gln Tyr Cys Ser Leu Pro Ala Leu
35 40 45

Arg Pro Thr Val
50

<210> 1951
<211> 52
<212> PRT
<213> 人工序列

<220>
<221> 來源
<223> /注釋="人工序列的說明書: 合成
多肽"

<220>
<221> 來源
<223> /注釋="p.R326C"

<400> 1951
Arg Ile Gln Ala Glu Tyr Val Ser Ala Leu Lys Leu Leu Arg Lys Arg
1 5 10 15

Ser Gln Val Trp Lys Pro Lys Val Ile Cys Cys Ile Ser Ala Arg Ser
20 25 30

Gly Glu Gly Ile Ser Glu Met Trp Asp Lys Met Lys Asp Phe Gln Asp
35 40 45

Leu Met Leu Ala
50

<210> 1952
<211> 36
<212> PRT
<213> 人工序列

<220>
<221> 來源

【發明申請專利範圍】

【請求項1】

一種醫藥組合物，其包含：

(i) 包含含有至少一個腫瘤特異性新表位之胺基酸序列之多肽，其中該腫瘤特異性新表位係選自由以下組成之群：CLQCLWALL (SEQ ID NO：13809) 、QWGPCLQCL (SEQ ID NO：13810) 、TTTTTLWRL (SEQ ID NO：13811) 、WALLQASQY (SEQ ID NO：13812)、EECQWGPCL (SEQ ID NO：13813) 、QWGPCLQCLW (SEQ ID NO：13814) 、LWALLQASQY (SEQ ID NO：13815)、QTTTTTLWRL (SEQ ID NO：13816) 、CQWGPCLQCL (SEQ ID NO：13817) 及LQCLWALLQA (SEQ ID NO：13818)，

