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(54) **Title**: POTENT AND SELECTIVE INHIBITORS OF NAV1.3 AND NAV1.7

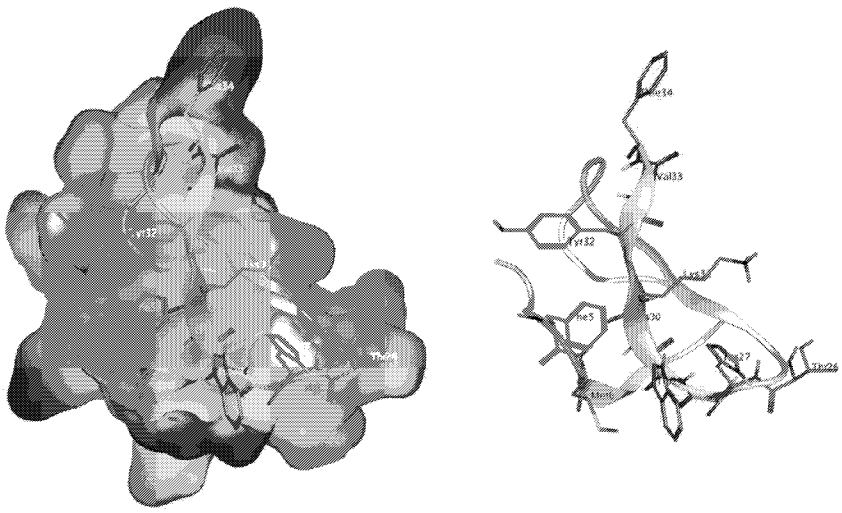


FIG. 10

(57) **Abstract**: Disclosed is a composition of matter comprising an isolated polypeptide, which is a peripherally-restricted Nav1.7 inhibitor. In some disclosed embodiments, the isolated polypeptide is an inhibitor of Nav1.7 and/or Nav1.3. Other embodiments are conjugated embodiments of the inventive composition of matter and pharmaceutical compositions containing the inventive composition of matter. Isolated nucleic acids encoding some embodiments of inventive polypeptides and expression vectors, and recombinant host cells containing them are disclosed. A method of treating or preventing pain is also disclosed.

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POTENT AND SELECTIVE INHIBITORS OF $Na_V1.3$ AND $Na_V1.7$

[0001] Throughout this application various publications are referenced within parentheses or brackets. The disclosures of these publications in their entireties are hereby incorporated by reference in this application in order to more fully describe the state of the art to which this invention pertains.

BACKGROUND OF THE INVENTION

[0002] Field of the Invention

[0003] The present invention relates to the biochemical arts, in particular to therapeutic peptides and conjugates.

[0004] Discussion of the Related Art

[0005] Voltage-gated sodium channels (VGSC) are glycoprotein complexes responsible for initiation and propagation of action potentials in excitable cells such as central and peripheral neurons, cardiac and skeletal muscle myocytes, and neuroendocrine cells. Mammalian sodium channels are heterotrimers, composed of a central, pore-forming alpha (α) subunit and auxiliary beta (β) subunits. Mutations in alpha subunit genes have been linked to paroxysmal disorders such as epilepsy, long QT syndrome, and hyperkalemic periodic paralysis in humans, and motor endplate disease and cerebellar ataxia in mice. (Isom, Sodium channel beta subunits: anything but auxiliary, Neuroscientist 7(1):42-54 (2001)). The β-subunit modulates the localization, expression and functional properties of α-subunits in VGSCs.

[0006] Voltage gated sodium channels comprise a family consisting of 9 different subtypes ($Na_V1.1$-$Na_V1.9$). As shown in Table 1, these subtypes show tissue specific localization and functional differences (See, Goldin, A. L., Resurgence of sodium channel research, Annu Rev Physiol 63: 871-94 (2001); Wilson et al., Compositions useful as inhibitors of voltage-gated ion channels, US 2005/0187217 A1). Three members of the gene family ($Na_V1.8$, 1.9, 1.5) are resistant to block by the well-known sodium channel blocker tetrodotoxin (TTX), demonstrating subtype specificity within this gene family. Mutational analysis has identified glutamate 387 as a critical

residue for TTX binding (See, Noda, M., H. Suzuki, et al., A single point mutation confers tetrodotoxin and saxitoxin insensitivity on the sodium channel II" FEBS Lett 259(1): 213-6 (1989)).

Table 1. VGSC family with rat TTX IC_{50} values. Abbreviations: CNS = central nervous system, PNS = peripheral nervous system, DRG = dorsal root ganglion, TG = Trigeminal ganglion. (See, Wilson et al., Compositions useful as inhibitors of Voltage-gated ion channels, US 2005/0187217 A1; Goldin, Resurgence of Sodium Channel Research, Annu Rev Physiol 63:871-94 (2001)).

VGSC isoform	Tissue	TTX IC_{50} (nM)	Indication
$Na_V1.1$	CNS, PNS soma of neurons	10	Pain, Epilepsy, Neurodegeneration
$Na_V1.2$	CNS high in axons	10	Neurodegeneration, Epilepsy
$Na_V1.3$	CNS, embryonic, injured nerves	2-15	Pain, Epilepsy
$Na_V1.4$	Skeletal muscle	5	Myotonia
$Na_V1.5$	heart	2000	Arrhythmia, long QT
$Na_V1.6$	CNS widespread, most abundant	1	Pain, movement disorders
$Na_V1.7$	PNS, DRG, terminals neuroendocrine	4	Pain, Neuroendocrine disorders, prostate cancer
$Na_V1.8$	PNS, small neurons in DRG & TG	>50,000	Pain
$Na_V1.9$	PNS, small neurons in DRG & TG	1000	Pain

[0007] In general, voltage-gated sodium channels (Na_Vs) are responsible for initiating the rapid upstroke of action potentials in excitable tissue in the nervous system, which transmit the electrical signals that compose and encode normal and aberrant pain sensations. Antagonists of Na_V channels can attenuate these pain signals and are useful for treating a variety of pain conditions, including but not limited to acute, chronic, inflammatory, and neuropathic pain. Known Na_V antagonists, such as

TTX, lidocaine, bupivacaine, phenytoin, lamotrigine, and carbamazepine, have been shown to be useful for attenuating pain in humans and animal models. (See, Mao, J. and L. L. Chen, Systemic lidocaine for neuropathic pain relief, Pain 87(1): 7-17 (2000); Jensen, T. S., Anticonvulsants in neuropathic pain: rationale and clinical evidence, Eur J Pain 6 (Suppl A): 61-68 (2002); Rozen, T. D., Antiepileptic drugs in the management of cluster headache and trigeminal neuralgia, Headache 41 Suppl 1: S25-32 (2001); Backonja, M. M., Use of anticonvulsants for treatment of neuropathic pain, Neurology 59(5 Suppl 2): S14-7 (2002)).

[0008] The α-subunits of TTX-sensitive, voltage-gated $Na_V1.7$ channels are encoded by the *SCN9A* gene. The $Na_V1.7$ channels are preferentially expressed in peripheral sensory neurons of the dorsal root ganglia, some of which are involved in the perception of pain. In humans, mutations in the *SCN9A* gene have shown a critical role for this gene in pain pathways. For instance, a role for the $Na_V1.7$ channel in pain perception was established by recent clinical gene-linkage analyses that revealed gain-of-function mutations in the *SCN9A* gene as the etiological basis of inherited pain syndromes such as primary erythermalgia (PE), inherited erythromelalgia (IEM), and paroxysmal extreme pain disorder (PEPD). (See, e.g., Yang et al., Mutations in *SCN9A*, encoding a sodium channel alpha subunit, in patients with primary erythermalgia, J. Med. Genet. 41:171-174 (2004); Harty et al., $Na_V1.7$ mutant A863P in erythromelalgia: effects of altered activation and steady-state inactivation on excitability of nociceptive dorsal root ganglion neurons, J. Neurosci. 26(48):12566-75 (2006); Estacion et al., $Na_V1.7$ gain-of-function mutations as a continuum: A1632E displays physiological changes associated with erythromelalgia and paroxysmal extreme pain disorder mutations and produces symptoms of both disorders, J. Neurosci. 28(43):11079-88 (2008)). In addition, overexpression of $Na_V1.7$ has been detected in strongly metastatic prostate cancer cell lines. (Diss et al., A potential novel marker for human prostate cancer: voltage-gated sodium channel expression in vivo, Prostate Cancer and Prostatic Diseases 8:266-73 (2005); Uysal-Onganer et al., Epidermal growth factor potentiates in vitro metastatic behavior human prostate cancer PC-3M cells: involvement of voltage-gated sodium channel, Molec. Cancer 6:76 (2007)).

[0009] Loss-of-function mutations of the *SCN9A* gene result in a complete inability of an otherwise healthy individual to sense any form of pain. (e.g., Ahmad et

al., A stop codon mutation in *SCN9A* causes lack of pain sensation, Hum. Mol. Genet. 16(17):2114-21 (2007)).

[0010] A cell-specific deletion of the *SCN9A* gene in conditional knockout mice reduces their ability to perceive mechanical, thermal or inflammatory pain. (Nassar et al., Nociceptor-specific gene deletion reveals a major role for $Na_V1.7$ (PN1) in acute and inflammatory pain, Proc. Natl. Acad. Sci, U S A. 101(34): 12706–12711 (2004)).

[0011] Based on such evidence, decreasing $Na_V1.7$ channel activity or expression levels in peripheral sensory neurons of the dorsal root ganglia (DRG) has been proposed as an effective pain treatment, e.g. for chronic pain, neuropathic pain, and neuralgia. (E.g., Thakker et al., Suppression of SCN9A gene expression and/or function for the treatment of pain, WO 2009/033027 A2; Yeomans et al., Decrease in inflammatory hyperalgesia by herpes vector-mediated knockdown of $Na_V1.7$ sodium channels in primary afferents, Hum. Gene Ther. 16(2):271-7 (2005); Fraser et al., Potent and selective $Na_V1.7$ sodium channel blockers, WO 2007/109324 A2; Hoyt et al., Discovery of a novel class of benzazepinone Na(v)1.7 blockers: potential treatments for neuropathic pain, Bioorg. Med. Chem. Lett. 17(16):4630-34 (2007); Hoyt et al., Benzazepinone $Na_V1.7$ blockers: Potential treatments for neuropathic pain, Bioorg. Med. Chem. Lett. 17(22):6172-77 (2007)).

[0012] The α-subunits of TTX-sensitive, voltage-gated $Na_V1.3$ channels are encoded by the *SCN3A* gene. Four splice variants of human Nav1.3 were reported to have different biophysical properties. (Thimmapaya et al., Distribution and functional characterization of human $Na_V1.3$ splice variants, Eur. J. Neurosci. 22:1-9 (2005)). Expression of $Na_V1.3$ has been shown to be upregulated within DRG neurons following nerve injury and in thalamic neurons following spinal cord injury. (Hains et al., Changes in electrophysiological properties and sodium channel $Na_V1.3$ expression in thalamic neurons after spinal cord injury, Brain 128:2359-71 (2005)). A gain-in-function mutation in Nav1.3 (K354Q) was reportedly linked to epilepsy. (Estacion et al., A sodium channel mutation linked to epilepsy increases ramp and persistent current of $Na_V1.3$ and induces hyperexcitability in hippocampal neurons, Experimental Neurology 224(2):362-368 (2010)).

[0013] Toxin peptides produced by a variety of organisms have evolved to target ion channels. Snakes, scorpions, spiders, bees, snails and sea anemones are a few

examples of organisms that produce venom that can serve as a rich source of small bioactive toxin peptides or "toxins" that potently and selectively target ion channels and receptors. In most cases, these toxin peptides have evolved as potent antagonists or inhibitors of ion channels, by binding to the channel pore and physically blocking the ion conduction pathway. In some other cases, as with some of the tarantula toxin peptides, the peptide is found to antagonize channel function by binding to a region outside the pore (e.g., the voltage sensor domain).

[0014] Native toxin peptides are usually between about 20 and about 80 amino acids in length, contain 2-5 disulfide linkages and form a very compact structure. Toxin peptides (e.g., from the venom of scorpions, sea anemones and cone snails) have been isolated and characterized for their impact on ion channels. Such peptides appear to have evolved from a relatively small number of structural frameworks that are particularly well suited to addressing the critical issues of potency, stability, and selectivity. (See, e.g., Dauplais et al., On the convergent evolution of animal toxins: conservation of a diad of functional residues in potassium channel-blocking toxins with unrelated structures, J. Biol. Chem. 272(7):4302-09 (1997); Alessandri-Haber et al., Mapping the functional anatomy of BgK on Kv1.1, Kv1.2, and Kv1.3, J. Biol. Chem. 274(50):35653-61 (1999)). The majority of scorpion and Conus toxin peptides, for example, contain 10-40 amino acids and up to five disulfide bonds, forming extremely compact and constrained structures (microproteins) often resistant to proteolysis. The conotoxin and scorpion toxin peptides can be divided into a number of superfamilies based on their disulfide connections and peptide folds. The solution structure of many of these has been determined by Nuclear Magnetic Resonance (NMR) spectroscopy, illustrating their compact structure and verifying conservation of their family folding patterns. (E.g., Tudor et al., Ionisation behaviour and solution properties of the potassium-channel blocker ShK toxin, Eur. J. Biochem. 251(1-2):133-41(1998); Pennington et al., Role of disulfide bonds in the structure and potassium channel blocking activity of ShK toxin, Biochem. 38(44): 14549-58 (1999); Jaravine et al., Three-dimensional structure of toxin OSK1 from Orthochirus scrobiculosus scorpion venom, Biochem. 36(6):1223-32 (1997); del Rio-Portillo et al.; NMR solution structure of Cn12, a novel peptide from the Mexican scorpion Centruroides noxius with a typical beta-toxin sequence but with alpha-like physiological activity, Eur. J. Biochem.

271(12): 2504-16 (2004); Prochnicka-Chalufour et al., Solution structure of discrepin, a new K+-channel blocking peptide from the alpha-KTx15 subfamily, Biochem. 45(6):1795-1804 (2006)). Conserved disulfide structures can also reflect the individual pharmacological activity of the toxin family. (Nicke et al. (2004), Eur. J. Biochem. 271: 2305-19, Table 1; Adams (1999), Drug Develop. Res.46: 219-34). For example, α-conotoxins have well-defined four cysteine/two disulfide loop structures (Loughnan, 2004) and inhibit nicotinic acetylcholine receptors. In contrast, ω-conotoxins have six cysteine/three disulfide loop consensus structures (Nielsen, 2000) and block calcium channels. Structural subsets of toxins have evolved to inhibit either voltage-gated or calcium-activated potassium channels.

[0015] Spider venoms contain many peptide toxins that target voltage-gated ion channels, including Kv, Cav, and Nav channels. A number of these peptides are gating modifiers that conform to the inhibitory cystine knot (ICK) structural motif. (See, Norton et al., The cystine knot structure of ion channel toxins and related polypeptides, Toxicon 36(11):1573-1583 (1998); Pallaghy et al., A common structural motif incorporating a cystine knot and a triple-stranded β-sheet in toxic and inhibitory polypeptides, Prot. Sci. 3(10):1833-6, (1994)). In contrast to some scorpion and sea anemone toxins, many spider toxins do not affect the rate of inactivation but inhibit channel activity by restricting the movement of the voltage sensor into the open channel conformation, shifting their voltage dependence of activation to a more positive potential. Many of these spider toxins are promiscuous within and across voltage-gated ion channel families.

[0016] A variety of toxin peptides that target VGSCs, in particular, have been reported. (See, Billen et al., Animal peptides targeting voltage-activated sodium channels, Cur. Pharm. Des. 14:2492-2502, (2008)). Three classes of peptide toxins have been described: 1) site 1 toxins, the μ-conotoxins, bind to the pore of the channel and physically occlude the conduction pathway; 2) site 3 toxins, including the α-scorpion toxins, some sea anemone toxins and δ-conotoxins, bind to the S3-S4 linker of domain IV and slow channel inactivation; and 3) site 4 toxins, including the β-scorpion toxins, bind to the S3-S4 linker in domain II and facilitate channel activation. Both site 3 and site 4 families of peptides alter the open probability of Na_V channels and affect gating transitions and are therefore called "gating modifiers."

[0017] μ-Conotoxin KIIIA (SEQ ID NO:530), a site 1 toxin originally isolated from *Conus kinoshitai*, is a C-terminally amidated peptide 16 amino acids in length that contains 6 cysteine residues engaged in 3 intramolecular disulfide bonds. It was initially characterized as an inhibitor of tetrodotoxin (TTX)-resistant sodium channels in amphibian dorsal root ganglion (DRG) neurons. (See, Bulaj et al., Novel conotoxins from *Conus striatus* and *Conus kinoshitai* selectively block TTX-resistant sodium channels, Biochem. 44(19):7259-7265, (2005)). Later it was found to more effectively inhibit TTX-sensitive than TTX-resistant sodium current in mouse DRG neurons. (See, Zhang et al., Structure/function characterization of μ-conotoxin KIIIA , an analgesic, nearly irreversible blocker of mammalian neuronal sodium channels, J. Biol. Chem. 282(42):30699-30706, (2007)). KIIIA has been found to block cloned mammalian (rodent) channels expressed in *Xenopus laevis* oocytes with the following rank order potency: $Na_V1.2 > Na_V1.4 > Na_V1.6 > Na_V1.7 > Na_V1.3 > Na_V1.5$. Intraperitoneal injection of KIIIA has demonstrated analgesic activity in a formalin-induced pain assay in mice with an ED_{50} of 1.6 nmol/mouse (0.1 mg/kg) without observed motor impairment; some motor impairment but not paralytic acitity was observed at a higher dose (10 nmol). (See, Zhang et al., 2007). Substitution of alanine for Lys7 and Arg10 modified maximal block, while substituion of His12 and Arg14 altered Nav isoform specificity. (See, McArthur et al., Interactions of key charged residues contributing to selective block of neuronal sodium channels by μ-conotoxin KIIIA, Mol. Pharm. 80(4): 573-584, (2011)). "Alanine scan" analogs of KIIIA have identified Lys7, Trp8, Arg10, Asp11, His12, and Arg14 as being important for activity against $rNa_V1.4$. (See Zhang et al., 2007). The NMR solution structure of KIIIA places these residues within or adjacent to an α-helix near the C-terminus of the molecule. (See, Khoo et al., Structure of the analgesic μ-conotoxin KIIIA and effects on the structure and function of disulfide deletion, Biochem. 48(6):1210-1219, (2009)). The disulfide bond between Cys1 and Cys9 may be removed by substitution of alanine (KIIIA[C1A,C9A]) without greatly reducing the activity of the compound. (See, Khoo et al., 2009; Han et al., Structurally minimized μ-conotoxin analogs as sodium channel blockers: implications for designing conopeptide-based therapeutics, ChemMedChem 4(3):406-414, (2009)). Replacing a second disulfide bond between Cys2 and Cys16 with a diselenide bond between selenocysteine residues has given rise to the disulfide-depleted selenoconopeptide

analogs of KIIIA. These compounds have retained the activity of KIIIA but are more synthetically accessible. (See, Han et al., Disulfide-depleted selenoconopeptides: simplified oxidative folding of cysteine-rich peptides, ACS Med. Chem. Lett.1(4):140-144, (2010)). The native structure has been further minimized to a lactam-stabilized helical peptide scaffold with Nav inhibitory activity. (See, Khoo et al., Lactam-stabilized helical analogues of the analgesic μ-conotoxin KIIIA, J. Med. Chem. 54:7558-7566 (2011)). KIIIA binds to the neurotoxin receptor site 1 in the outer vestibule of the conducting pore of the VGSCs and blocks the channel in an all-or-none manner. Recent studies have shown that some analogs of KIIIA only partially inhibit the sodium current and may be able to bind simultaneously with TTX and saxitoxin (STX). (See, Zhang et al., Cooccupancy of the outer vestibule of voltage-gated sodium channels by μ-conotoxin KIIIA and saxitoxin or tetrodotoxin, J. Neurophys. 104(1):88-97, (2010); French et al., The tetrodotoxin receptor of voltage-gated sodium channels - perspectives from interactions with μ-conotoxins, Marine Drugs 8:2153-2161, (2010); Zhang et al., μ-Conotoxin KIIIA derivatives with divergent affinities versus efficacies in blocking voltage-gated sodium channels. Biochem. 49(23):4804-4812, (2010); Zhang et al., Synergistic and antagonistic interactions between tetrodotoxin and μ-conotoxin in blocking voltage-gated sodium channels, Channels 3(1):32-38, (2009)).