(ii) 編碼該多肽之核酸，

(iii) 包含(i)或(ii)之抗原呈遞細胞(APC)，或

(iv) 經包含(i)或(ii)之APC刺激之T細胞；及

醫藥上可接受之載劑。

【請求項2】

如請求項1之醫藥組合物，其中該腫瘤特異性新表位結合至由HLA等位基因所編碼之蛋白質。

【請求項3】

如請求項1或2之醫藥組合物，其中該腫瘤特異性新表位以小於500 nM之K_D結合至由HLA-A、HLA-B或HLA-C等位基因所編碼之蛋白質。

【請求項4】

如請求項1或2之醫藥組合物，其中該腫瘤特異性新表位以小於1000 nM之結合親和性結合至由II類HLA等位基因所編碼之蛋白質。

【請求項5】

如請求項1之醫藥組合物，其中該腫瘤特異性新表位為CLQCLWALL (SEQ ID NO：13809)。

【請求項6】

如請求項1之醫藥組合物，其中該腫瘤特異性新表位為QWGPCLQCL (SEQ ID NO：13810)。

【請求項7】

如請求項1之醫藥組合物，其中該腫瘤特異性新表位為TTTTTLWRL (SEQ ID NO：13811)。

【請求項8】

如請求項1之醫藥組合物，其中該腫瘤特異性新表位為WALLQASQY (SEQ ID NO：13812)。

【請求項9】

如請求項1之醫藥組合物，其中該腫瘤特異性新表位為EECQWGPCL (SEQ ID NO：13813)。

【請求項10】

如請求項1之醫藥組合物，其中該腫瘤特異性新表位為QWGPCLQCLW (SEQ ID NO：13814)。

【請求項11】

如請求項1之醫藥組合物，其中該腫瘤特異性新表位為LWALLQASQY (SEQ ID NO：13815)。

【請求項12】

如請求項1之醫藥組合物，其中該腫瘤特異性新表位為QTTTTTLWRL (SEQ ID NO：13816)。

【請求項13】

如請求項1之醫藥組合物，其中該腫瘤特異性新表位為CQWGPCLQCL (SEQ ID NO：13817)。

【請求項14】

如請求項1之醫藥組合物，其中該腫瘤特異性新表位為LQCLWALLQA (SEQ ID NO：13818)。

【請求項15】

如請求項1之醫藥組合物，其中該醫藥組合物包含經包含(i)中之多肽之APC刺激或經包含(ii)中之編碼該多肽之核酸之APC刺激之T細胞。

【請求項16】

如請求項1之醫藥組合物，其中該醫藥組合物包含(i)中之多肽或(ii)中之核酸。

【請求項17】

如請求項1之醫藥組合物，其進一步包含佐劑或免疫調節劑。

【請求項18】

如請求項17之醫藥組合物，其中該佐劑或免疫調節劑為聚(I:C)。

【請求項19】

如請求項1之醫藥組合物，其中該醫藥組合物為免疫原性組合物或疫苗組合物。

【請求項20】

一種用於治療癌症之醫藥組合物，其中該醫藥組合物為免疫原性組合物或疫苗組合物，其包含：

(i) 經分離之新抗原多肽，其包含含有至少一個腫瘤特異性新表位之胺基酸序列，其中該腫瘤特異性新表位係選自由以下組成之群之胺基酸序列：CLQCLWALL (SEQ ID NO：13809)、QWGPCLQCL (SEQ ID NO：13810)、TTTTTLWRL (SEQ ID NO：13811)、WALLQASQY (SEQ ID NO：13812)、EECQWGPCL (SEQ ID NO：13813)、QWGPCLQCLW (SEQ ID NO：13814)、LWALLQASQY (SEQ ID NO：13815)、QTTTTTLWRL (SEQ ID NO：13816)、CQWGPCLQCL (SEQ ID NO：13817)及LQCLWALLQA (SEQ ID NO：13818)，

(ii) 編碼(i)之核酸，

(iii) 包含(i)或(ii)之抗原呈遞細胞(APC)，或

(iv) 經(iii)刺激之T細胞；及

醫藥上可接受之載劑。

【請求項21】

一種如請求項1至20中任一項之醫藥組合物之用途，其係用於製備在有需要之個體治療腫瘤之醫藥品。

【請求項22】

如請求項21之用途，其中該個體具有GATA3之框移突變。

【請求項23】

如請求項21之用途，其中該腫瘤為乳癌。

【請求項24】

如請求項23之用途，其中該乳癌為非轉移乳癌、轉移乳癌、

HER-2陽性乳癌、I期乳癌、II期乳癌、IIA期乳癌或可手術之IIC期乳癌。

【請求項25】

如請求項21至24中任一項之用途，其中該醫藥組合物係作為與額外癌症療法之組合療法進行投與，其中該額外癌症療法為檢查點抑制劑、手術、化學療法或靶向療法。

【請求項26】

一種如請求項1至20中任一項之醫藥組合物之用途，其係用於製備治療個體之乳癌之醫藥品，其中該醫藥品進一步包含癌症藥物或係用於與癌症藥物組合使用，該癌症藥物係選自由以下組成之群：依魯替尼(ibrutinib)、厄洛替尼(erlotinib)、伊馬替尼(imatinib)、吉非替尼(gefitinib)、克唑替尼(crizotinib)、曲妥珠單抗(trastuzumab)、威羅菲尼(vemurafenib)、RAF/MEK抑制劑或抗雌激素療法；且其中該醫藥組合物中之多肽係源自與該所選癌症藥物相關之抗藥性突變。

【請求項27】

一種組合，其包含：

(a)選自由以下組成之群之癌症藥物：依魯替尼(ibrutinib)、厄洛替尼(erlotinib)、伊馬替尼(imatinib)、吉非替尼(gefitinib)、克唑替尼(crizotinib)、曲妥珠單抗(trastuzumab)、威羅菲尼(vemurafenib)、RAF/MEK抑制劑或抗雌激素療法；及

(b) 如請求項1至20中任一項之醫藥組合物，其中該多肽係源自與該所選癌症藥物相關之抗藥性突變，以用於治療個體中之乳癌。