[0018] OD1 (SEQ ID NO:589) is an α-like toxin isolated from the venom of the Iranian yellow scorpion *Odonthobuthus doriae*. (See, Jalali et al., OD1, the first toxin isolated from the venom of the scorpion *Odonthobuthus doriae* active on voltage-gated Na+ channels, FEBS Lett. 579(19):4181-4186, (2005)). This peptide is 65 amino acids in length with an amidated C-terminus containing 6 cysteine residues that form 3 disulfide bonds. OD1 has been characterized as an $Na_V1.7$ modulator that impairs fast inactivation (EC_{50} = 4.5 nM), increases the peak current at all voltages, and induces a persistent current, with selectivity against $Na_V1.8$ and $Na_V1.3$. (See Maertens et al., Potent modulation of the voltage-gated sodium channel Nav1.7 by OD1, a toxin from the scorpion *Odonthobuthus doriae*, Mol. Pharm. 70(1):405-414, (2006)).

[0019] Huwentoxin-IV(HWTX-IV; SEQ ID NO:528) is a 35 residue C-terminal peptide amide with 3 disulfide bridges between 6 cysteine residues isolated from the venom of the Chinese bird spider, *Selenocosmia huwena*. (See, Peng et al., Function and solution structure of huwentoxin - IV , a potent neuronal tetrodotoxin

(TTX)-sensitive sodium channel antagonist from chinese bird spider *Selenocosmia huwena*, J. Biol. Chem. 277(49):47564-47571, (2002)). The disulfide bonding pattern (C1—C4, C2—C5, C3—C6) and NMR solution structure place HWTX-IV in the ICK structural family since the C3—C6 disulfide bond passes through the 16-residue ring formed by the other two disulfide bridges (C1—C4 and C2—C5). HWTX-IV inhibits TTX-sensitive sodium currents in adult rat DRG neurons with an IC_{50} value of 30 nM but has no effect on TTX-resistant VGSCs at up to a 100 nM concentration. (See, Peng et al., 2002). HWTX-IV was also 12-fold less potent against central neuronal sodium channels in rat hippocampus neurons, suggesting that it may be selective toward $Na_V1.7$. (See, Xiao et al., Synthesis and characterization of huwentoxin-IV, a neurotoxin inhibiting central neuronal sodium channels, Toxicon 51(2):230-239, (2008)). Testing HWTX-IV against VGSC sub-types determined the relative sensitivity to be hNav1.7 (IC_{50} = 26 nM) > rNav1.2 >> rNav1.3 > rNav1.4 ≥ hNav1.5. (See Xiao et al., Tarantula huwentoxin-IV inhibits neuronal sodium channels by binding to receptor site 4 and trapping the domain II voltage sensor in the closed configuration, J. Biol. Chem. 283(40):27300-27313, (2008)). Site directed protein mutagenesis mapped the binding of HWTX-IV to neurotoxin site 4, the extracellular S3-S4 linker betweendomain II, and its behavior in response to changes in voltage and channel activation is consistent with binding to the voltage sensor of Nav1.7 and trapping it in the resting configuration. (See, Xiao et al., 2008). Huwentoxin-I (HWTX-I; SEQ ID NO:529), a related family member is less potent against VGSCs but is active against N-Type Ca_V channels. (See, Wang et al., The cross channel activities of spider neurotoxin huwentoxin I on rat dorsal root ganglion neurons, Biochem. Biophys. Res. Comm. 357(3):579-583, (2007); Chen et al., Antinociceptive effects of intrathecally administered huwentoxin-I, a selective N-type calcium channel blocker, in the formalin test in conscious rats, Toxicon 45(1):15-20, (2005); Liang et al., Properties and amino acid sequence of huwentoxin-I, a neurotoxin purified from the venom of the Chinese bird spider *Selenocosmia huwena*, Toxicon 31(8):969-78, (1993)).

[0020] ProTx-II (SEQ ID NO:531), isolated from the venom of the tarantula *Thixopelma pruriens*, is a 30 amino acid polypeptide with a C-terminal free acid and 6 cysteine residues that form 3 disulfide bonds. It differs from other members of the ICK family because it contains only three residues between the fifth and sixth cysteine

residues instead of the normal 4-11. ProTx-II is a potent inhibitor of several Na_V channel sub-types including $Na_V1.2$, $Na_V1.7$ (IC_{50} < 1 nM), $Na_V1.5$, and $Na_V1.8$, as well as Cav3.1 channels but not K_V channels. (See, Middleton et al., Two tarantula peptides inhibit activation of multiple sodium channels, Biochem. 41(50):14734-14747, (2002); Priest et al., ProTx-I and ProTx-II: gating modifiers of voltage-gated sodium channels, Toxicon 49(2):194-201, (2007); Edgerton et al., Inhibition of the activation pathway of the T-type calcium channel CaV3.1 by ProTxII, Toxicon 56(4):624-636, (2010)). The "alanine scan" analogs of ProTx-II were tested against Nav1.5, identifying Met6, Trp7, Arg13, Met19, Val20, Arg22, Leu23, Trp24, Lys27, Leu29, and Trp30 as being important for activity. (See, Smith et al., Molecular interactions of the gating modifier toxin ProTx-II with Nav1.5: implied existence of a novel toxin binding site coupled to activation, J. Biol. Chem. 282(17):12687-12697, (2007)). Biophysical characterization showed that ProTx-II differs from HwTx-IV in its ability to interact with lipid membranes. (See, Smith et al., Differential phospholipid binding by site 3 and site 4 toxins: implications for structural variability between voltage-sensitive sodium channel comains, J. Biol. Chem. 280(12):11127-11133, (2005). Doses of 0.01 and 0.1 mg/kg i.v. of ProTx-II were well tolerated in rats, but 1 mg/kg doses were lethal. ProTx-II was not efficacious in a mechanical hyperalgesia study. (See, Schmalhofer et al., ProTx-II, a selective inhibitor of NaV1.7 sodium channels, blocks action potential propagation in nociceptors, Mol. Pharm. 74(5):1476-1484, (2008)). Intrathecal administration was lethal at 0.1 mg/kg and not effective in the hyperalgesia study at lower doses. ProTx-II application to desheathed cutaneous nerves completely blocked the C-fiber compound action potential but had little effect on action potential propagation of the intact nerve. (See, Schmalhofer et al., 2008). ProTx-II is believed to bind to the S3-S4 linker of domain II of $Na_V1.7$ to inhibit channel activation but may also interact with the domain IV voltage sensor and affect sodium channel activation at higher concentrations. (See, Xiao et al., The tarantula toxins ProTx-II and huwentoxin-IV differentially interact with human Nav1.7 voltage sensors to inhibit channel activation and inactivation, Mol. Pharm. 78(6):1124-1134, (2010); Sokolov et al., Inhibition of sodium channel gating by trapping the domain II voltage sensor with protoxin II, Mol. Pharm. 73(3):1020-1028, (2008); Edgerton et al., Evidence for multiple effects of ProTxII on activation gating in NaV1.5, Toxicon 52(3):489-500, (2008)).

[0021] Production of toxin peptides is a complex process in venomous organisms, and is an even more complex process synthetically. Due to their conserved disulfide structures and need for efficient oxidative refolding, toxin peptides present challenges to synthesis. (See, Steiner and Bulaj, Optimization of oxidative folding methods for cysteine-rich peptides: a study of conotoxins containing three disulfide bridges, J. Pept. Sci. 17(1): 1-7, (2011); Góngora-Benítez et al., Optimized Fmoc solid-phase synthesis of the cysteine-rich peptide Linaclotide, Biopolymers Pept. Sci. 96(1):69-80, (2011)). Although toxin peptides have been used for years as highly selective pharmacological inhibitors of ion channels, the high cost of synthesis and refolding of the toxin peptides and their short half-life in vivo have impeded the pursuit of these peptides as a therapeutic modality. Far more effort has been expended to identify small molecule inhibitors as therapeutic antagonists of ion channels, than has been given the toxin peptides themselves. One exception is the approval of the small ω-conotoxin MVIIA peptide (Prialt®, ziconotide), an inhibitor of neuron-specific N-type voltage-sensitive calcium channels, for treatment of intractable pain. The synthetic and refolding production process for ziconotide, however, is costly and only results in a small peptide product with a very short half-life in vivo (about 4 hours).

[0022] A small clinical trial in humans showed that local, non-systemic injection of the non-peptide tetrodotoxin produced pain relief in patients suffering from pain due to cancer and / or to chemotherapy (Hagen et al., J Pain Symp Manag 34:171-182 (2007)). Tetrodotoxin is a non-CNS-penetrant inhibitor of sodium channels including $Na_V1.3$ and $Na_V1.7$; although it cannot be used systemically due to lack of selectivity among sodium channel subtypes, its efficacy provides further validation for treating chronic pain syndromes with inhibitors of $Na_V1.7$ and / or $Na_V1.3$ in peripheral neurons.

[0023] Polypeptides typically exhibit the advantage of greater target selectivity than is characteristic of small molecules. Non-CNS penetrant toxin peptides and peptide analogs selective for Nav1.7 and/or Nav1.3 are desired, and are provided by the present invention.

SUMMARY OF THE INVENTION

[0024] The present invention is directed to a composition of matter comprising an isolated polypeptide, which is a peripherally-restricted $Na_V1.7$ inhibitor. In one embodiment, the isolated polypeptide is a dual inhibitor of $Na_V1.7$ and $Na_V1.3$ having the amino acid sequence DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-NH_2 (SEQ ID NO:1), which is a peptide we have designated "GpTx-1", and which was isolated from the venom of the tarantula *Grammostola porteri*, as described herein. Other embodiments of the present invention comprise a peptide analog of GpTx-1. In other embodiments, the present invention is directed to a composition of matter comprising an isolated polypeptide comprising the amino acid sequence of the formula:

$X_{aa}^{1}X_{aa}^{2}\ X_{aa}^{3}X_{aa}^{4}X_{aa}^{5}X_{aa}^{6}X_{aa}^{7}X_{aa}^{8}X_{aa}^{9}X_{aa}^{10}X_{aa}^{11}X_{aa}^{12}X_{aa}^{13}X_{aa}^{14}Asp^{15}$

$X_{aa}^{16}\ X_{aa}^{17}\ X_{aa}^{18}X_{aa}^{19}\ X_{aa}^{20}\ X_{aa}^{21}X_{aa}^{22}X_{aa}^{23}\ X_{aa}^{24}X_{aa}^{25}\ X_{aa}^{26}X_{aa}^{27}X_{aa}^{28}X_{aa}^{29}$

$X_{aa}^{30}\ X_{aa}^{31}Lys^{32}X_{aa}^{33}X_{aa}^{34}X_{aa}^{35}\ X_{aa}^{36}X_{aa}^{37}X_{aa}^{38}$// SEQ ID NO:475

or a pharmaceutically acceptable salt thereof,

wherein:

$X_{aa}^{1}X_{aa}^{2}$ is absent; or X_{aa}^{1} is any amino acid residue and X_{aa}^{2} is any amino acid residue; or X_{aa}^{1} is absent and X_{aa}^{2} is any amino acid residue;

X_{aa}^{3} is Cys, if X_{aa}^{18} is Cys; or X_{aa}^{3} is SeCys, if X_{aa}^{18} is SeCys; or X_{aa}^{3} is an alkyl amino acid residue, if X_{aa}^{18} is an alkyl amino acid residue;

X_{aa}^{4} is an acidic, hydrophobic, basic, or neutral hydrophilic amino acid residue;

X_{aa}^{5} is a Gly, Ala, hydrophobic, or basic amino acid residue;

X_{aa}^{6} is a Gly, Ala, 2-Abu, Nle, Nva, or hydrophobic amino acid residue;

X_{aa}^{7} is a Gly, Ala, aromatic, or hydrophobic amino acid residue;

X_{aa}^{8} is a basic, acidic, or neutral hydrophilic amino acid residue, or an Ala residue;

X_{aa}^{9} is a basic or neutral hydrophilic amino acid residue;

X_{aa}^{10} is Cys if X_{aa}^{24} is Cys; or X_{aa}^{10} is SeCys if X_{aa}^{24} is SeCys;

X_{aa}^{11} is any amino acid residue;

X_{aa}^{12} is a Pro, acidic, neutral, or hydrophobic amino acid residue;

X_{aa}^{13} is any amino acid residue;

X_{aa}^{14} is any amino acid residue;

X_{aa}^{16} is a basic, neutral hydrophilic, or acidic amino acid residue, or an Ala residue;

X_{aa}^{17} is a Cys if X_{aa}^{31} is Cys; or X_{aa}^{17} is a SeCys if X_{aa}^{31} is SeCys;

X_{aa}^{18} is a Cys, SeCys, or an alkyl amino acid residue;

X_{aa}^{19} is any amino acid residue;

X_{aa}^{20} is a Pro, Gly, basic, or neutral hydrophilic residue;

X_{aa}^{21} is a basic, hydrophobic, or neutral hydrophilic amino acid residue;

X_{aa}^{22} is a hydrophobic or basic amino acid residue;

X_{aa}^{23} is a hydrophobic, basic, or neutral hydrophilic amino acid residue;

X_{aa}^{24} is a Cys or SeCys residue;

X_{aa}^{25} is a Ser, Ala, or a neutral hydrophilic amino acid residue;

X_{aa}^{26} is an Ala, acidic, basic, or neutral hydrophilic amino acid residue;

X_{aa}^{27} is an acidic, basic, neutral hydrophilic or hydrophobic residue;

X_{aa}^{28} is an aromatic or basic amino acid residue;

X_{aa}^{29} is acidic, basic, or neutral hydrophilic amino acid residue;

X_{aa}^{30} is a Trp, 5-bromoTrp, 6-bromoTrp, 5-chloroTrp, 6-chloroTrp, 1-Nal, 2-Nal, or thioTrp residue;

X_{aa}^{31} is a Cys or SeCys;

X_{aa}^{33} is a hydrophobic or aromatic amino acid residue;

X_{aa}^{34} is any amino acid residue;

X_{aa}^{35} is a hydrophobic amino acid residue;

each of X_{aa}^{36}, X_{aa}^{37}, and X_{aa}^{38} is independently absent or is independently a neutral, basic, or hydrophobic amino acid residue;

and wherein:

if X_{aa}^{3} and X_{aa}^{18} are both Cys residues, there is a disulfide bond between residue X_{aa}^{3} and residue X_{aa}^{18}; or if X_{aa}^{3} and X_{aa}^{18} are both SeCys residues, there is a diselenide bond between residue X_{aa}^{3} and residue X_{aa}^{18};

if X_{aa}^{10} and X_{aa}^{24} are both Cys residues, there is a disulfide bond between residue X_{aa}^{10} and residue X_{aa}^{24}; or if X_{aa}^{10} and X_{aa}^{24} are both SeCys residues, there is a diselenide bond between residue X_{aa}^{10} and residue X_{aa}^{24};

if X_{aa}^{17} and X_{aa}^{31} are both Cys residues, there is a disulfide bond between residue X_{aa}^{17} and residue X_{aa}^{31}; or if X_{aa}^{17} and X_{aa}^{31} are both SeCys residues, there is a diselenide bond between residue X_{aa}^{17} and residue X_{aa}^{31};

the amino-terminal residue is optionally acetylated, biotinylated, 4-pentynoylated, or PEGylated; and

the carboxy-terminal residue is optionally amidated.

In particular embodiments the composition of matter comprises an amino acid sequence selected from SEQ ID NOS: 3-30, 32-72, 74-134, 136-178, 180-211, 218-239, 241-305, 307-363, 366-386, 388-432, 434-474, 515-527, 532-588, 590, 591, 593-775, 777, 778, 780-788, 790-1049, and 1062-3086.

[0025] The present invention includes a composition of matter, comprising an amino acid sequence selected from SEQ ID NOS: 3-134, 136-305, 307-386, 388-474, 515-527, 532-588, 590, 591, 593-1049, and 1062-3086.

[0026] The present invention also encompasses a nucleic acid (e.g., DNA or RNA) encoding any of SEQ ID NOS: 3-134, 136-305, 307-386, 388-474, 515-527, 532-588, 590, 591, 593-1049, and 1062-3086 that does not include a non-canonical amino acid; an expression vector comprising the nucleic acid; and a recombinant host cell comprising the expression vector. The compositions of the invention provide an effective method of treating, or preventing, pain, for example acute, persistent, or chronic pain. For example, a dual inhibitor of Nav1.7 and Nav1.3 can be effective in some forms of chronic pain, particularly in cases where Nav1.7 inhibition alone is insufficient. Selectivity against off-target sodium channels, particularly those governing cardiac excitability (Nav1.5) and skeletal muscle excitability (NaV1.4), is cardinal for any systemically delivered therapeutic. This selectivity is a particularly high hurdle for a dual inhibitor. Compositions of the present invention provide such selectivity against Nav1.5 and Nav1.4. For example, the GpTx-1 peptide (SEQ ID NO:1) is a weak inhibitor of Nav1.4. Moreover, the inhibition of Nav1.4 is strongly state dependent, such that GpTx-1 exerts negligible effects on the physiological, non-inactivated states of Nav1.4. (This is a key distinction between GpTx-1 and tetrodotoxin, which has little selectivity against Nav1.4, and which inhibits equally the inactivated and non-inactivated states of Nav1.4).

[0027] Consequently, the present invention is also directed to a pharmaceutical composition or a medicament containing the inventive composition of matter, and a pharmaceutically acceptable carrier.

[0028] GpTx-1 and GpTx-1 peptide analogs are also useful as research tools. Heretofore, there have not been available specific biochemical probes for Nav1.7 or for Nav1.3, and particularly no probes for correctly folded, functional Nav1.7 in the plasma membrane of live cells. As GpTx-1 and its congeners inhibit Nav1.7 / Nav1.3, they clearly bind to the channel molecule with high potency and selectivity. Labeling with fluorescent or other tracer groups at the non-active sites of GpTx-1 as defined by NMR and by residue substitution can provide research tools suitable for, but not limited to, localizing sodium channels, sorting cells that express sodium channels, and screening or panning for peptides that bind to Nav1.7 or Nav1.3.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] Figure 1 (top panel) shows the reversed phase (RP) HPLC separation of crude venom extracted from *Grammostola porteri*. The tick marks along the x-axis represent time slices of fractionation. Figure 1 (bottom panel) shows the activity of the isolated venom fraction (percent of control, POC) in the $Na_V1.7$ IonWorks® Quatrro (IWQ) assay. Fraction 31 (indicated with rectangular box) contained a major peak in the RP-HPLC chromatogram, exhibited > 80% inhibition in the ion channel assay, and was later deconvoluted to yield GpTx-1 (SEQ ID NO:1).

[0030] Figure 2 (inset) shows the high resolution electrospray ionization-mass spectrometry (ESI-MS) analysis of the indicated fraction (31) from the initial separation of *Grammostola porteri* venom. The arrows indicate the (m/z) ratios observed for the different ionization states of a peptide with a molecular weight of 4071 Da that was eventually identifed as GpTx-1. Additional peaks in the mass spectrum indicate that the venom fraction is a mixture of at least four distinct peptides.

[0031] Figure 3 shows the matrix-assisted laser desorption ionization time-of-flight mass spectrometry (MALDI-TOF MS) analysis of fraction 31 from the separation of *Grammostola porteri* venom. The inset shows the low and mid mass ranges. The peak with an m/z ratio of 4074.9 was eventually identified as GpTx-1, but the fraction is a mixture of at least four distinct peptides.

[0032] Figure 4 (top panel) shows the RP-HPLC separation (sub-fractionation) of the material in fraction 31 from the intial separation of *Grammostola porteri* venom. The tick marks along the x-axis represent time slices of the sub-fractionation. Figure 4 (bottom panel) shows the activity of the isolated sub-fractions (POC) in the $Na_V1.7$ IonWorks® Quatrro (IWQ) assay. The major peak in the RP-HPLC chromatogram was the most active in the $Na_V1.7$ assay and was deconvoluted to identify GpTx-1.

[0033] Figure 5 shows LC-MS analysis of synthetic GpTx-1. The top panel shows the RP-HPLC chromatogram of UV absorbance at 214 nm. The bottom panel shows the total ion count (TIC) of the ESI-MS detector.

[0034] Figure 6 shows the ESI-MS analysis of the peak with the retention time (r_t) of 6.75 minutes in Figure 5. The peaks with m/z ratios of 1358.8 and 1019.4

represent the $[M+3H]^{3+}$ and $[M+3H]^{4+}$ charge states, resepctively, of GpTx-1, which has a monoisotopic molecular weight of 4071.9 Da.

[0035] Figure 7 shows the overlay of the peptide backbone for the 20 lowest energy conformations (RMSD = 0.1±0.05Å) from the structural determination of GpTx-1 by NMR spectroscopy.

[0036] Figure 8 shows the overlay of the peptide heavy atoms for the 20 lowest energy conformations (RMSD = 0.74±0.12Å) from the structural determination of GpTx-1 by NMR spectroscopy.

[0037] Figure 9 shows a ribbon representation of the peptide backbone and disulfide bonds (with the numbers corresponding to the cysteine residues) from the structural determination of GpTx-1 by NMR spectroscopy.

[0038] Figure 10 shows GpTx-1 oriented with the hydrophobic and putative binding face formed by the C-terminal β-strand and residues Phe5 and Met6 oriented toward the reader. On the right, is a ribbon representation of the peptide backbone with the side chains of key residues depicted, and the left shows a partially transparent surface rendering of the molecule.

[0039] Figure 11 (left) shows the hydrophobic and putative binding face of GpTx-1 with an opaque surface. On the right, the molecule has been rotated clockwise by 90° to show the topological contrast between the flat hydrophobic face and the hydrophilic (solvent-exposed) face of the peptide.

[0040] Figure 12A-N shows schematic structures of some embodiments of a composition of the invention that include one or more units of a pharmacologically active toxin, e.g., GpTx-1, or toxin (e.g., GpTx-1) peptide analog (squiggle) fused, via an optional peptidyl linker moiety such as but not limited to L5 or L10 described herein, with one or more domains of an immunoglobulin. These schematics show a more typical IgG1, although they are intended to apply as well to IgG2s, which will have 4 disulfide bonds in the hinge and a different arrangement of the disulfide bond linking the heavy and light chain, and IgG3s and IgG4s. Figure 12A represents a monovalent heterodimeric Fc-toxin peptide analog fusion or conjugate with the toxin peptide analog fused or conjugated to the C-terminal end of one of the immunoglobulin Fc domain monomers. Figure 12B represents a bivalent homodimeric Fc-toxin peptide analog fusion or conjugate, with toxin peptide analogs fused to the C-terminal ends of both of

the immunoglobulin Fc domain monomers. Figure 12C represents a monovalent heterodimeric toxin peptide analog-Fc fusion or conjugate with the toxin peptide analog fused or chemically conjugated to the N-terminal end of one of the immunoglobulin Fc domain monomers. Figure 12D represents a bivalent homodimeric toxin peptide analog-Fc fusion or conjugate, with toxin peptide analogs fused to the N-terminal ends of both of the immunoglobulin Fc domain monomers. Figure 12E represents a monovalent heterotrimeric Fc-toxin peptide analog/Ab comprising an immunoglobulin heavy chain (HC) + immunoglobulin light chain (LC) + an immunoglobulin Fc monomer with a toxin peptide analog fused to its C-terminal end. Figure 12 F represents a monovalent heterotetrameric (HT) antibody HC-toxin peptide analog fusion or conjugate, with a toxin peptide analog fused to the C-terminal end of one of the HC monomers. Figure 12G represents a bivalent HT antibody Ab HC-toxin peptide analog fusion or conjugate having toxin peptide analogs on the C-terminal ends of both HC monomers. Figure 12H represents a monovalent HT toxin peptide analog-LC Ab, with the toxin peptide analog fused to the N-terminal end of one of the LC monomers. Figure 12I represents a monovalent HT toxin peptide analog-HC Ab, with the toxin peptide analog fused to the N-terminal end of one of the HC monomers. Figure 12J represents a monovalent HT Ab LC-toxin peptide analog fusion or conjugate (i.e., LC-toxin peptide analog fusion or conjugate + LC + 2(HC)), with the toxin peptide analog fused to the C-terminal end of one of the LC monomers. Figure 12K represents a bivalent HT Ab LC-toxin peptide analog fusion or conjugate (i.e., 2(LC-toxin peptide analog fusion or conjugate) + 2(HC)), with toxin peptide analogs fused to the C-terminal end of both of the LC monomers. Figure 12 L represents a trivalent HT Ab LC-toxin peptide analog/HC-toxin peptide analog (i.e., 2(LC-toxin peptide analog fusion or conjugate) + HC-toxin peptide analog fusion or conjugate + HC), with the toxin peptide analogs fused to the C-terminal ends of both of the LC monomers and one of the HC monomers. Figure 12M represents a bivalent antibody with a toxin peptide analog moiety inserted into an internal loop of the immunoglobulin Fc domain of each HC monomer. Figure 12N represents a monovalent antibody with a toxin peptide analog moiety inserted into an internal loop of the immunoglobulin Fc domain of one of the HC monomers. Dimers or trimers will form spontaneously in certain host cells upon expression of a deoxyribonucleic acid (DNA) construct encoding a single chain.

In other host cells, the cells can be placed in conditions favoring formation of dimers/trimers or the dimers/trimers can be formed in vitro. If more than one HC monomer, LC monomer, or immunoglobulin Fc domain monomer is part of a single embodiment, the individual monomers can be, if desired, identical or different from each other.

[0041] Figure 13A-F illustrates in situ hybridization studies detecting expression of $Na_V1.7$ message RNA in human trigeminal ganglia (Figure 13 A-B) and in human dorsal root ganglia (Figure 13C-F). Figure 13A, Figure 13C, Figure 13E show Hematoxylin and Eosin (H & E) stained cells; Figure 13B, Figure 13D, and Figure 13F show expression of Nav1.7 via hybridization of ^{33}P-labeled antisense probe as blue dots. $Na_V1.7$-specific staining also was detected in myenteric plexes of stomach and small intestine. No $Na_V1.7$-specific staining was detected in human cerebellum, cerebral cortex, adrenal medulla, or pituitary, and only light staining was detected in hypothalamic nuclei. Staining from spinal cord was restricted to light staining in ventral motor areas and to spinal ependyma (epithelial cells lining the central canal). All staining was done under RNAse-free conditions on formalin-fixed, paraffin-embedded tissue. Probe was verified specific for $Na_V1.7$ by verifying a positive signal on HEK-293T cell lines expressing cloned human $Na_V1.7$ and a lack of signal on cell lines expressing any of the following sodium channels: $hNa_V1.1$ (HEK-293T), $hNa_V1.2$ (CHO), $hNa_V1.3$ (CHO), $hNa_V1.4$ (HEK-293T), $hNa_V1.5$ (HEK-293T), $hNa_V1.6$ (HEK-293T), $rNa_V1.3$ (HEK-293T), and on the parental 293T cell lines.

[0042] Figure 14A-E shows that individual neurons acutely isolated from rat sensory ganglia express a heterogeneous population of sodium currents. Individual neurons expressed either fast, tetrodotoxin-sensitive sodium currents (likely $Na_V1.7$ and $Na_V1.3$), slow, tetrodotoxin-resistant sodium currents (likely $Na_V1.8$), or a mixed population (no one current type encodes > 90% of the total sodium current). Figure 14A-C show examples of a neuron expressing fast TTX-S (Figure 14A), mixed (Figure 14B), or slow TTX-R (Figure 14C) sodium currents. Figure 14D-E illustrate that neurons isolated from sensory ganglia of rats that have undergone spinal nerve ligation ("SNL") surgery (Figure 14E) express a far greater proportion of fast TTX-S currents than control rats (Figure 14D).

[0043] Figure 15A-B shows sequence alignments of KIIIA (SEQ ID NO:530), GpTx-1(1-34) (SEQ ID NO:1), Huwentoxin-IV(SEQ ID NO:528), Huwentoxin-I (SEQ ID NO:529), and ProTx II (SEQ ID NO:531).

[0044] Figure 16 shows the concentration–time profile of GpTx-1 in mouse plasma following a 1 mg/kg subcutaneous ("s.c.") administration.. The GpTx-1 concentration was below the lower limit of quantitation in two of the three animals, and the profile could not be obtained.

[0045] Figure 17A shows the concentration–time profile of [Ala5]GpTx-1 (SEQ ID NO:22) in plasma from two mice following a 1 mg/kg intravenous ("i.v.") administration. (Exposures from a third mouse were lower than the quantitation limit, and the profile could not be obtained.)

[0046] Figure 17B shows the average plasma concentration-time profiles of [Ala5]GpTx-1 (SEQ ID NO:22) in plasma from mice following a 5 mg/kg s.c. dose (n = 3), a 1 mg/kg s.c. dose (n=2), and a 1 mg/kg intravenous (i.v.) dose (n=2). For the 5 mg/kg dose, peptide concentrations in the plasma were sustained at about 0.6 μM, approximately 40-fold over the in vitro Nav1.7 IC_{50} by PatchXpress® (PX), for 3 h.

[0047] Figure 18 shows the dose response relationship for GpTx-1 (SEQ ID NO:1; n=7), [Ala5]GpTx-1 (SEQ ID NO:22; n=8), and BSA control tested against hERG. The IC_{50} value for both compounds was > 10 μM.

[0048] Figure 19A shows the dose response relationship for GpTx-1 (SEQ ID NO:1; n=7) tested against hNav1.5. The IC_{50} value for GpTx-1 was 9.8 μM.

[0049] Figure 19B shows the dose response relationship for [Ala5]GpTx-1 (SEQ ID NO:22, n=9) tested against hNav1.5. The IC_{50} value for [Ala5]GpTx-1 was > 30 μM.

[0050] Figure 20 shows the effect of GpTx-1 (SEQ ID NO:1) on hNav1.7 channels. Cells were held at -140 mV and peak inward hNav1.7 currents were measured at -10 mV. "Baseline" trace shows hNav1.7 current before GpTx-1, and '100 nM GpTx-1' trace shows hNav1.7 current after GpTx-1 addition.

[0051] Figure 21 shows a dose-response curve of GpTx-1 (SEQ ID NO:1) against hNav1.7 channels. Peak inward hNav1.7 currents were measured at -10 mV in the presence of increasing concentrations of GpTx-1; cells were held at -140 mV. Currents were normalized with 100 representing Nav1.7 current with no peptide

addition and 0 representing Nav1.7 current following complete block. The IC_{50} of GpTx-1 against hNav1.7 channels was 7.40 nM.

[0052] Figure 22 shows a time course of increasing concentrations of GpTx-1 (SEQ ID NO:1) against hNav1.7 channels. Peak inward hNav1.7 currents were measured at -10 mV every 10 seconds in the presence of increasing concentrations of GpTx-1; cells were held at a -140 mV. "Baseline" indicates hNav1.7 current in the absence of GpTx-1 and "Wash" indicates hNav1.7 current following removal of GpTx-1.

[0053] Figure 23 shows the effect of GpTx-1 (SEQ ID NO:1) on hNav1.3 channels. Cells were held at -140 mV and peak inward hNav1.3 currents were measured at -10 mV. "Baseline" trace shows hNav1.3 current before GpTx-1, and '300 nM GpTx-1' trace shows hNav1.3 current after GpTx-1 addition.

[0054] Figure 24 shows a dose-response curve of GpTx-1 (SEQ ID NO:1) against hNav1.3 channels. Peak inward hNav1.3 currents were measured at -10 mV in the presence of increasing concentrations of GpTx-1; cells were held at -140 mV. Currents were normalized with 100 representing Nav1.3 current with no peptide addition and 0 representing Nav1.3 current following complete block. The IC_{50} of GpTx-1 against hNav1.3 channels was 16.8 nM.

[0055] Figure 25 shows a time course of increasing concentrations of GpTx-1 (SEQ ID NO:1) against hNav1.3 channels. Peak inward hNav1.3 currents were measured at -10 mV every 10 seconds in the presence of increasing concentrations of GpTx-1; cells were held at a -140 mV. "Baseline" indicates hNav1.3 current in the absence of GpTx-1 and "Wash" indicates hNav1.3 current following removal of GpTx-1.

[0056] Figure 26 shows the effect of GpTx-1 (SEQ ID NO:1) on hNav1.4 channels. Cells were held at -140 mV and peak inward hNav1.4 currents were measured at -10 mV. "Baseline" trace shows hNav1.4 current before GpTx-1, and '3 μM GpTx-1' trace shows hNav1.4 current after GpTx-1 addition.

[0057] Figure 27 shows a dose-response curve of GpTx-1 (SEQ ID NO:1) against hNav1.4 channels. Peak inward hNav1.4 currents were measured at -10 mV in the presence of increasing concentrations of GpTx-1; cells were held at -140 mV. Currents were normalized with 100 representing Nav1.4 current with no peptide

addition and 0 representing Nav1.4 current following complete block. The IC_{50} of GpTx-1 against hNav1.4 channels was 2.9 μM.

[0058] Figure 28 shows a dose-response curve of GpTx-1 (SEQ ID NO:1) against hNav1.4 channels. Peak inward hNav1.4 currents were measured at -10 mV in the presence of increasing concentrations of GpTx-1; cells were held at a potential yielding approximately 20% inactivation. Note that GpTx-1 is more potent against hNav1.4 when channels are partially inactivated. Currents were normalized with 100 representing Nav1.4 current with no peptide addition and 0 representing Nav1.4 current following complete block. The IC_{50} of GpTx-1 against partially inactivated hNav1.4 channels was 0.26 μM.

[0059] Figure 29 shows a time course of increasing concentrations of GpTx-1 (SEQ ID NO:1) against hNav1.4 channels. Peak inward hNav1.4 currents were measured at -10 mV every 10 seconds in the presence of increasing concentrations of GpTx-1; cells were held at a -140 mV. "Baseline" indicates hNav1.4 current in the absence of GpTx-1 and "Wash" indicates hNav1.4 current following removal of GpTx-1.

[0060] Figure 30 shows a time course of increasing concentrations of GpTx-1 (SEQ ID NO:1) against hNav1.4 channels. Peak inward hNav1.4 currents were measured at -10 mV every 10 seconds in the presence of increasing concentrations of GpTx-1; cells were held at -140 mV (squares) or a potential yielding approximately 20% inactivation (circles). "Baseline" indicates hNav1.4 current in the absence of GpTx-1 and "Wash" indicates hNav1.4 current following removal of GpTx-1. Note that GpTx-1 is more potent against hNav1.4 when channels are partially inactivated.

[0061] Figure 31 shows the effect of GpTx-1 (SEQ ID NO:1) on hNav1.5 channels. Cells were held at -140 mV and peak inward hNav1.5 currents were measured at -10 mV. "Baseline" trace shows hNav1.5 current before GpTx-1, and '3 μM GpTx-1' trace shows hNav1.5 current after GpTx-1 addition.

[0062] Figure 32 shows a dose-response curve of GpTx-1 (SEQ ID NO:1) against hNav1.5 channels. Peak inward hNav1.5 currents were measured at -10 mV in the presence of increasing concentrations of GpTx-1; cells were held at -140 mV. Currents were normalized with 100 representing Nav1.5 current with no peptide

addition and 0 representing Nav1.5 current following complete block. The IC_{50} of GpTx-1 against hNav1.5 channels was 8.9 μM.

[0063] Figure 33 shows a time course of increasing concentrations of GpTx-1 (SEQ ID NO:1) against hNav1.5 channels. Peak inward hNav1.5 currents were measured at -10 mV every 10 seconds in the presence of increasing concentrations of GpTx-1; cells were held at a -140 mV. "Baseline" indicates hNav1.5 current in the absence of GpTx-1 and "Wash" indicates hNav1.5 current following removal of GpTx-1.

[0064] Figure 34 shows the effect of [Ala5]GpTx-1 (SEQ ID NO:22) on hNav1.7 channels. Cells were held at -140 mV and peak inward hNav1.7 currents were measured at -10 mV. 'Baseline" trace shows hNav1.7 current before [Ala5]GpTx-1 addition, and "300 nM [Ala5]GpTx-1" trace shows hNav1.7 current after [Ala5]GpTx-1 addition. Cells were held at a potential yielding approximately 20% inactivation.

[0065] Figure 35 shows a dose-response curve of [Ala5]GpTx-1 (SEQ ID NO:22) against hNav1.7 channels. Peak inward hNav1.7 currents were measured at -10 mV in the presence of increasing concentrations of [Ala5]GpTx-1; cells were held at a potential yielding approximately 20% inactivation. Currents were normalized with 100 representing Nav1.7 current with no peptide addition and 0 representing Nav1.7 current following complete block. The IC_{50} of [Ala5]GpTx-1 against partially inactivated hNav1.7 channels was 13.2 nM.

[0066] Figure 36 shows a time course of increasing concentrations of [Ala5]GpTx-1 (SEQ ID NO:22) against hNav1.7 channels. Peak inward hNav1.7 currents were measured at -10 mV every 10 seconds in the presence of increasing concentrations of [Ala5]GpTx-1; cells were held at -140 mV (squares) or a potential yielding approximately 20% inactivation (circles). "Baseline" indicates hNav1.7 current in the absence of [Ala5]GpTx-1 and "Wash" indicates hNav1.7 current following removal of [Ala5]GpTx-1.

[0067] Figure 37 shows a time course of increasing concentrations of GpTx-1 (SEQ ID NO:1) against TTX-sensitive Nav channels in mouse dorsal root ganglion (DRG) neurons. Peak inward Nav currents were measured at -10 mV every 10 seconds in the presence of increasing concentrations of GpTx-1; cells were held at -140 mV. "Control" indicates Nav current in the absence of GpTx-1, 'TTX' indicates Nav current

in the presence of 300 nM TTX, and "Wash" indicates Nav current following removal of GpTx-1 and TTX. Note that GpTx-1 blocked nearly all TTX-sensitive Nav current. Currents measured in this study were almost all TTX-sensitive currents, identified at the start of the record on the basis of fast kinetics of inactivation.

[0068] Figure 38 shows a representative dose-response curve of GpTx-1 (SEQ ID NO:1) against TTX-sensitive Nav channels in mouse DRG neurons. Peak inward Nav currents were measured at -10 mV in the presence of increasing concentrations of GpTx-1; cells were held at -140 mV. The IC_{50} value of GpTx-1 against TTX-sensitive sodium channels in mDRG neurons was measured to be 7.1 nM. Currents were normalized with 100 representing TTX-sensitive current with no peptide addition and 0 representing TTX-sensitive current following complete block.

[0069] Figure 39 shows the effect of a single concentration of GpTx-1 (SEQ ID NO:1) on TTX-sensitive Nav channels in mouse DRG neurons. Cells were held at -140 mV and peak inward Nav currents were measured at -10 mV. "Baseline" trace shows Nav current before GpTx-1 addition, and "200 nM GpTx-1" trace shows Nav current after GpTx-1 addition. Note that inactivation of control currents was complete in a couple milliseconds, which distinguishes TTX-sensitive current from TTX-resistant current.

[0070] Figure 40 shows the time course of increasing concentrations of GpTx-1 (SEQ ID NO:1) against TTX-sensitive Nav channels in mouse DRG neurons. Peak inward Nav currents were measured at -10 mV every 10 seconds in the presence of increasing concentrations of GpTx-1; cells were held at a potential yielding approximately 20% inactivation. "Control" indicates Nav current in the absence of GpTx-1, "TTX" indicates Nav current in the presence of 300 nM TTX, and "Wash" indicates Nav current following removal of GpTx-1 and TTX. Note that GpTx-1 blocked all TTX-sensitive Nav current, since 300 nM TTX gave no additional current block.

[0071] Figure 41 shows a representative dose-response curve of GpTx-1 (SEQ ID NO:1) against TTX-sensitive Nav channels in mouse DRG neurons, as defined by fast inactivation kinetics. Peak inward Nav currents were measured at -10 mV in the presence of increasing concentrations of GpTx-1; cells were held at a potential yielding approximately 20% inactivation. The IC_{50} value of GpTx-1 against TTX-sensitive

sodium channels in mDRG neurons was measured to be 4.7 nM. Currents were normalized with 100 representing TTX-sensitive current with no peptide addition and 0 representing TTX-sensitive current following complete block.

[0072] Figure 42 shows the effect of GpTx-1 (SEQ ID NO:1) on TTX-sensitive Nav channels in mouse DRG neurons. Cells were held at a potential yielding approximately 20% inactivation and peak inward Nav currents were measured at -10 mV. "Baseline" trace shows Nav current before GpTx-1 addition, and "200 nM GpTx-1" trace shows Nav current after GpTx-1 addition.

[0073] Figure 43 shows the time course of increasing concentrations of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) against TTX-sensitive Nav channels in mouse DRG neurons. Peak inward Nav currents were measured at -10 mV every 10 seconds in the presence of increasing concentrations of [Ala5]GpTx-1(1-34) (SEQ ID NO:22); cells were held at -140 mV. "Control" indicates Nav current in the absence of [Ala5]GpTx-1(1-34) (SEQ ID NO:22), "TTX"' indicates Nav current in the presence of 300 nM TTX, and "Wash" indicates Nav current following removal of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) and TTX. Note that [Ala5]GpTx-1(1-34) (SEQ ID NO:22) blocked nearly all TTX-sensitive Nav current.

[0074] Figure 44 shows a representative dose-response curve of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) against TTX-sensitive Nav channels in mouse DRG neurons. Peak inward Nav currents were measured at -10 mV in the presence of increasing concentrations of [Ala5]GpTx-1(1-34); cells were held at -140 mV. The IC_{50} value of [Ala5]GpTx-1(1-34) against TTX-sensitive sodium channels in mDRG neurons was measured to be 17.0 nM. Currents were normalized with 100 representing TTX-sensitive current with no peptide addition and 0 representing TTX-sensitive current following complete block.

[0075] Figure 45 shows the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) on TTX-sensitive Nav channels in mouse DRG neurons. Cells were held at -140 mV and peak inward Nav currents were measured at -10 mV. "Baseline" trace shows Nav current before addition of [Ala5]GpTx-1(1-34) (SEQ ID NO:22), "300 nM SEQ ID NO:22" trace shows Nav current after SEQ ID NO:22 addition, and "300 nM SEQ ID NO:22 + 300 nM TTX" trace shows Nav current after SEQ ID NO:22 and TTX

addition. Note that [Ala5]GpTx-1(1-34) selectively blocked TTX-sensitive Nav current but not TTX-resistant Nav current.

[0076] Figure 46 shows a time course of increasing concentrations of a homodimeric conjugate (Homodimeric Conjugate 1) of peptide monomer [Phe6,Atz13]GpTx-1(1-34) (SEQ ID NO:591) against hNav1.7 channels. Peak inward hNav1.7 currents were measured at -10 mV every 10 seconds in the presence of increasing concentrations of Homodimeric Conjugate 1; cells were held at -140 mV. "Control" indicates human Nav1.7 (hNav1.7) current in the absence of Homodimeric Conjugate 1and "Wash" indicates hNav1.7 current following removal of Homodimeric Conjugate 1.

[0077] Figure 47 shows a representative dose-response curve of Homodimeric Conjugate 1 against human Nav1.7 channels. Peak inward hNav1.7 currents were measured at -10 mV in the presence of increasing concentrations of Homodimeric Conjugate 1; cells were held at -140 mV. The IC_{50} value of Homodimeric Conjugate 1 against hNav1.7 sodium channels was measured to be 1.2 nM. Currents were normalized with 100 representing Nav1.7 current with no peptide addition and 0 representing Nav1.7 current following complete block.

[0078] Figure 48 shows the recovery of hNav1.7 currents following washout of Homodimeric Conjugate 1. Peak inward hNav1.7 currents were measured at -10 mV every 10 seconds in the presence of 3 nM or 300 nM Homodimeric Conjugate 1; cells were held at a -140 mV. "Control" indicates hNav1.7 current in the absence of Homodimeric Conjugate 1 and "Wash" indicates hNav1.7 current following removal of Homodimeric Conjugate 1. Note that hNav1.7 currents partially recover following washout of 3 nM Homodimeric Conjugate 1 but do not recover following washout of 300 nM of Homodimeric Conjugate 1.

[0079] Figure 49 shows the effect of Homodimeric Conjugate 1 on hNav1.7 channels. Cells were held at -140 mV and peak inward hNav1.7 currents were measured at -10 mV. "Baseline" trace shows hNav1.7 current before Homodimeric Conjugate 1 addition, and '10 nM Homodimeric Conjugate 1' trace shows hNav1.7 current after Homodimeric Conjugate 1 addition.

[0080] Figure 50 shows a time course of increasing concentrations of Homodimeric Conjugate 1 against hNav1.7 channels. Peak inward hNav1.7 currents

were measured at -10 mV every 10 seconds in the presence of increasing concentrations of Homodimeric Conjugate 1; cells were held at a potential yielding approximately 20% inactivation. "Control" indicates hNav1.7 current in the absence of Homodimeric Conjugate 1 and "Wash" indicates hNav1.7 current following removal of Homodimeric Conjugate 1.

[0081] Figure 51 shows a representative dose-response curve of Homodimeric Conjugate 1 against hNav1.7 channels. Peak inward hNav1.7 currents were measured at -10 mV in the presence of increasing concentrations of Homodimeric Conjugate 1; cells were held at a potential yielding approximately 20% inactivation. The IC_{50} value of Homodimeric Conjugate 1 against TTX-sensitive sodium channels in mDRG neurons was measured to be 0.66 nM. Currents were normalized with 100 representing Nav1.7 current with no peptide addition and 0 representing Nav1.7 current following complete block.

[0082] Figure 52 shows the effect of Homodimeric Conjugate 1 on hNav1.7 channels. Cells were held at a potential yielding approximately 20% inactivation and peak inward hNav1.7 currents were measured at -10 mV. "Baseline" trace shows hNav1.7 current before Homodimeric Conjugate 1 addition, and "3 nM Homodimeric Conjugate 1" trace shows hNav1.7 current after Homodimeric Conjugate 1 addition.

[0083] Figure 53 shows a time course of increasing concentrations of Homodimeric Conjugate 1 against hNav1.5 channels. Peak inward hNav1.5 currents were measured at -10 mV every 10 seconds in the presence of increasing concentrations of Homodimeric Conjugate 1; cells were held at a -140 mV. "Control" indicates hNav1.5 current in the absence of Homodimeric Conjugate 1 and "Wash" indicates hNav1.5 current following removal of Homodimeric Conjugate 1. Note that hNav1.5 currents partially recover following washout of Homodimeric Conjugate 1.

[0084] Figure 54 shows a representative dose-response curve of Homodimeric Conjugate 1 against hNav1.5 channels. Peak inward hNav1.5 currents were measured at -10 mV in the presence of increasing concentrations of Homodimeric Conjugate 1; cells were held at -140 mV. The IC_{50} value of Homodimeric Conjugate 1 against hNav1.5 sodium channels was measured to be 75.5 nM. Currents were normalized with 100 representing Nav1.5 current with no peptide addition and 0 representing Nav1.5 current following complete block.

[0085] Figure 55 shows the effect of Homodimeric Conjugate 1 on hNav1.5 channels. Cells were held at -140 mV and peak inward hNav1.5 currents were measured at -10 mV. "Baseline" trace shows hNav1.5 current before Homodimeric Conjugate 1 addition, and "2 μM Homodimeric Conjugate 1" trace shows hNav1.5 current after Homodimeric Conjugate 1 addition.

[0086] Figure 56 shows the time course of increasing concentrations of Homodimeric Conjugate 1 against hNav1.5 channels. Peak inward hNav1.5 currents were measured at -10 mV every 10 seconds in the presence of increasing concentrations of Homodimeric Conjugate 1; cells were held at a potential yielding approximately 20% inactivation. "Control" indicates hNav1.5 current in the absence of Homodimeric Conjugate 1 and "Wash" indicates hNav1.5 current following removal of Homodimeric Conjugate 1.

[0087] Figure 57 shows a representative dose-response curve of Homodimeric Conjugate 1 against hNav1.5 channels. Peak inward hNav1.5 currents were measured at -10 mV in the presence of increasing concentrations of Homodimeric Conjugate 1; cells were held at a potential yielding approximately 20% inactivation. The IC_{50} value of Homodimeric Conjugate 1 against hNav1.5 sodium channels was measured to be 57 nM. Currents were normalized with 100 representing Nav1.5 current with no peptide addition and 0 representing Nav1.5 current following complete block.

[0088] Figure 58 shows the effect of Homodimeric Conjugate 1 on hNav1.5 channels. Cells were held at a potential yielding approximately 20% inactivation and peak inward hNav1.5 currents were measured at -10 mV. "Baseline" trace shows hNav1.5 current before Homodimeric Conjugate 1 addition, and "2 uM Homodimeric Conjugate 1" trace shows hNav1.5 current after Homodimeric Conjugate 1 addition.

[0089] Figure 59 shows the timecourse of the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) in the formalin pain model in male CD-1 mice with a 1-hour pre-treatment dose of 5 mg/kg s.c. The peptide had no effect in the first or acute phase (0-5 minutes post formalin injection). The peptide significantly reduced the time spent lifting and/or licking the affected paw during the second phase (5-40 minutes post formalin injection, associated with spinal sensitization) compared to vehicle (PBS). In this experiment the 1 mg/kg s.c. dose of morphine used as a positive control was insufficient to significantly reduce pain response in the animals, and it was increased to

3 mg/kg in the following studies. The terminal plasma exposure (peptide plasma concentrations at 45 min post formalin injection) for the peptide was 0.80 ± 0.21 μM.

[0090] Figure 60 shows the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) in the formalin pain model in male CD-1 mice with a 1-hour pre-treatment dose of 5 mg/kg s.c. during the first phase (0-5 minutes post formalin injection). Neither the peptide nor the morphine positive control significantly reduced the time spent lifting and/or licking the affected paw during the first phase. Pharmacological reductions in flinching during this first phase generally reflect nonspecific effects on animal movement, consciousness, or health rather than an actual reduction in pain.

[0091] Figure 61 shows the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) in the formalin pain model in male CD-1 mice with a 1-hour pre-treatment dose of 5 mg/kg s.c. during the second phase (5-40 minutes post formalin injection). The peptide but not the morphine control significantly reduced the time spent lifting and/or licking the affected paw during the second phase. Again, the lack of effect of the morphine positive control does not reflect a "failed" assay, but the variability of mouse responses to this concentration of morphine. Morphine doses for future experiments were increased to 3 mg/kg.

[0092] Figure 62 shows the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) on paw edema in the formalin pain model in male CD-1 mice with a 1-hour pre-treatment dose of 5 mg/kg s.c. Neither the peptide nor the morphine positive control significantly reduced the paw edema caused by formalin injection relative to the vehicle (PBS).

[0093] Figure 63 shows the timecourse of the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) in a repeat of the formalin pain model in male CD-1 mice with 1-hour pre-treatment doses of 5, 1.67, and 0.5 mg/kg s.c. The peptide had no effect at any dose in the first phase (0-5 minutes post formalin injection). The positive control, a 3 mg/kg s.c. dose of morphine, did significantly reduce the time spent lifting/licking the affected paw in the first phase. The 5 mg/kg s.c. dose of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) demonstrated a significant reduction of the time spent lifting/licking in the second phase of the study, as did the morphine positive control. The lower peptide doses (1.67 and 0.5 mg/ kg s.c.) had no effect relative to the vehicle in the second phase. Terminal exposures (peptide plasma concentrations at 45 min post formalin injection) were 0.58

± 0.26 μM, 0.15 ± 0.05 μM, and 0.04 ± 0.2 μM for the 5.0, 1.67, and 0.5 mg/kg doses, respectively.

[0094] Figure 64 shows the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) in the first phase of the formalin pain model in male CD-1 mice with 1-hour pre-treatment doses of 5, 1.67, and 0.5 mg/kg s.c. The peptide had no effect at any dose in the first phase (0-5 minutes post formalin injection) relative to the vehicle, but the positive control, a 3 mg/kg s.c. dose of morphine, did significantly reduce the time spent lifting/licking the affected paw in the first phase.

[0095] Figure 65 shows the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) in the second phase of the formalin pain model in male CD-1 mice with 1-hour pre-treatment doses of 5, 1.67, and 0.5 mg/kg s.c. The 5 mg/kg s.c. dose of peptide demonstrated a significant reduction of the time spent lifting/licking in the second phase of the study, as did the morphine positive control. The lower peptide doses (1.67 and 0.5 mg/ kg s.c.) had no effect relative to the vehicle in the second phase.

[0096] Figure 66 shows the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) on paw edema in the formalin pain model in male CD-1 mice with a 1-hour pre-treatment doses of 5, 1.67, and 0.5 mg/kg s.c. Neither the peptide nor the morphine control significantly reduced the paw edema caused by formalin injection relative to the vehicle (PBS).

[0097] Figure 67 shows the timecourse of the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) in a third repetition of the formalin pain model in male CD-1 mice with 1-hour pre-treatment doses of 5, 3, and 1 mg/kg s.c. The 5 mg/kg peptide dose and the 3 mg/kg s.c. dose of morphine (30 minutes pretreatment) had no effect in the first phase (0-5 minutes post formalin injection). However, the lower peptide doses (1 and 3 mg/kg s.c.) appeared to increase the time spent lifting/licking relative to the vehicle control. The 5 mg/kg s.c. dose of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) demonstrated a significant reduction of the time spent lifting/licking in the second phase of the study, as did the morphine positive control. However, the lower peptide doses did not show a reduction in lifting/licking behavior relative to the vehicle control in the second phase. The 1 mg/kg s.c. group was not significantly different from the vehicle control, whereas the 3 mg/ kg s.c. group appeared to significantly increase time spent lifting/licking in the second phase. Terminal exposures (peptide plasma concentrations at 45 min post

formalin injection) were 1.84 ± 0.18 μM, 0.53 ± 0.23 μM, and 0.20 ± 0.05 μM for the 5.0, 3, and 1 mg/kg doses, respectively.

[0098] Figure 68 shows the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) in the first phase of the formalin pain model in male CD-1 mice with 1-hour pre-treatment doses of 5, 3, and 1 mg/kg s.c. The 5 mg/kg peptide dose and the 3 mg/kg s.c. dose of morphine had no effect in the first phase (0-5 minutes post formalin injection). However, the lower peptide doses (1 and 3 mg/kg s.c.) appeared to increase the time spent lifting/licking relative to the control.

[0099] Figure 69 shows the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) in the second phase of the formalin pain model in male CD-1 mice with 1 hour pre-treatment doses of 5, 3, and 1 mg/kg s.c. The 5 mg/kg s.c. dose of peptide demonstrated a significant reduction of the time spent lifting/licking in the second phase of the study, as did the morphine positive control. However, the lower peptide doses did not show a reduction in lifting/licking behavior relative to the vehicle control in the second phase. The 1 mg/kg s.c. group was not significantly different from the vehicle control, whereas the 3 mg/kg s.c. group appeared to significantly increase the time spent lifting/licking in the second phase.

[00100] Figure 70 shows the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) on paw edema in the formalin pain model in male CD-1 mice with a 1-hour pre-treatment doses of 5, 3, and 1 mg/kg s.c. Neither the peptide nor the morphine control significantly reduced the paw edema caused by formalin injection relative to the vehicle (PBS).

[00101] Figure 71 shows the effects of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at 3 and 5 mg/kg s.c. doses with a 1-hour pre-treatment time on the total basic movement component of locomotor activity in male CD-1 mice. No doses of peptide significantly decreased exploratory behavior in relation to the vehicle control. Terminal exposures (peptide plasma concentrations at 2 h post peptide injection) were 1.79 ± 0.38 and 0.89 ± 0.33 μM for the 5 and 3 mg/kg s.c. doses, respectively.

[00102] Figure 72 shows the effects of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at 3 and 5 mg/kg s.c. doses with a 1-hour pre-treatment time on fine movement component of locomotor activity in male CD-1 mice. At the 3 mg/kg dose, fine movement was not

significantly affected. At the 5mg/kg dose, peptide significantly reduced the total fine movement relative to the vehicle.

[00103] Figure 73 shows the effects of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at 3 and 5 mg/kg s.c. doses with a 1-hour pre-treatment time on the total rearing component of locomotor activity in male CD-1 mice. No doses of peptide significantly decreased exploratory behavior in relation to the vehicle control.

[00104] Figure 74 shows the effects of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at 3 and 5 mg/kg s.c. doses with a 1-hour pre-treatment time on the total time rearing component of locomotor activity in male CD-1 mice. At the 3 mg/kg dose, total time rearing was not significantly affected. At the 5 mg/kg dose, peptide significantly reduced the total time rearing relative to the vehicle.

[00105] Figure 75 shows the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at a 5 mg/kg s.c. dose with a 1-hour pre-treatment time and mexiletine at a 30 mg/kg intraperitoneal ("i.p.") dose with a 30 minute pre-treatment time on the veratridine-induced (1 μg injection in the dorsal paw) spontaneous nociceptive behaviors in male CD-1 mice measured for 20 minutes after veratridine injection. Overall there was a good paw lifting response from the vehicle group that was significantly reversed with mexiletine. At 5 mg/kg, [Ala5]GpTx-1(1-34) (SEQ ID NO:22) did not significantly reduce the lifting behavior. There is no reduction of paw edema across all groups.

[00106] Figure 76 shows the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at a 5 mg/kg s.c. dose with a 1-hour pre-treatment time and mexiletine at a 30 mg/kg i.p. dose with a 30 minute pre-treatment time on the veratridine-induced (1 μg injection in the dorsal paw) paw edema in male CD-1 mice. There is no reduction of paw edema across all groups.

[00107] Figure 77 shows the time course of the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at a 5 mg/kg s.c. dose with a 1-hour pre-treatment time and mexiletine at a 30 mg/kg i.p. dose with a 30 minute pre-treatment time on the veratridine-induced (1 μg injection in the dorsal paw) spontaneous nociceptive behaviors in male CD-1 mice. Overall there was a good paw lifting response from the vehicle group that was significantly reversed with mexiletine throughout the course of the experiment. At 5 mg/kg, [Ala5]GpTx-1(1-34) (SEQ ID NO:22) was unable to significantly reduce the lifting behavior during the course of the entire experiment, though it did trend toward a

reduction in paw lifting and licking during the 10-15 and 15-20 minute time bins. Terminal exposure (peptide plasma concentration at 1.5 h post peptide injection) was 0.70 ± 0.10 μM for the 5 mg/kg dose.

[00108] Figure 78 shows repeat testing of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at a 1 and 5 mg/kg s.c. doses with a 1-hour pre-treatment time (n = 9-10) and mexiletine at a 30 mg/kg i.p. dose with a 30 minute pre-treatment time (n = 10) on veratridine-induced (1 μg injection in the dorsal paw) spontaneous nociceptive behaviors in male CD-1 mice. Overall there was a good paw lifting response from the vehicle group that was significantly reversed with mexiletine. At 1 and 5 mg/kg, [Ala5]GpTx-1(1-34) (SEQ ID NO:22) did not significantly reduce the lifting behavior.

[00109] Figure 79 shows the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at 1 and 5 mg/kg s.c. doses with a 1-hour pre-treatment time and mexiletine at a 30 mg/kg i.p. dose with a 30 minute pre-treatment time on the veratridine-induced (1 μg injection in the dorsal paw) paw edema in male CD-1 mice. There was no reduction of paw edema in any group.

[00110] Figure 80 shows the time course of the effects of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at 1 and 5 mg/kg s.c. doses with a 1 hour pre-treatment time and mexiletine at a 30 mg/kg i.p. dose with a 30 minute pre-treatment time on the veratridine-induced (1 μg injection in the dorsal paw) spontaneous nociceptive behaviors in male CD-1 mice. Overall there was a good paw lifting response from the vehicle group that was significantly reversed with mexiletine throughout the course of the experiment. At 1 and 5 mg/kg, [Ala5]GpTx-1(1-34) (SEQ ID NO:22) did not significantly reduce the lifting behavior at any point during the course of the experiment. Terminal exposures (peptide plasma concentration at 1.5 h post peptide injection) were 0.72 ± 0.13 and 0.09 ± 0.05 μM for the 5 and 1 mg/kg doses, respectively.

[00111] Figure 81A shows the reaction of alkyne-containing peptide [Phe6; Pra13]GpTx-1(1-34) (SEQ ID NO:1049) with a 2 kDa PEG bis-azide via a copper catalyzed 1,3-dipolar cycloaddition reaction to obtain the site-specific homodimeric peptide with two triazole linkages by converting the propargylglycine or Pra residues in the sequences to 3-(1,2,3-triazol-4-yl)alanine or Atz residues.

[00112] Figure 81B shows the two step sequence of first reacting an alkyne-containing peptide [Ala5,Phe6,Pra13,Leu26,Arg28]GpTx-1(1-34) (SEQ ID NO:640) with an azido-PEG11-bromoacetamide linker via a copper catalyzed 1,3-dipolar cycloaddition reaction to obtain the site-specifically PEGylated peptide-linker construct (SEQ ID NO:1062) with a triazole linkage by converting the propargylglycine or Pra residue in the peptide sequence to a 3-(1,2,3-triazol-4-yl)alanine or Atz residue. Second, the engineered free cysteines in the anti-DNP mAb (E273C) hIgG1 (comprising immunoglobulin monomers SEQ ID NO:3087; SEQ ID NO:3088; SEQ ID NO:3087; SEQ ID NO:3088) react with the bromoacetamide functionality in peptide-linker to form a site-specific immunoglobulin-peptide conjugate with a stable thioacetamide linkage (Immunoglobulin-peptide Conjugate 1). If one cysteine reacts, then the result is a monovalent immunoglobulin-peptide conjugate as represented, but if both cysteines react, then the result is a bivalent immunoglobulin-peptide conjugate.

[00113] Figure 82 shows a reducing SDS-PAGE gel of the site specific conjugation reaction mixture of peptide-linker construct (SEQ ID NO:1062) with anti-DNP mAb (E273C) hIgG1 (comprising immunoglobulin monomers SEQ ID NO:3087; SEQ ID NO:3088; SEQ ID NO:3087; SEQ ID NO:3088) prior to purification on the SP-column. Approximately 75% of mAb heavy chain (HC) shows a 5-kD shift, indicating conjugation of a single GpTX-1 peptide analog. The higher molecular weight band indicates higher order conjugate due to over reduction.

[00114] Figure 83 shows the results from the purification of the site specific conjugation reaction mixture of peptide-linker construct (SEQ ID NO:1062) with anti-DNP mAb (E273C) hIgG1 (comprising immunoglobulin monomers SEQ ID NO:3087; SEQ ID NO:3088; SEQ ID NO:3087; SEQ ID NO:3088). The left panel shows the cation exchange chromatogram of UV absorbance at 280 nm of the conjugation reaction using a 5-mL HiTrap SP-HP column. The right panel shows the non-reducing SDS-PAGE gel (left) of the peaks from the cation exchange chromatogram indicating that the internal disulfide bonds of the antibody-peptide conjugates are intact and the reducing SDS-PAGE gel (right) of the peaks from the cation exchange chromatogram. Peak 1 shows the heavy chain (HC) of the non-reacted antibody. Peak 2 shows approximately 50% of the HC shifted indicating a monovalent antibody- GpTx-1 peptide analog

conjugate. Peak 3 shows nearly 100% HC shifted indicating bivalent antibody- GpTx-1 peptide analog conjugate.

[00115] Figure 84 shows the results from the purification of the site specific conjugation reaction mixture of peptide-linker construct (SEQ ID NO:1062) with anti-DNP mAb (E273C) hIgG1 Fc domain (homodimer of SEQ ID NO:3089). The left panel shows the cation exchange chromatogram of UV absorbance at 280 nm of the conjugation reaction using a 5 mL HiTrap SP-HP column. The right panel shows the non-reducing SDS-PAGE gel (left) of the peaks from the cation exchange chromatogram indicating that the internal disulfide bonds of the antibody-peptide conjugates are intact and the reducing SDS-PAGE gel (right) of the peaks from the cation exchange chromatogram. Peak 1 shows approximately 50% of the HC shifted indicating a monovalent antibody-peptide conjugate. Peak 2 shows near 100% HC shifted indicating bivalent antibody-peptide conjugate.

[00116] Figure 85 shows the analytical size exclusion chromatogram of UV absorbance at 280 nm for the (top panel) unmodified anti-DNP mAb (E273C) hIgG1 (comprising SEQ ID NO:3087; SEQ ID NO:3088; SEQ ID NO:3087; SEQ ID NO:3088) and the (bottom panel) bivalent antibody- GpTx-1 peptide analog conjugate (Immunoglobulin-peptide Conjugate 2) run on a Tosoh Bioscience Super SW3000, 4 μM, 250A, 4.6 mm x 30 cm column in 100 mM sodium phosphate, 250 mM NaCl, pH 6.8 with isocratic elution of 0.35 mL/min for 20 min. The chromatogram indicates no aggregation in the peptide conjugate sample.

[00117] Figure 86 shows the results from the deconvoluted LC-MS TOF of the bivalent peptide conjugate of peptide-linker construct (SEQ ID NO:1062) with anti-DNP mAb (E273C) hIgG1 (comprising immunoglobulin monomers SEQ ID NO:3087; SEQ ID NO:3088; SEQ ID NO:3087; SEQ ID NO:3088), which is Immunoglobulin-peptide Conjugate 2. The presence of multiple peaks indicates different glycosylation isoforms.

[00118] Figure 87 shows the results from the deconvoluted LC-MS TOF of the bivalent peptide conjugate of peptide-linker construct (SEQ ID NO:1062) with anti-DNP mAb (E52C) hIgG1 Fc domain (homodimer of SEQ ID NO:3089), which is Fc-peptide Conjugate 2. The presence of multiple peaks indicates different glycosylation isoforms.

[00119] Figure 88 shows a schematic representation of Fc-peptide Conjugate 1 for illustrative purposes only. A homology model of the immunoglobulin anti-DNP mAb (E52C) hIgG1 Fc domain (homodimer of SEQ ID NO:3089) was constructed from an immunoglobulin crystal structure (1HZH.pdb) and is depicted as a solid ribbon. Cys52 of SEQ ID 3089, the site of conjugation, is rendered in CPK format. The PEG11 linker is depicted as a solid tube, in an arbitrary conformation in this embodiment, connecting the C52 residue in the immunoglobulin Fc domain to the Atz13 residue in the peptide. A homology model of the peptide (SEQ ID NO:1046) was constructed from the NMR structure of GpTx-1 and is displayed as a solid ribbon and shown in this embodiment in an arbitrary relative orientation to the immunoglobulin Fc domain.

[00120] Figure 89 shows a schematic representation of Fc-peptide Conjugate 2 for illustrative purposes only. A homology model of the anti-DNP mAb (E52C) hIgG1 Fc domain (homodimer of SEQ ID NO:3089) was constructed from an immunoglobulin crystal structure (1HZH.pdb) and is depicted as a solid ribbon. Cys52 residues of both Fc domain monomers (SEQ ID 3089), were the sites of conjugation, and are rendered in CPK format. The PEG11 linkers are depicted as solid tubes in this embodiment in an arbitrary conformation connecting the C52 residues in the immunoglobulin Fc domain to the Atz13 residues in the peptides. Homology models of the peptide (SEQ ID NO:1046) were constructed from the NMR structure of GpTx-1 and are displayed as a solid ribbon and shown in arbitrary relative orientations to the immunoglobulin Fc domain. Two peptides are shown to reflect the bivalent nature of Fc-peptide Conjugate 2.

[00121] Figure 90 shows a schematic representation of Immunoglobulin-peptide Conjugate 1 for illustrative purposes only. A homology model of the anti-DNP mAb (E273C) hIgG1 (comprising immunoglobulin monomers SEQ ID NO:3087; SEQ ID NO:3088; SEQ ID NO:3087; SEQ ID NO:3088) was constructed from an immunoglobulin crystal structure (1HZH.pdb) and is depicted as a solid ribbon. Cys273, the site of conjugation, is rendered in CPK format. In this embodiment, the PEG11 linker is depicted as a solid tube in an arbitrary conformation connecting the C273 residue in the immunoglobulin to the Atz13 residue in the peptide. A homology model of the peptide (SEQ ID NO:1046) was constructed from the NMR structure of

GpTx-1 and is displayed as a solid ribbon and shown in an arbitrary relative orientation to the immunoglobulin in this embodiment.

[00122] Figure 91 shows a schematic representation of Immunoglobulin-peptide Conjugate 2 for illustrative purposes only. A homology model of the anti-DNP mAb (E273C) hIgG1 (comprising immunoglobulin monomers SEQ ID NO:3087; SEQ ID NO:3088; SEQ ID NO:3087; SEQ ID NO:3088) was constructed from an immunoglobulin crystal structure (1HZH.pdb) and is depicted as a solid ribbon. Both Cys273 residues, the sites of conjugation, are rendered in CPK format. In this embodiment, the PEG11 linkers are depicted as solid tubes in an arbitrary conformation connecting the C273 residues in the immunoglobulin to the Atz13 residues in the peptides. Homology models of the peptide (SEQ ID NO:1046) were constructed from the NMR structure of GpTx-1 and are displayed as a solid ribbon and shown in arbitrary relative orientations to the immunoglobulin in this embodiment. Two peptides are shown to reflect the bivalent nature of Immunoglobulin-peptide Conjugate 2.

[00123] Figure 92 shows the mean plasma concentration – time profiles of GpTx-1 peptide analog-Fc conjugate (Fc-Peptide Conjugate 2) and control Fc (homodimer of SEQ ID NO:3089) following a 1 and 10 mg/kg s.c. dose to mice (n=3).

[00124] Figure 93 shows the mean plasma concentration – time profiles of peptide-IgG conjugate (Immunoglobulin-Peptide Conjugate 2) and control IgG (hIgG1 mAb comprising SEQ ID NO:3087; SEQ ID NO:3088; SEQ ID NO:3087; SEQ ID NO:3088) following a 1 and 10 mg/kg s.c. dose to mice (n=3).

[00125] Figure 94 shows the effects of peptide [Ala5]GpTx-1 (SEQ ID NO:22) at 500 nM on fast sodium current and voltage-gated potassium currents. Traces are voltage-clamp recordings from a neuron enzymatically isolated from rat dorsal root ganglia. Inward sodium and outward potassium currents combined were evoked simultaneously by a 20 ms step to 0 mV from a holding voltage of -90 mV. Trace at right was taken approximately 160 seconds after addition of 500 nM peptide. [Ala5]GpTx-1 (SEQ ID NO:22) at 500 nM blocked fast sodium current but not voltage-gated potassium currents.

[00126] Figure 95 shows the timecourse of the effect of [Glu29]GpTx-1(1-34) (SEQ ID NO:30) in the formalin pain model in male CD-1 mice with a 1-hour pre-treatment dose of 5 mg/kg s.c. The 5 mg/kg peptide dose and the 3 mg/kg s.c. dose of

the positive control morphine (30 minutes pretreatment) had no significant effect in the first phase (0-5 minutes post formalin injection). The 5 mg/kg s.c. dose of [Glu29]GpTx-1(1-34) (SEQ ID NO:30) did not demonstrate a significant reduction of the time spent lifting/licking in the second phase of the study (5-40 minutes post formalin injection), but the morphine positive control did significantly reduce the time spent lifting/licking in the second phase. Terminal exposure (peptide plasma concentration at 45 min post formalin injection) was 0.502 ± 0.271 μM for the 5 mg/kg peptide dose.

[00127] Figure 96 shows the effect of [Glu29]GpTx-1(1-34) (SEQ ID NO:30) in the first phase of the formalin pain model in male CD-1 mice with a 1-hour pre-treatment dose of 5 mg/kg s.c. The 5 mg/kg peptide dose and the 3 mg/kg s.c. dose of morphine had no effect in the first phase (0-5 minutes post formalin injection).

[00128] Figure 97 shows the effect of [Glu29]GpTx-1(1-34) (SEQ ID NO:30) in the second phase of the formalin pain model (5-40 minutes post formalin injection) in male CD-1 mice with a 1 hour pre-treatment dose of 5 mg/kg s.c. The 5 mg/kg s.c. dose of peptide did not demonstrate a significant reduction of the time spent lifting/licking in the second phase of the study relative to the vehicle control. The morphine positive control did significantly reduce the time spent lifting/licking in the second phase.

[00129] Figure 98 shows the effect of [Glu29]GpTx-1(1-34) (SEQ ID NO:30) on paw edema in the formalin pain model in male CD-1 mice with a 1-hour pre-treatment dose 5 mg/kg s.c. Neither the peptide nor the morphine control significantly reduced the paw edema caused by formalin injection relative to the vehicle (PBS).

[00130] Figure 99 shows a repeat of the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at a 5 mg/kg s.c. dose with a 1-hour pre-treatment time on the total basic movement component of locomotor activity in male CD-1 mice. Total basic movement was significantly reduced by the 5 mg/kg peptide dose. Terminal exposure (peptide plasma concentration at 2 h post peptide injection) was 2.1 ± 0.47 μM.

[00131] Figure 100 shows the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at a 5 mg/kg s.c. dose with a 1-hour pre-treatment time on the fine movement component of locomotor activity in male CD-1 mice. At the 5mg/kg dose, peptide significantly reduced the total fine movement relative to the vehicle.

[00132] Figure 101 shows the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at a 5 mg/kg s.c. dose with a 1-hour pre-treatment time on the total rearing component of locomotor activity in male CD-1 mice. At the 5mg/kg dose, peptide significantly reduced total rearing relative to the vehicle control.

[00133] Figure 102 shows the effect of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at a 5 mg/kg s.c. dose with a 1-hour pre-treatment time on the total time rearing component of locomotor activity in male CD-1 mice. At the 5 mg/kg dose, peptide significantly reduced the total time rearing relative to the vehicle control.

[00134] Figure 103 shows the effect of [Glu29]GpTx-1(1-34) (SEQ ID NO:30) at a 5 mg/kg s.c. dose with a 1-hour pre-treatment time on the total basic movement component of locomotor activity in male CD-1 mice. The peptide dose did not significantly decrease exploratory behavior or total basic movement relative to the vehicle control. Terminal exposure (peptide plasma concentration at 2 h post peptide injection) was 0.771 ± 0.272 μM for the 5 mg/kg s.c. peptide dose.

[00135] Figure 104 shows the effect of [Glu29]GpTx-1(1-34) (SEQ ID NO:30) at a 5 mg/kg s.c. dose with a 1-hour pre-treatment time on the fine movement component of locomotor activity in male CD-1 mice. At the 5 mg/kg dose, fine movement was not significantly affected relative to the vehicle control.

[00136] Figure 105 shows the effect of [Glu29]GpTx-1(1-34) (SEQ ID NO:30) at 5 mg/kg s.c. dose with a 1-hour pre-treatment time on the total rearing component of locomotor activity in male CD-1 mice. The peptide dose did not significantly decrease exploratory behavior or total rearing in relation to the vehicle control.

[00137] Figure 106 shows the effect of [Glu29]GpTx-1(1-34) (SEQ ID NO:30) at a 5 mg/kg s.c. dose with a 1-hour pre-treatment time on the total time rearing component of locomotor activity in male CD-1 mice. At the 5 mg/kg dose, total time rearing was not significantly affected relative to the vehicle control.

[00138] Figure 107 shows the effect of [Glu28]GpTx-1(1-34) (SEQ ID NO:153) at a 5 mg/kg s.c. dose with a 1-hour pre-treatment time on the total basic movement component of locomotor activity in male CD-1 mice. Total basic movement was significantly reduced by the 5 mg/kg peptide dose. Terminal exposure (peptide plasma concentration at 2 h post peptide injection) was 1.28 ± 0.403 μM.

[00139] Figure 108 shows the effect of [Glu28]GpTx-1(1-34) (SEQ ID NO:153) at a 5 mg/kg s.c. dose with a 1-hour pre-treatment time on the fine movement component of locomotor activity in male CD-1 mice. At the 5mg/kg dose, peptide significantly reduced the total fine movement relative to the vehicle.

[00140] Figure 109 shows the effect of [Glu28]GpTx-1(1-34) (SEQ ID NO:153) at a 5 mg/kg s.c. dose with a 1-hour pre-treatment time on the total rearing component of locomotor activity in male CD-1 mice. At the 5mg/kg dose, peptide significantly reduced total rearing relative to the vehicle control.

[00141] Figure 110 shows the effect of [Glu28]GpTx-1(1-34) (SEQ ID NO:153) at a 5 mg/kg s.c. dose with a 1-hour pre-treatment time on the total time rearing component of locomotor activity in male CD-1 mice. At the 5 mg/kg dose, peptide significantly reduced the total time rearing relative to the vehicle control.

[00142] Figure 111 shows the effects of 10 mg/kg s.c. doses of Fc-peptide Conjugate 2 and Immunoglobulin-peptide Conjugate 2 with a 1-hour pre-treatment time on the total basic movement component of locomotor activity in male CD-1 mice. The peptide conjugate doses did not significantly decrease exploratory behavior or total basic movement relative to the vehicle control. Terminal exposures (peptide conjugate plasma concentrations at 24.5 h post peptide conjugate injection) were 0.034 ± 0.009 μM and 0.051 ± 0.007 μM for the 10 mg/kg s.c. doses of Fc-peptide Conjugate 2 and Immunoglobulin-peptide Conjugate 2, respectively.

[00143] Figure 112 shows the effects of 10 mg/kg s.c. doses of Fc-peptide Conjugate 2 and Immunoglobulin-peptide Conjugate 2 with a 1-hour pre-treatment time on the fine movement component of locomotor activity in male CD-1 mice. At the 10 mg/kg doses, fine movement was not significantly affected by either peptide conjugate relative to the vehicle control.

[00144] Figure 113 shows the effects of 10 mg/kg s.c. doses of Fc-peptide Conjugate 2 and Immunoglobulin-peptide Conjugate 2 with a 1-hour pre-treatment time on the total rearing component of locomotor activity in male CD-1 mice. The peptide conjugate doses did not significantly decrease exploratory behavior or total rearing in relation to the vehicle control.

[00145] Figure 114 shows the effects of 10 mg/kg s.c. doses of Fc-peptide Conjugate 2 and Immunoglobulin-peptide Conjugate 2 with a 1-hour pre-treatment time

on the total time rearing component of locomotor activity in male CD-1 mice. At the 10 mg/kg doses, total time rearing was not significantly affected by either peptide conjugate relative to the vehicle control.

[00146] Figure 115 shows the timecourse of the effects of Fc-peptide Conjugate 2 and Immunoglobulin-peptide Conjugate 2 in the formalin pain model in male CD-1 mice with 1-hour pre-treatment doses of 10 mg/kg s.c. The 10 mg/kg peptide doses and the 3 mg/kg s.c. dose of the positive control morphine (30 minutes pretreatment) had no significant effect in the first phase (0-5 minutes post formalin injection). The 10 mg/kg s.c. doses of Fc-peptide Conjugate 2 and Immunoglobulin-peptide Conjugate 2 did not demonstrate a significant reduction of the time spent lifting/licking in the second phase of the study (5-40 minutes post formalin injection), but the morphine positive control did significantly reduce the time spent lifting/licking in the second phase. Terminal exposures (peptide conjugate plasma concentrations at 45 min post formalin injection) were 0.035 ± 0.011 μM and 0.040 ± 0.011 μM for the 10 mg/kg doses of Fc-peptide Conjugate 2 and Immunoglobulin-peptide Conjugate 2, respectively.

[00147] Figure 116 shows the effects of Fc-peptide Conjugate 2 and Immunoglobulin-peptide Conjugate 2 in the first phase of the formalin pain model in male CD-1 mice with 1-hour pre-treatment doses of 10 mg/kg s.c. The 10 mg/kg s.c. doses of Fc-peptide Conjugate 2 and Immunoglobulin-peptide Conjugate 2 and the 3 mg/kg s.c. dose of morphine had no effect in the first phase (0-5 minutes post formalin injection).

[00148] Figure 117 shows the effects of Fc-peptide Conjugate 2 and Immunoglobulin-peptide Conjugate 2 in the second phase of the formalin pain model (5-40 minutes post formalin injection) in male CD-1 mice with 1 hour pre-treatment doses of 10 mg/kg s.c. The 10 mg/kg s.c. doses of Fc-peptide Conjugate 2 and Immunoglobulin-peptide Conjugate 2 did not demonstrate a significant reduction of the time spent lifting/licking in the second phase of the study relative to the vehicle control. The morphine positive control did significantly reduce the time spent lifting/licking in the second phase.

DETAILED DESCRIPTION OF EMBODIMENTS

[00149] The section headings used herein are for organizational purposes only and are not to be construed as limiting the subject matter described.

[00150] Definitions

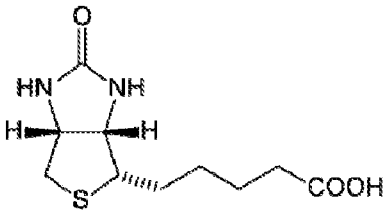
[00151] Unless otherwise defined herein, scientific and technical terms used in connection with the present application shall have the meanings that are commonly understood by those of ordinary skill in the art. Further, unless otherwise required by context, singular terms shall include pluralities and plural terms shall include the singular. Thus, as used in this specification and the appended claims, the singular forms "a", "an" and "the" include plural referents unless the context clearly indicates otherwise. For example, reference to "a protein" includes a plurality of proteins; reference to "a cell" includes populations of a plurality of cells.

[00152] "Polypeptide" and "protein" are used interchangeably herein and include a molecular chain of two or more amino acids linked covalently through peptide bonds. The terms do not refer to a specific length of the product. Thus, "peptides," and "oligopeptides," are included within the definition of polypeptide. The terms include post-translational modifications of the polypeptide, for example, glycosylations, acetylations, biotinylations, 4-pentynoylations, PEGylations, phosphorylations and the like. In addition, protein fragments, analogs, mutated or variant proteins, fusion proteins and the like are included within the meaning of polypeptide. The terms also include molecules in which one or more amino acid analogs or non-canonical or unnatural amino acids are included as can be expressed recombinantly using known protein engineering techniques. In addition, fusion proteins can be derivatized as described herein by well-known organic chemistry techniques.

[00153] A composition of the present invention that includes a peptide or polypeptide of the invention covalently linked, attached, or bound, either directly or indirectly through a linker moiety, to another peptide or polypeptide of the invention or to a half-life extending moiety is a "conjugate" or "conjugated" molecule, whether conjugated by chemical means (e.g., post-translationally or post-synthetically) or by recombinant fusion.

[00154] "Biotin" is a water-soluble B-complex vitamin, i.e., vitamin B7, that is composed of an ureido (tetrahydroimidizalone) ring fused with a tetrahydrothiophene ring (See, Formula I).

Formula I:



A valeric acid substituent is attached to one of the carbon atoms of the tetrahydrothiophene ring. In nature, biotin is a coenzyme in the metabolism of fatty acids and leucine, and it plays a role in vivo in gluconeogenesis. Biotin binds very tightly to the tetrameric protein avidin (e.g., Chicken avidin, bacterial streptavidin, and neutravidin), with a dissociation equilibrium constant K_D in the order of 10^{-14} M to 10^{-16} M, which is one of the strongest known protein-ligand interactions, approaching the covalent bond in strength. (Laitinen et al.. *Genetically engineered avidins and streptavidins*, Cell Mol Life Sci. 63 (24): 2992–30177 (2006)). The biotin-avidin non-covalent interaction is often used in different biotechnological applications. (See, Laitinen et al., *Genetically engineered avidins and streptavidins*, Cell Mol Life Sci. 63 (24): 2992–30177 (2006)).

[00155] "Biotinylated" means that a substance is covalently conjugated to one or more biotin moieties. Biotinylated peptides useful in practicing the invention can be purchased commercially (e.g., Midwest Bio-Tech Inc.) or can be readily synthesized and biotinylated. Biotinylation of compounds, such as peptides, can be by any known chemical technique. These include primary amine biotinylation, sulfhydryl biotinylation, and carboxyl biotinylation. For example, amine groups on the peptide, which are present as lysine side chain epsilon-amines and N-terminal α-amines, are common targets for primary amine biotinylation biotinylation. Amine-reactive biotinylation reagents can be divided into two groups based on water solubility.

1) N-hydroxysuccinimide (NHS)-esters of biotin have poor solubility in aqueous solutions. For reactions in aqueous solution, they must first be dissolved in an organic solvent, then diluted into the aqueous reaction mixture. The most

commonly used organic solvents for this purpose are dimethyl sulfoxide (DMSO) and dimethyl formamide (DMF), which are compatible with most proteins at low concentrations.

2) Sulfo-NHS-esters of biotin are more soluble in water, and are dissolved in water just before use because they hydrolyze easily. The water solubility of sulfo-NHS-esters stems from their sulfonate group on the N-hydroxysuccinimide ring and eliminates the need to dissolve the reagent in an organic solvent.

Chemical reactions of NHS- and sulfo-NHS-esters are essentially the same: an amide bond is formed and NHS or sulfo-NHS become leaving groups. Because the targets for the ester are deprotonated primary amines, the reaction is prevalent above pH 7. Hydrolysis of the NHS-ester is a major competing reaction, and the rate of hydrolysis increases with increasing pH. NHS- and sulfo-NHS-esters have a half-life of several hours at pH 7, but only a few minutes at pH 9. The conditions for conjugating NHS-esters to primary amines of peptides include incubation temperatures in the range 4-37°C, reaction pH values in the range 7-9, and incubation times from a few minutes to about 12 hours. Buffers containing amines (such as Tris or glycine) must be avoided because they compete with the reaction. The HABA dye (2-(4-hydroxyazobenzene) benzoic acid) method can be used to determine the extent of biotinylation. Briefly, HABA dye is bound to avidin and yields a characteristic absorbance. When biotin, in the form of biotinylated protein or other molecule, is introduced, it displaces the dye, resulting in a change in absorbance at 500 nm. The absorbance change is directly proportional to the level of biotin in the sample.

[00156] "4-pentynoylation" of an amino acid residue is typically by coupling 4-pentynoic acid via a standard amide bond reaction via the N-terminal or at a side chain. When appropriate for additional PEGylations, 4-pentynoylation can alternatively employ an alkyne in the copper-catalyzed 1,3-dipolar cycloaddition reaction (the so-called "Click" reaction) to react with the azide in the azido-PEG molecule to link the peptide and the PEG via a triazole.

[00157] An "isolated polypeptide" is a polypeptide molecule that is purified or separated from at least one contaminant polypeptide molecule with which it is ordinarily associated in the natural source of the polypeptide. An isolated polypeptide molecule is other than in the form or setting in which it is found in nature.

[00158] "Toxin peptides" include peptides and polypeptides having the same amino acid sequence of a naturally occurring pharmacologically active peptide or polypeptide that can be isolated from a venom, and also include modified peptide analogs of such naturally occurring molecules. (See, e.g., Kalman et al., ShK-Dap22, a potent Kv1.3-specific immunosuppressive polypeptide, J. Biol. Chem. 273(49):32697-707 (1998); Kem et al., US Patent No. 6,077,680; Mouhat et al., OsK1 derivatives, WO 2006/002850 A2; Chandy et al., Analogs of SHK toxin and their uses in selective inhibition of Kv1.3 potassium channels, WO 2006/042151; Sullivan et al., Toxin Peptide therapeutic agents, WO 2006/116156 A2, all of which are incorporated herein by reference in their entirety). Snakes, scorpions, spiders, bees, snails and sea anemone are a few examples of organisms that produce venom that can serve as a rich source of small bioactive toxin peptides or "toxins" that potently and selectively target ion channels and receptors. GpTx-1 (SEQ ID NO:1); GpTx-2 (SEQ ID NO:467); GpTx-3 (SEQ ID NO:468); GpTx-4 (SEQ ID NO:469); GpTx-5 (SEQ ID NO:470); GpTx-6(1-35) (SEQ ID NO:471); and GpTx-7(1-35) (SEQ ID NO:473) are examples of toxin peptides. Some other examples of toxins that inhibit voltage-gated sodium channels include Huwentoxin-IV (ECLEI FKACN PSNDQ CCKSS KLVCS RKTRW CKYQI-NH_2// SEQ ID NO:528) and Huwentoxin-I (ACKGV FDACT PGKNE CCPNR VCSDK HKWCK WKL //SEQ ID NO:529), isolated from the venom of tarantula *Ornithoctonus huwena*; KIIIA (CCNCS SKWCR DHSRC C-NH_2//SEQ ID NO:530) isolated from the venom of marine cone snail *Conus kinoshitai*; and ProTxII (YCQKW MWTCD SERKC CEGMV CRLWC KKKLW //SEQ ID NO:531) isolated from the venom of tarantula *Thrixopelma pruriens*. Another example is the alpha toxin OD1 (GVRDAYIADD KNCVYTCASN GYCNTECTKN GAESGYCQWI GRYGNACWCI KLPDEVPIRIPGKCR-NH_2//SEQ ID NO:589), a toxin isolated from the venom of the scorpion *Odonthobuthus doriae*. Another example of a toxin peptide is OSK1 (also known as OsK1), a toxin peptide isolated from *Orthochirus scrobiculosus* scorpion venom. (e.g., Mouhat et al., K+ channel types targeted by synthetic OSK1, a toxin from *Orthochirus scrobiculosus* scorpion venom, Biochem. J. 385:95-104 (2005); Mouhat et al., Pharmacological profiling of Orthochirus scrobiculosus toxin 1 analogs with a trimmed N-terminal domain, Molec. Pharmacol. 69:354- 62 (2006); Mouhat et al., OsK1 derivatives, WO 2006/002850 A2). Another example is ShK, isolated from the

venom of the sea anemone *Stichodactyla helianthus*, and its peptide analogs. (E.g., Tudor et al., Ionisation behaviour and solution properties of the potassium-channel blocker ShK toxin, Eur. J. Biochem. 251(1-2):133-41(1998); Pennington et al., Role of disulfide bonds in the structure and potassium channel blocking activity of ShK toxin, Biochem. 38(44): 14549-58 (1999); Kem et al., ShK toxin compositions and methods of use, US Patent No. 6,077,680; Lebrun et al., Neuropeptides originating in scorpion, US Patent No. 6,689,749; Beeton et al., Targeting effector memory T cells with a selective peptide inhibitor of Kv1.3 channnels for therapy of autoimmune diseases, Molec. Pharmacol. 67(4):1369-81 (2005); and Sullivan et al., Selective and potent peptide inhibitors of $K_V1.3$, WO 2010/108154 A2).

[00159] The toxin peptides are usually between about 20 and about 80 amino acids in length, contain 2-5 disulfide linkages and form a very compact structure. Toxin peptides (e.g., from the venom of scorpions, sea anemones and cone snails) have been isolated and characterized for their impact on ion channels. Such peptides appear to have evolved from a relatively small number of structural frameworks that are particularly well suited to addressing the critical issues of potency and stability. The majority of scorpion and *Conus* toxin peptides, for example, contain 10-40 amino acids and up to five disulfide bonds, forming extremely compact and constrained structure (microproteins) often resistant to proteolysis. The conotoxin and scorpion toxin peptides can be divided into a number of superfamilies based on their disulfide connections and peptide folds. The solution structure of many toxin peptides has been determined by NMR spectroscopy, illustrating their compact structure and verifying conservation of family folding patterns. (E.g., Tudor et al., Ionisation behaviour and solution properties of the potassium-channel blocker ShK toxin, Eur. J. Biochem. 251(1-2):133-41(1998); Pennington et al., Role of disulfide bonds in the structure and potassium channel blocking activity of ShK toxin, Biochem. 38(44): 14549-58 (1999); Jaravine et al., Three-dimensional structure of toxin OSK1 from *Orthochirus scrobiculosus* scorpion venom, Biochem. 36(6):1223-32 (1997); del Rio-Portillo et al.; NMR solution structure of Cn12, a novel peptide from the Mexican scorpion *Centruroides noxius* with a typical beta-toxin sequence but with alpha-like physiological activity, Eur. J. Biochem. 271(12): 2504-16 (2004); Prochnicka-Chalufour et al., Solution structure of discrepin, a new K+-channel blocking peptide

from the alpha-KTx15 subfamily, Biochem. 45(6):1795-1804 (2006)). Other examples are known in the art, or can be found in Sullivan et al., Toxin Peptide Therapeutic Agents, WO06116156 A2 or U.S. Patent No. 7,833,979; Sullivan et al., Selective and potent peptide inhibitors of $K_V1.3$, WO 2010/108154 A2; Mouhat et al., OsK1 derivatives, WO 2006/002850 A2; Sullivan et al., U.S. Patent Application No. 11/978,076 (titled: , filed 25 October 2007), Lebrun et al., U.S. Patent No. 6,689,749, which are each incorporated by reference in their entireties.

[00160] The term "peptide analog" refers to a peptide having a sequence that differs from a peptide sequence existing in nature by at least one amino acid residue substitution, internal addition, or internal deletion of at least one amino acid, and/or amino- or carboxy- terminal end truncations or additions, and/or carboxy-terminal amidation. An "internal deletion" refers to absence of an amino acid from a sequence existing in nature at a position other than the N- or C-terminus. Likewise, an "internal addition" refers to presence of an amino acid in a sequence existing in nature at a position other than the N- or C-terminus.

[00161] Embodiments of the inventive composition of matter includes a toxin peptide analog, or a pharmaceutically acceptable salt thereof. "Toxin peptide analogs" contain modifications of a native toxin peptide sequence of interest (e.g., amino acid residue substitutions, internal additions or insertions, internal deletions, and/or amino- or carboxy- terminal end truncations, or additions as previously described above) relative to a native toxin peptide sequence of interest, such as GpTx-1 (DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-NH_2 //SEQ ID NO:1). Toxin peptide analogs of the present invention are 20 to about 80 amino acid residues long and, in relation to SEQ ID NO:1, have C^1-C^4, C^2-C^5 and C^3-C^6 disulfide (or diselenide) bonding in which, C^1, C^2, C^3, C^4, C^5 and C^6 represent the order of cysteine (or selenocysteine) residues appearing in the primary sequence of the toxin peptide stated conventionally with the N-terminus of the peptide(s) on the left, with the first and sixth cysteines (or selenocysteines) in the amino acid sequence forming a disulfide bond (or diselenide bond, if SeCys), the second and fourth cysteines (or selenocysteines) forming a disulfide bond (or diselenide bond, if SeCys), and the third and fifth cysteines (or selenocysteines) forming a disulfide bond (or diselenide bond, if SeCys). As described herein, the toxin peptide analogs of the present invention can also have

additional amino acid residues at the N-terminal and/or C-terminal ends, in relation to SEQ ID NO:1.

[00162] By "physiologically acceptable salt" of the composition of matter, for example a salt of the toxin peptide analog, is meant any salt or salts that are known or later discovered to be pharmaceutically acceptable. Some non-limiting examples of pharmaceutically acceptable salts are: acetate; trifluoroacetate; hydrohalides, such as hydrochloride and hydrobromide; sulfate; citrate; maleate; tartrate; glycolate; gluconate; succinate; mesylate; besylate; salts of gallic acid esters (gallic acid is also known as 3,4, 5 trihydroxybenzoic acid) such as PentaGalloylGlucose (PGG) and epigallocatechin gallate (EGCG), salts of cholesteryl sulfate, pamoate, tannate and oxalate salts.

[00163] The term "fusion protein" indicates that the protein includes polypeptide components derived from more than one parental protein or polypeptide. Typically, a fusion protein is expressed from a fusion gene in which a nucleotide sequence encoding a polypeptide sequence from one protein is appended in frame with, and optionally separated by a linker from, a nucleotide sequence encoding a polypeptide sequence from a different protein. The fusion gene can then be expressed by a recombinant host cell as a single protein.

[00164] The terms "-mimetic peptide," "peptide mimetic," and "-agonist peptide" refer to a peptide or protein having biological activity comparable to a naturally occurring protein of interest, for example, but not limited to, a toxin peptide molecule. These terms further include peptides that indirectly mimic the activity of a naturally occurring peptide molecule, such as by potentiating the effects of the naturally occurring molecule.

[00165] The term "-antagonist peptide," "peptide antagonist," and "inhibitor peptide" refer to a peptide that blocks or in some way interferes with the biological activity of a receptor of interest, or has biological activity comparable to a known antagonist or inhibitor of a receptor of interest, such as, but not limited to, an ion channel (e.g., Kv1.3) or a G-Protein Coupled Receptor (GPCR).

[00166] A "domain" of a protein is any portion of the entire protein, up to and including the complete protein, but typically comprising less than the complete protein. A domain can, but need not, fold independently of the rest of the protein chain and/or be

correlated with a particular biological, biochemical, or structural function or location (e.g., a ligand binding domain, or a cytosolic, transmembrane or extracellular domain).

[00167] As used herein "soluble" when in reference to a protein produced by recombinant DNA technology in a host cell is a protein that exists in aqueous solution; if the protein contains a twin-arginine signal amino acid sequence the soluble protein is exported to the periplasmic space in gram negative bacterial hosts, or is secreted into the culture medium by eukaryotic host cells capable of secretion, or by bacterial host possessing the appropriate genes (e.g., the kil gene). Thus, a soluble protein is a protein which is not found in an inclusion body inside the host cell. Alternatively, depending on the context, a soluble protein is a protein which is not found integrated in cellular membranes. In contrast, an insoluble protein is one which exists in denatured form inside cytoplasmic granules (called an inclusion body) in the host cell, or again depending on the context, an insoluble protein is one which is present in cell membranes, including but not limited to, cytoplasmic membranes, mitochondrial membranes, chloroplast membranes, endoplasmic reticulum membranes, etc.

[00168] A distinction is also drawn between proteins which are “soluble” (i.e., dissolved or capable of being dissolved) in an aqueous solution devoid of significant amounts of ionic detergents (e.g., SDS) or denaturants (e.g., urea, guanidine hydrochloride) and proteins which exist as a suspension of insoluble protein molecules dispersed within the solution. A “soluble” protein will not be removed from a solution containing the protein by centrifugation using conditions sufficient to remove cells present in a liquid medium (e.g., centrifugation at 5,000×g for 4-5 minutes). In some embodiments of the inventive composition, the toxin peptide analog is synthesized by the host cell and segregated in an insoluble form within cellular inclusion bodies, which can then be purified from other cellular components in a cell extract with relative ease, and the toxin peptide analog can in turn be solubilized, refolded and/or further purified.

[00169] A distinction is drawn between a “soluble” protein (i.e., a protein which when expressed in a host cell is produced in a soluble form) and a "solubilized" protein. An insoluble recombinant protein found inside an inclusion body or found integrated in a cell membrane may be solubilized (i.e., rendered into a soluble form) by treating purified inclusion bodies or cell membranes with denaturants such as guanidine hydrochloride, urea or sodium dodecyl sulfate (SDS). These denaturants must then be

removed from the solubilized protein preparation to allow the recovered protein to renature (refold). Although the inventive compositions can be refolded in active form, not all proteins will refold into an active conformation after solubilization in a denaturant and removal of the denaturant. Many proteins precipitate upon removal of the denaturant. SDS may be used to solubilize inclusion bodies and cell membranes and will maintain the proteins in solution at low concentration. However, dialysis will not always remove all of the SDS (SDS can form micelles which do not dialyze out); therefore, SDS-solubilized inclusion body protein and SDS-solubilized cell membrane protein is soluble but not refolded.

[00170] A "secreted" protein refers to those proteins capable of being directed to the ER, secretory vesicles, or the extracellular space as a result of a secretory signal peptide sequence, as well as those proteins released into the extracellular space without necessarily containing a signal sequence. If the secreted protein is released into the extracellular space, the secreted protein can undergo extracellular processing to produce a "mature" protein. Release into the extracellular space can occur by many mechanisms, including exocytosis and proteolytic cleavage. In some other embodiments of the inventive composition, the toxin peptide analog can be synthesized by the host cell as a secreted protein, which can then be further purified from the extracellular space and/or medium.

[00171] The term "recombinant" indicates that the material (e.g., a nucleic acid or a polypeptide) has been artificially or synthetically (i.e., non-naturally) altered by human intervention. The alteration can be performed on the material within, or removed from, its natural environment or state. For example, a "recombinant nucleic acid" is one that is made by recombining nucleic acids, e.g., during cloning, DNA shuffling or other well known molecular biological procedures. Examples of such molecular biological procedures are found in Maniatis et al., Molecular Cloning. A Laboratory Manual. Cold Spring Harbor Laboratory, Cold Spring Harbor, N.Y. (1982). A "recombinant DNA molecule," is comprised of segments of DNA joined together by means of such molecular biological techniques. The term "recombinant protein" or "recombinant polypeptide" as used herein refers to a protein molecule which is expressed using a recombinant DNA molecule. A "recombinant host cell" is a cell that contains and/or expresses a recombinant nucleic acid.

[00172] The term "polynucleotide" or "nucleic acid" includes both single-stranded and double-stranded nucleotide polymers containing two or more nucleotide residues. The nucleotide residues comprising the polynucleotide can be ribonucleotides or deoxyribonucleotides or a modified form of either type of nucleotide. Said modifications include base modifications such as bromouridine and inosine derivatives, ribose modifications such as 2',3'-dideoxyribose, and internucleotide linkage modifications such as phosphorothioate, phosphorodithioate, phosphoroselenoate, phosphorodiselenoate, phosphoroanilothioate, phosphoraniladate and phosphoroamidate.

[00173] The term "oligonucleotide" means a polynucleotide comprising 200 or fewer nucleotide residues. In some embodiments, oligonucleotides are 10 to 60 bases in length. In other embodiments, oligonucleotides are 12, 13, 14, 15, 16, 17, 18, 19, or 20 to 40 nucleotides in length. Oligonucleotides may be single stranded or double stranded, e.g., for use in the construction of a mutant gene. Oligonucleotides may be sense or antisense oligonucleotides. An oligonucleotide can include a label, including an isotopic label (e.g., ^{125}I, ^{14}C, ^{13}C, ^{35}S, ^{3}H, ^{2}H, ^{13}N, ^{15}N, ^{18}O, ^{17}O, etc.), for ease of quantification or detection, a fluorescent label, a hapten or an antigenic label, for detection assays. Oligonucleotides may be used, for example, as PCR primers, cloning primers or hybridization probes.

[00174] A "polynucleotide sequence" or "nucleotide sequence" or "nucleic acid sequence," as used interchangeably herein, is the primary sequence of nucleotide residues in a polynucleotide, including of an oligonucleotide, a DNA, and RNA, a nucleic acid, or a character string representing the primary sequence of nucleotide residues, depending on context. From any specified polynucleotide sequence, either the given nucleic acid or the complementary polynucleotide sequence can be determined. Included are DNA or RNA of genomic or synthetic origin which may be single- or double-stranded, and represent the sense or antisense strand. Unless specified otherwise, the left-hand end of any single-stranded polynucleotide sequence discussed herein is the 5' end; the left-hand direction of double-stranded polynucleotide sequences is referred to as the 5' direction. The direction of 5' to 3' addition of nascent RNA transcripts is referred to as the transcription direction; sequence regions on the DNA strand having the same sequence as the RNA transcript that are 5' to the 5' end of the

RNA transcript are referred to as "upstream sequences;" sequence regions on the DNA strand having the same sequence as the RNA transcript that are 3' to the 3' end of the RNA transcript are referred to as "downstream sequences."

[00175] As used herein, an "isolated nucleic acid molecule" or "isolated nucleic acid sequence" is a nucleic acid molecule that is either (1) identified and separated from at least one contaminant nucleic acid molecule with which it is ordinarily associated in the natural source of the nucleic acid or (2) cloned, amplified, tagged, or otherwise distinguished from background nucleic acids such that the sequence of the nucleic acid of interest can be determined. An isolated nucleic acid molecule is other than in the form or setting in which it is found in nature. However, an isolated nucleic acid molecule includes a nucleic acid molecule contained in cells that ordinarily express a polypeptide (e.g., an oligopeptide or antibody) where, for example, the nucleic acid molecule is in a chromosomal location different from that of natural cells.

[00176] As used herein, the terms "nucleic acid molecule encoding," "DNA sequence encoding," and "DNA encoding" refer to the order or sequence of deoxyribonucleotides along a strand of deoxyribonucleic acid. The order of these deoxyribonucleotides determines the order of ribonucleotides along the mRNA chain, and also determines the order of amino acids along the polypeptide (protein) chain. The DNA sequence thus codes for the RNA sequence and for the amino acid sequence.

[00177] The term "gene" is used broadly to refer to any nucleic acid associated with a biological function. Genes typically include coding sequences and/or the regulatory sequences required for expression of such coding sequences. The term "gene" applies to a specific genomic or recombinant sequence, as well as to a cDNA or mRNA encoded by that sequence. A "fusion gene" contains a coding region that encodes a polypeptide with portions from different proteins that are not naturally found together, or not found naturally together in the same sequence as present in the encoded fusion protein (i.e., a chimeric protein). Genes also include non-expressed nucleic acid segments that, for example, form recognition sequences for other proteins. Non-expressed regulatory sequences including transcriptional control elements to which regulatory proteins, such as transcription factors, bind, resulting in transcription of adjacent or nearby sequences.

[00178] "Expression of a gene" or "expression of a nucleic acid" means transcription of DNA into RNA (optionally including modification of the RNA, e.g., splicing), translation of RNA into a polypeptide (possibly including subsequent post-translational modification of the polypeptide), or both transcription and translation, as indicated by the context.

[00179] As used herein the term "coding region" or "coding sequence" when used in reference to a structural gene refers to the nucleotide sequences which encode the amino acids found in the nascent polypeptide as a result of translation of an mRNA molecule. The coding region is bounded, in eukaryotes, on the 5' side by the nucleotide triplet "ATG" which encodes the initiator methionine and on the 3' side by one of the three triplets which specify stop codons (i.e., TAA, TAG, TGA).

[00180] The term "control sequence" or "control signal" refers to a polynucleotide sequence that can, in a particular host cell, affect the expression and processing of coding sequences to which it is ligated. The nature of such control sequences may depend upon the host organism. In particular embodiments, control sequences for prokaryotes may include a promoter, a ribosomal binding site, and a transcription termination sequence. Control sequences for eukaryotes may include promoters comprising one or a plurality of recognition sites for transcription factors, transcription enhancer sequences or elements, polyadenylation sites, and transcription termination sequences. Control sequences can include leader sequences and/or fusion partner sequences. Promoters and enhancers consist of short arrays of DNA that interact specifically with cellular proteins involved in transcription (Maniatis, et al., Science 236:1237 (1987)). Promoter and enhancer elements have been isolated from a variety of eukaryotic sources including genes in yeast, insect and mammalian cells and viruses (analogous control elements, i.e., promoters, are also found in prokaryotes). The selection of a particular promoter and enhancer depends on what cell type is to be used to express the protein of interest. Some eukaryotic promoters and enhancers have a broad host range while others are functional in a limited subset of cell types (for review see Voss, et al., Trends Biochem. Sci., 11:287 (1986) and Maniatis, et al., Science 236:1237 (1987)).

[00181] The term "vector" means any molecule or entity (e.g., nucleic acid, plasmid, bacteriophage or virus) used to transfer protein coding information into a host cell.

[00182] The term "expression vector" or "expression construct" as used herein refers to a recombinant DNA molecule containing a desired coding sequence and appropriate nucleic acid control sequences necessary for the expression of the operably linked coding sequence in a particular host cell. An expression vector can include, but is not limited to, sequences that affect or control transcription, translation, and, if introns are present, affect RNA splicing of a coding region operably linked thereto. Nucleic acid sequences necessary for expression in prokaryotes include a promoter, optionally an operator sequence, a ribosome binding site and possibly other sequences. Eukaryotic cells are known to utilize promoters, enhancers, and termination and polyadenylation signals. A secretory signal peptide sequence can also, optionally, be encoded by the expression vector, operably linked to the coding sequence of interest, so that the expressed polypeptide can be secreted by the recombinant host cell, for more facile isolation of the polypeptide of interest from the cell, if desired. Such techniques are well known in the art. (E.g., Goodey, Andrew R.; et al., Peptide and DNA sequences, U.S. Patent No. 5,302,697; Weiner et al., Compositions and methods for protein secretion, U.S. Patent No. 6,022,952 and U.S. Patent No. 6,335,178; Uemura et al., Protein expression vector and utilization thereof, U.S. Patent No. 7,029,909; Ruben et al., 27 human secreted proteins, US 2003/0104400 A1).

[00183] The terms "in operable combination", "in operable order" and "operably linked" as used herein refer to the linkage of nucleic acid sequences in such a manner that a nucleic acid molecule capable of directing the transcription of a given gene and/or the synthesis of a desired protein molecule is produced. The term also refers to the linkage of amino acid sequences in such a manner so that a functional protein is produced. For example, a control sequence in a vector that is "operably linked" to a protein coding sequence is ligated thereto so that expression of the protein coding sequence is achieved under conditions compatible with the transcriptional activity of the control sequences.

[00184] The term "host cell" means a cell that has been transformed, or is capable of being transformed, with a nucleic acid and thereby expresses a gene of

interest. The term includes the progeny of the parent cell, whether or not the progeny is identical in morphology or in genetic make-up to the original parent cell, so long as the gene of interest is present. Any of a large number of available and well-known host cells may be used in the practice of this invention. The selection of a particular host is dependent upon a number of factors recognized by the art. These include, for example, compatibility with the chosen expression vector, toxicity of the peptides encoded by the DNA molecule, rate of transformation, ease of recovery of the peptides, expression characteristics, bio-safety and costs. A balance of these factors must be struck with the understanding that not all hosts may be equally effective for the expression of a particular DNA sequence. Within these general guidelines, useful microbial host cells in culture include bacteria (such as *Escherichia coli* sp.), yeast (such as *Saccharomyces* sp.) and other fungal cells, insect cells, plant cells, mammalian (including human) cells, e.g., CHO cells and HEK-293 cells. Modifications can be made at the DNA level, as well. The peptide-encoding DNA sequence may be changed to codons more compatible with the chosen host cell. For *E. coli*, optimized codons are known in the art. Codons can be substituted to eliminate restriction sites or to include silent restriction sites, which may aid in processing of the DNA in the selected host cell. Next, the transformed host is cultured and purified. Host cells may be cultured under conventional fermentation conditions so that the desired compounds are expressed. Such fermentation conditions are well known in the art.

[00185] The term "transfection" means the uptake of foreign or exogenous DNA by a cell, and a cell has been "transfected" when the exogenous DNA has been introduced inside the cell membrane. A number of transfection techniques are well known in the art and are disclosed herein. See, e.g., Graham et al., 1973, Virology 52:456; Sambrook et al., 2001, Molecular Cloning: A Laboratory Manual, supra; Davis et al., 1986, Basic Methods in Molecular Biology, Elsevier; Chu et al., 1981, Gene 13:197. Such techniques can be used to introduce one or more exogenous DNA moieties into suitable host cells.

[00186] The term "transformation" refers to a change in a cell's genetic characteristics, and a cell has been transformed when it has been modified to contain new DNA or RNA. For example, a cell is transformed where it is genetically modified from its native state by introducing new genetic material via transfection, transduction,

or other techniques. Following transfection or transduction, the transforming DNA may recombine with that of the cell by physically integrating into a chromosome of the cell, or may be maintained transiently as an episomal element without being replicated, or may replicate independently as a plasmid. A cell is considered to have been "stably transformed" when the transforming DNA is replicated with the division of the cell.

[00187] The term "transgene" refers to an isolated nucleotide sequence, originating in a different species from the host, that may be inserted into one or more cells of a mammal or mammalian embryo. The transgene optionally may be operably linked to other genetic elements (such as a promoter, poly A sequence and the like) that may serve to modulate, either directly, or indirectly in conjunction with the cellular machinery, the transcription and/or expression of the transgene. Alternatively or additionally, the transgene may be linked to nucleotide sequences that aid in integration of the transgene into the chromosomal DNA of the mammalian cell or embryo nucleus (as for example, in homologous recombination). The transgene may be comprised of a nucleotide sequence that is either homologous or heterologous to a particular nucleotide sequence in the mammal's endogenous genetic material, or is a hybrid sequence (i.e. one or more portions of the transgene are homologous, and one or more portions are heterologous to the mammal's genetic material). The transgene nucleotide sequence may encode a polypeptide or a variant of a polypeptide, found endogenously in the mammal, it may encode a polypeptide not naturally occurring in the mammal (i.e. an exogenous polypeptide), or it may encode a hybrid of endogenous and exogenous polypeptides. Where the transgene is operably linked to a promoter, the promoter may be homologous or heterologous to the mammal and/or to the transgene. Alternatively, the promoter may be a hybrid of endogenous and exogenous promoter elements (enhancers, silencers, suppressors, and the like).

[00188] Peptides. Recombinant DNA- and/or RNA-mediated protein expression and protein engineering techniques, or any other methods of preparing peptides, are applicable to the making of the inventive polypeptides, e.g., toxin peptide analogs and fusion protein conjugates thereof (e.g., fusion proteins containing a toxin peptide analog and an immunoglobulin Fc domain, transthyretin, or human serum albumin). For example, the peptides can be made in transformed host cells. Briefly, a recombinant DNA molecule, or construct, coding for the peptide is prepared. Methods of preparing

such DNA molecules are well known in the art. For instance, sequences encoding the peptides can be excised from DNA using suitable restriction enzymes. Any of a large number of available and well-known host cells may be used in the practice of this invention. The selection of a particular host is dependent upon a number of factors recognized by the art. These include, for example, compatibility with the chosen expression vector, toxicity of the peptides encoded by the DNA molecule, rate of transformation, ease of recovery of the peptides, expression characteristics, bio-safety and costs. A balance of these factors must be struck with the understanding that not all hosts may be equally effective for the expression of a particular DNA sequence. Within these general guidelines, useful microbial host cells in culture include bacteria (such as *Escherichia coli* sp.), yeast (such as *Saccharomyces* sp.) and other fungal cells, insect cells, plant cells, mammalian (including human) cells, e.g., CHO cells and HEK293 cells. Modifications can be made at the DNA level, as well. The peptide-encoding DNA sequence may be changed to codons more compatible with the chosen host cell. For E. coli, optimized codons are known in the art. Codons can be substituted to eliminate restriction sites or to include silent restriction sites, which may aid in processing of the DNA in the selected host cell. Next, the transformed host is cultured and purified. Host cells may be cultured under conventional fermentation conditions so that the desired compounds are expressed. Such fermentation conditions are well known in the art. In addition, the DNA optionally further encodes, 5' to the coding region of a fusion protein, a signal peptide sequence (e.g., a secretory signal peptide) operably linked to the expressed toxin peptide analog. For further examples of appropriate recombinant methods and exemplary DNA constructs useful for recombinant expression of the inventive compositions by mammalian cells, including dimeric Fc fusion proteins ("peptibodies") or chimeric immunoglobulin(light chain + heavy chain)-Fc heterotrimers ("hemibodies"), conjugated to pharmacologically active toxin peptide analogs of the invention, see, e.g., Sullivan et al., Toxin Peptide Therapeutic Agents, US2007/0071764 and Sullivan et al., Toxin Peptide Therapeutic Agents, PCT/US2007/022831, published as WO 2008/088422, which are both incorporated herein by reference in their entireties.

[00189] Peptide compositions of the present invention can also be made by synthetic methods. Solid phase synthesis is the preferred technique of making

individual peptides since it is the most cost-effective method of making small peptides. For example, well known solid phase synthesis techniques include the use of protecting groups, linkers, and solid phase supports, as well as specific protection and deprotection reaction conditions, linker cleavage conditions, use of scavengers, and other aspects of solid phase peptide synthesis. Suitable techniques are well known in the art. (E.g., Merrifield (1973), Chem. Polypeptides, pp. 335-61 (Katsoyannis and Panayotis eds.); Merrifield (1963), J. Am. Chem. Soc. 85: 2149; Davis et al. (1985), Biochem. Intl. 10: 394-414; Stewart and Young (1969), Solid Phase Peptide Synthesis; U.S. Pat. No. 3,941,763; Finn et al. (1976), The Proteins (3rd ed.) 2: 105-253; and Erickson et al. (1976), The Proteins (3rd ed.) 2: 257-527; "Protecting Groups in Organic Synthesis," 3rd Edition, T. W. Greene and P. G. M. Wuts, Eds., John Wiley & Sons, Inc., 1999; NovaBiochem Catalog, 2000; "Synthetic Peptides, A User's Guide," G. A. Grant, Ed., W.H. Freeman & Company, New York, N.Y., 1992; "Advanced Chemtech Handbook of Combinatorial & Solid Phase Organic Chemistry," W. D. Bennet, J. W. Christensen, L. K. Hamaker, M. L. Peterson, M. R. Rhodes, and H. H. Saneii, Eds., Advanced Chemtech, 1998; "Principles of Peptide Synthesis, 2nd ed.," M. Bodanszky, Ed., Springer-Verlag, 1993; "The Practice of Peptide Synthesis, 2nd ed.," M. Bodanszky and A. Bodanszky, Eds., Springer-Verlag, 1994; "Protecting Groups," P. J. Kocienski, Ed., Georg Thieme Verlag, Stuttgart, Germany, 1994; "Fmoc Solid Phase Peptide Synthesis, A Practical Approach," W. C. Chan and P. D. White, Eds., Oxford Press, 2000, G. B. Fields et al., Synthetic Peptides: A User's Guide, 1990, 77-183). For further examples of synthetic and purification methods known in the art, which are applicable to making the inventive compositions of matter, see, e.g., Sullivan et al., Toxin Peptide Therapeutic Agents, US2007/0071764 and Sullivan et al., Toxin Peptide Therapeutic Agents, PCT/US2007/022831, published as WO 2008/088422 A2, which are both incorporated herein by reference in their entireties.

[00190] In further describing the toxin peptide analogs herein, a one-letter abbreviation system is frequently applied to designate the identities of the twenty "canonical" amino acid residues generally incorporated into naturally occurring peptides and proteins (Table 2). Such one-letter abbreviations are entirely interchangeable in meaning with three-letter abbreviations, or non-abbreviated amino acid names. Within the one-letter abbreviation system used herein, an upper case letter

indicates a L-amino acid, and a lower case letter indicates a D-amino acid. For example, the abbreviation "R" designates L-arginine and the abbreviation "r" designates D-arginine.

Table 2. One-letter abbreviations for the canonical amino acids. Three-letter abbreviations are in parentheses.

Alanine (Ala)	A
Glutamine (Gln)	Q
Leucine (Leu)	L
Serine (Ser)	S
Arginine (Arg)	R
Glutamic Acid (Glu)	E
Lysine (Lys)	K
Threonine (Thr)	T
Asparagine (Asn)	N
Glycine (Gly)	G
Methionine (Met)	M
Tryptophan (Trp)	W
Aspartic Acid (Asp)	D
Histidine (His)	H
Phenylalanine (Phe)	F
Tyrosine (Tyr)	Y
Cysteine (Cys)	C
Isoleucine (Ile)	I
Proline (Pro)	P
Valine (Val)	V

[00191] An amino acid substitution in an amino acid sequence is typically designated herein with a one-letter abbreviation for the amino acid residue in a particular position, followed by the numerical amino acid position relative to a native sequence of interest, which is then followed by the one-letter symbol for the amino acid residue substituted in. For example, "T30D" symbolizes a substitution of a threonine

residue by an aspartate residue at amino acid position 30, relative to the native sequence of interest.

[00192] Non-canonical amino acid residues can be incorporated into a peptide within the scope of the invention by employing known techniques of protein engineering that use recombinantly expressing cells. (See, e.g., Link et al., Non-canonical amino acids in protein engineering, Current Opinion in Biotechnology, 14(6):603-609 (2003)). The term "non-canonical amino acid residue" refers to amino acid residues in D- or L-form that are not among the 20 canonical amino acids generally incorporated into naturally occurring proteins, for example, β-amino acids, homoamino acids, cyclic amino acids and amino acids with derivatized side chains. Examples include (in the L-form or D-form) β-alanine, β-aminopropionic acid, piperidinic acid, aminocaprioic acid, aminoheptanoic acid, aminopimelic acid, desmosine, diaminopimelic acid, N^{α}-ethylglycine, N^{α}-ethylaspargine, hydroxylysine, allo-hydroxylysine, isodesmosine, allo-isoleucine, ω-methylarginine, N^{α}-methylglycine, N^{α}-methylisoleucine, N^{α}-methylvaline, , γ-carboxyglutamate, ε-N,N,N-trimethyllysine, ε-N-acetyllysine, O-phosphoserine, N^{α}-acetylserine, N^{α}-formylmethionine, 3-methylhistidine, 5-hydroxylysine, and other similar amino acids, and those listed in Table 3 below, and derivatized forms of any of these as described herein. Table 3 contains some exemplary non-canonical amino acid residues that are useful in accordance with the present invention and associated abbreviations as typically used herein, although the skilled practitioner will understand that different abbreviations and nomenclatures may be applicable to the same substance and appear interchangeably herein. Some amino acid sequences, as recited herein may include "{H}-" at the N-terminal, which represents an N-terminal amino group, and/or may include "-{Free Acid}" at the C-terminal, which represents a C-terminal carboxy group.

Table 3. Useful non-canonical amino acids for amino acid addition, insertion, or substitution into peptide sequences in accordance with the present invention. In the event an abbreviation listed in Table 3 differs from another abbreviation for the same substance disclosed elsewhere herein, both abbreviations are understood to be applicable. The amino acids listed in Table 3 can be in the L-form or D-form, unless otherwise noted.

Amino Acid	**Abbreviation(s)**
Acetamidomethyl	Acm
Acetylarginine	acetylarg
α-aminoadipic acid	Aad
aminobutyric acid	Abu
2-aminobutyric acid	2-Abu
6-aminohexanoic acid	Ahx; εAhx
3-amino-6-hydroxy-2-piperidone	Ahp
2-aminoindane-2-carboxylic acid	Aic
α-amino-isobutyric acid	Aib
3-amino-2-naphthoic acid	Anc
2-aminotetraline-2-carboxylic acid	Atc
Aminophenylalanine	Aminophe; Amino-Phe
4-amino-phenylalanine (also known as para-aminophenylalanine)	4AmP; 4-AminoF; 4-Amino-Phe
4-amidino-phenylalanine	4AmPhe
2-amino-2-(1-carbamimidoylpiperidin-4-yl)acetic acid	4AmPig
ω-N-methylarginine	R(Me)
Arg ψ(CH_2NH) -reduced amide bond	rArg
3-(1,2,3-triazol-4-yl)Alanine	Atz
(S)-2-amino-3-(1-(1-bromo-2-oxo-6,9,12-trioxa-3-azatetradecan-14-yl)-1H-1,2,3-triazol-4-yl)propanoic acid	Atz(PEG3-bromoacetamide)
3-(1-(O-(aminoethyl)-O'-(ethylene)-decaethyleneglycol)-1,2,3-triazol-4-	Atz(amino-PEG10)

yl)Alanine	
3-(1-(O-(aminoethyl)-O'-(ethylene)-ethyleneglycol450avg)-1,2,3-triazol-4-yl)Alanine	Atz(20kDa PEG)
(S)-2-amino-3-(1-(2-oxo-6,9,12,15,18,21,24,27,30,33,36-undecaoxa-3-azaoctatriacontan-38-yl)-1H-1,2,3-triazol-4-yl)propanoic acid	Atz(PEG11-(acetamidomethyl)
(S)-2-amino-3-(1-(1-hydroxy-5-oxo-9,12,15,18,21,24,27,30,33,36,39-undecaoxa-3-thia-6-azahentetracontan-41-yl)-1H-1,2,3-triazol-4-yl)propanoic acid	Atz(PEG11-((2-hydroxyethyl)thio)acetamide)
(S)-2-amino-3-(1-(1-bromo-2-oxo-6,9,12,15,18,21,24,27,30,33,36-undecaoxa-3-azaoctatriacontan-38-yl)-1H-1,2,3-triazol-4-yl)propanoic acid	Atz(PEG11-bromoacetamide)
(S)-2-amino-6-(3-(1-(1-bromo-2-oxo-6,9,12,15,18,21,24,27,30,33,36-undecaoxa-3-azaoctatriacontan-38-yl)-1H-1,2,3-triazol-4-yl)propanamido)hexanoic acid	K(ethyl-triazole-PEG11-bromoacetamide)
β-alanine	bA
β-homoarginine	bhArg
β-homolysine	bhomoK
β-homo Tic	BhTic
β-homophenylalanine	BhPhe
β-homoproline	BhPro
β-homotryptophan	BhTrp
4,4'-biphenylalanine; 4-phenyl-phenylalanine ; or biphenylalanine	Bip; 4Bip

β, β-diphenyl-alanine	BiPhA
β-phenylalanine	BPhe
p-carboxyl-phenylalanine	Cpa
Citrulline	Cit
Cyclohexylalanine	Cha
Cyclohexylglycine	Chg
Cyclopentylglycine	Cpg
4-tert-butyl-L-phenylalanine	4tBu-F
4-benzoyl-L-phenylalanine	4-Bz-F
2-chloro-L-phenylalanine	2-Cl-F
4-trifluoromethyl-L-phenylalanine	4CF3-F
4-fluoro-L-phenylalanine	4-F-F
4-methyl-L-phenylalanine	4-Me-F
2-amino-3-guanidinopropanoic acid	3G-Dpr
α, γ-diaminobutyric acid	Dab
2,4-diaminobutyric acid	Dbu
diaminopropionic acid	Dap
3,4-dichloro-L-phenylalanine	DiCl-F
3,4-dimethoxy-L-phenylalanine	DiMeO-F
α, β-diaminopropionoic acid (or 2,3-diaminopropionic acid	Dpr
3,3-diphenylalanine	Dip
4-guanidino phenylalanine	Guf
4-guanidino proline	4GuaPr
Homoarginine	hArg; hR
Homocitrulline	hCit
Homoglutamine	hQ
Homoleucine	hLeu; hL
Homolysine	hLys; hK; homoLys
Homophenylalanine	hPhe; homoPhe
4-hydroxyproline (or hydroxyproline)	Hyp
2-indanylglycine (or indanylglycine)	IgI
indoline-2-carboxylic acid	Idc
Iodotyrosine	I-Tyr

Lys ψ(CH_2NH)-reduced amide bond	rLys
(S)-6-((S)-2-acetamidopent-4-ynamido)-2-aminohexanoic acid	K(Ac-Pra)
N-ε-biotinyl-L-lysine	K(Biotin)
(S)-2,2',2''-(10-(2-((5-amino-5-carboxypentyl)amino)-2-oxoethyl)-1,4,7,10-tetraazacyclododecane-1,4,7-triyl)triacetic acid	K(DOTA)
(S)-2-amino-6-(pent-4-ynamido)hexanoic acid	K(4-Pen)
methionine oxide	Met[O]
methionine sulfone	$Met[O]_2$
N^{α}-methylarginine	NMeR
Nα-[$(CH_2)_3NHCH(NH)NH_2$] substituted glycine	N-Arg
N^{α}-methylcitrulline	NMeCit
N^{α}-methylglutamine	NMeQ
N^{α}-methylhomocitrulline	N^{α}-MeHoCit
N^{α}-methylhomolysine	NMeHoK
N^{α}-methylleucine	N^{α}-MeL; NMeL; NMeLeu; NMe-Leu
N^{α}-methyllysine	NMe-Lys
*N*ε-methyl-lysine	N-eMe-K
*N*ε-ethyl-lysine	N-eEt-K
*N*ε-isopropyl-lysine	N-eIPr-K
N^{α}-methylnorleucine	NMeNle; NMe-Nle
N^{α}-methylornithine	N^{α}-MeOrn; NMeOrn
N^{α}-methylphenylalanine	NMe-Phe
1'N-methyltryptophan	1'NMeW
4-methyl-phenylalanine	MePhe
α-methylphenyalanine	AMeF
N^{α}-methylthreonine	NMe-Thr; NMeThr

N^{α}-methylvaline	NMeVal; NMe-Val
Nε-(O-(aminoethyl)-O'-(2-propanoyl)-undecaethyleneglycol)-Lysine	K(NPeg11)
Nε-(O-(aminoethyl)-O'-(2-propanoyl)-(ethyleneglycol)27-Lysine	K(NPeg27)
3-(1-naphthyl)alanine	1-Nal; 1Nal
3-(2-naphthyl)alanine	2-Nal; 2Nal
nipecotic acid	Nip
Nitrophenylalanine	nitrophe
norleucine	Nle
norvaline	Nva or Nvl
O-methyltyrosine	Ome-Tyr
(S)-octylglycine	OctylG
octahydroindole-2-carboxylic acid	Oic
Ornithine	Orn
Orn ψ(CH2NH)-reduced amide bond	rOrn
pyroglutamic acid	pGlu; PE; pE
L-phosphoserine	pS
4-piperidinylalanine	4PipA
4-pyridinylalanine	4Pal
3-pyridinylalanine	3Pal
2-pyridinylalanine	2Pal
para-iodophenylalanine (or 4-iodophenylalanine)	pI-Phe
Phenylglycine	Phg
Propargylglycine	Pra
pipecolic acid	Pip
4-amino-1-piperidine-4-carboxylic acid	4Pip
Sarcosine	Sar
1,2,3,4-tetrahydroisoquinoline	Tic
1,2,3,4-tetrahydroisoquinoline-1-carboxylic acid	Tiq
1,2,3,4-tetrahydroisoquinoline-7-	Hydroxyl-Tic

hydroxy-3-carboxylic acid	
1,2,3,4-tetrahydronorharman-3-carboxylic acid	Tpi
thiazolidine-4-carboxylic acid	Thz
3-thienylalanine	Thi
(S)-tert-butylglycine	Tle
symmetrical N'-ω-dimethyl arginine	SDMA
N-ε-dimethyl lysine	K(Me2)
4-carboxyphenylalanine	4CO2-F

[00193] Nomenclature and Symbolism for Amino Acids and Peptides by the UPAC-IUB Joint Commission on Biochemical Nomenclature (JCBN) have been published in the following documents: Biochem. J., 1984, 219, 345-373; Eur. J. Biochem., 1984, 138, 9-37; 1985, 152, 1; 1993, 213, 2; Internat. J. Pept. Prot. Res., 1984, 24, following p 84; J. Biol. Chem., 1985, 260, 14-42; Pure Appl. Chem., 1984, 56, 595-624; Amino Acids and Peptides, 1985, 16, 387-410; Biochemical Nomenclature and Related Documents, 2nd edition, Portland Press, 1992, pages 39-69.

[00194] The one or more useful modifications to peptide domains of the inventive compositions can include amino acid additions or insertions, amino acid deletions, peptide truncations, amino acid substitutions, and/or chemical derivatization of amino acid residues, accomplished by known chemical techniques. For example, the thusly modified amino acid sequence includes at least one amino acid residue inserted or substituted therein, relative to the amino acid sequence of the native sequence of interest, in which the inserted or substituted amino acid residue has a side chain comprising a nucleophilic or electrophilic reactive functional group by which the peptide is covalently conjugated to a linker and/or half-life extending moiety. In accordance with the invention, useful examples of such a nucleophilic or electrophilic reactive functional group include, but are not limited to, a thiol, a primary amine, a seleno, a hydrazide, an aldehyde, a carboxylic acid, a ketone, an aminooxy, a masked (protected) aldehyde, or a masked (protected) keto functional group. Examples of amino acid residues having a side chain comprising a nucleophilic reactive functional group include, but are not limited to, a lysine residue, a homolysine, an α,β-

diaminopropionic acid residue, an α,γ-diaminobutyric acid residue, an ornithine residue, a cysteine, a homocysteine, a glutamic acid residue, an aspartic acid residue, or a selenocysteine ("SeCys") residue.

[00195] Amino acid residues are commonly categorized according to different chemical and/or physical characteristics. The term "acidic amino acid residue" refers to amino acid residues in D- or L-form having side chains comprising acidic groups. Exemplary acidic residues include aspartic acid and glutamic acid residues. The term "alkyl amino acid residue" refers to amino acid residues in D- or L-form having C_{1-6}alkyl side chains which may be linear, branched, or cyclized, including to the amino acid amine as in proline, wherein the C_{1-6}alkyl is substituted by 0, 1, 2 or 3 substituents selected from C_{1-4}haloalkyl, halo, cyano, nitro, $-C(=O)R^b$, $-C(=O)OR^a$, $-C(=O)NR^aR^a$, $-C(=NR^a)NR^aR^a$, $-NR^aC(=NR^a)NR^aR^a$, $-OR^a$, $-OC(=O)R^b$, $-OC(=O)NR^aR^a$, $-OC_{2-6}$alkylNR^aR^a, $-OC_{2-6}$alkylOR^a, $-SR^a$, $-S(=O)R^b$, $-S(=O)_2R^b$, $-S(=O)_2NR^aR^a$, $-NR^aR^a$, $-N(R^a)C(=O)R^b$, $-N(R^a)C(=O)OR^b$, $-N(R^a)C(=O)NR^aR^a$, $-N(R^a)C(=NR^a)NR^aR^a$, $-N(R^a)S(=O)_2R^b$, $-N(R^a)S(=O)_2NR^aR^a$, $-NR^aC_{2-6}$alkylNR^aR^a and $-NR^aC_{2-6}$alkylOR^a; wherein R^a is independently, at each instance, H or R^b; and R^b is independently, at each instance C_{1-6}alkyl substituted by 0, 1, 2 or 3 substituents selected from halo, C_{1-4}alk, C_{1-3}haloalk, $-OC_{1-4}$alk, $-NH_2$, $-NHC_{1-4}$alk, and $-N(C_{1-4}alk)C_{1-4}$alk; or any protonated form thereof, including alanine, valine, leucine, isoleucine, proline, serine, threonine, lysine, arginine, histidine, aspartate, glutamate, asparagine, glutamine, cysteine, methionine, hydroxyproline, cyclohexylalanine, norleucine, norvaline, 2-aminobutyric acid, but which residues do not contain an aryl or aromatic group. The term "aromatic amino acid residue" refers to amino acid residues in D- or L-form having side chains comprising aromatic groups. Exemplary aromatic residues include tryptophan, tyrosine, 3-(1-naphthyl)alanine, histidine, or phenylalanine residues. The term "basic amino acid residue" refers to amino acid residues in D- or L-form having side chains comprising basic groups. Exemplary basic amino acid residues include histidine, lysine, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, and homoarginine (hR) residues. The term "hydrophilic amino acid residue" refers to amino acid residues in D- or L-form having side chains comprising polar groups. Exemplary hydrophilic residues include cysteine, serine, threonine, histidine, lysine, asparagine, aspartate, glutamate,

glutamine, and citrulline (Cit) residues. The terms "lipophilic amino acid residue" refers to amino acid residues in D- or L-form having sidechains comprising uncharged, aliphatic or aromatic groups. Exemplary lipophilic sidechains include phenylalanine, isoleucine, leucine, methionine, valine, tryptophan, and tyrosine. Alanine (A) is amphiphilic—it is capable of acting as a hydrophilic, or lipophilic (i.e., hydrophobic), residue. Alanine, therefore, is included within the definition of both "lipophilic" (i.e., "hydrophobic") residue and "hydrophilic" residue. The term "nonfunctional" or "neutral" amino acid residue refers to amino acid residues in D- or L-form having side chains that lack acidic, basic, or aromatic groups. Exemplary neutral amino acid residues include methionine, glycine, alanine, valine, isoleucine, leucine, and norleucine (Nle) residues.

[00196] Additional useful embodiments of toxin peptide analogs can result from conservative modifications of the amino acid sequences of the toxin polypeptides disclosed herein. Conservative modifications will produce half-life extending moiety-conjugated peptides having functional, physical, and chemical characteristics similar to those of the conjugated (e.g., PEG-conjugated) peptide from which such modifications are made. Such conservatively modified forms of the conjugated toxin peptide analogs disclosed herein are also contemplated as being an embodiment of the present invention.

[00197] In contrast, substantial modifications in the functional and/or chemical characteristics of peptides may be accomplished by selecting substitutions in the amino acid sequence that differ significantly in their effect on maintaining (a) the structure of the molecular backbone in the region of the substitution, for example, as an α-helical conformation, (b) the charge or hydrophobicity of the molecule at the target site, or (c) the size of the molecule.

[00198] For example, a "conservative amino acid substitution" may involve a substitution of a native amino acid residue with a nonnative residue such that there is little or no effect on the polarity or charge of the amino acid residue at that position. Furthermore, any native residue in the polypeptide may also be substituted with alanine, as has been previously described for "alanine scanning mutagenesis" (see, for example, MacLennan et al., Acta Physiol. Scand. Suppl., 643:55-67 (1998); Sasaki et al., 1998, Adv. Biophys. 35:1-24 (1998), which discuss alanine scanning mutagenesis).

[00199] In some useful embodiments of the compositions of the invention, the amino acid sequence of the toxin peptide is modified in one or more ways relative to a native toxin peptide sequence of interest, such as, but not limited to, a native GpTx-1 sequence (SEQ ID NO:1), a peptide analog of GpTx-1, or any other toxin peptides having amino acid sequences as set for in Table 5A, Table 5B, and Table 31, or elsewhere herein. The one or more useful modifications can include amino acid additions or insertions, amino acid deletions, peptide truncations, amino acid substitutions, and/or chemical derivatization of amino acid residues, accomplished by known chemical techniques. Such modifications can be, for example, for the purpose of enhanced potency, selectivity, and/or proteolytic stability, or the like. Those skilled in the art are aware of techniques for designing peptide analogs with such enhanced properties, such as alanine scanning, rational design based on alignment mediated mutagenesis using known toxin peptide sequences and/or molecular modeling.

[00200] The term "protease" is synonymous with "peptidase". Proteases comprise two groups of enzymes: the endopeptidases which cleave peptide bonds at points within the protein, and the exopeptidases, which remove one or more amino acids from either N- or C-terminus respectively. The term "proteinase" is also used as a synonym for endopeptidase. The four mechanistic classes of proteinases are: serine proteinases, cysteine proteinases, aspartic proteinases, and metallo-proteinases. In addition to these four mechanistic classes, there is a section of the enzyme nomenclature which is allocated for proteases of unidentified catalytic mechanism. This indicates that the catalytic mechanism has not been identified.

[00201] Cleavage subsite nomenclature is commonly adopted from a scheme created by Schechter and Berger (Schechter I. & Berger A., On the size of the active site in proteases. I. Papain, Biochemical and Biophysical Research Communication, 27:157 (1967); Schechter I. & Berger A., On the active site of proteases. 3. Mapping the active site of papain; specific inhibitor peptides of papain, Biochemical and Biophysical Research Communication, 32:898 (1968)). According to this model, amino acid residues in a substrate undergoing cleavage are designated P1, P2, P3, P4 etc. in the N-terminal direction from the cleaved bond. Likewise, the residues in the C-terminal direction are designated P1', P2', P3', P4', etc.

[00202] The skilled artisan is aware of a variety of tools for identifying protease binding or protease cleavage sites of interest. For example, the PeptideCutter software tool is available through the ExPASy (Expert Protein Analysis System) proteomics server of the Swiss Institute of Bioinformatics (SIB; www.expasy.org/tools/peptidecutter). PeptideCutter searches a protein sequence from the SWISS-PROT and/or TrEMBL databases or a user-entered protein sequence for protease cleavage sites. Single proteases and chemicals, a selection or the whole list of proteases and chemicals can be used. Different forms of output of the results are available: tables of cleavage sites either grouped alphabetically according to enzyme names or sequentially according to the amino acid number. A third option for output is a map of cleavage sites. The sequence and the cleavage sites mapped onto it are grouped in blocks, the size of which can be chosen by the user. Other tools are also known for determining protease cleavage sites. (E.g., Turk, B. et al., Determination of protease cleavage site motifs using mixture-based oriented peptide libraries, Nature Biotechnology, 19:661-667 (2001); Barrett A. et al., Handbook of proteolytic enzymes, Academic Press (1998)).

[00203] The serine proteinases include the chymotrypsin family, which includes mammalian protease enzymes such as chymotrypsin, trypsin or elastase or kallikrein. The serine proteinases exhibit different substrate specificities, which are related to amino acid substitutions in the various enzyme subsites interacting with the substrate residues. Some enzymes have an extended interaction site with the substrate whereas others have a specificity restricted to the P1 substrate residue.

[00204] Trypsin preferentially cleaves at R or K in position P1. A statistical study carried out by Keil (1992) described the negative influences of residues surrounding the Arg- and Lys- bonds (i.e. the positions P2 and P1', respectively) during trypsin cleavage. (Keil, B., Specificity of proteolysis, Springer-Verlag Berlin-Heidelberg-NewYork, 335 (1992)). A proline residue in position P1' normally exerts a strong negative influence on trypsin cleavage. Similarly, the positioning of R and K in P1' results in an inhibition, as well as negatively charged residues in positions P2 and P1'.

[00205] Chymotrypsin preferentially cleaves at a W, Y or F in position P1 (high specificity) and to a lesser extent at L, M or H residue in position P1. (Keil, 1992).

Exceptions to these rules are the following: When W is found in position P1, the cleavage is blocked when M or P are found in position P1' at the same time. Furthermore, a proline residue in position P1' nearly fully blocks the cleavage independent of the amino acids found in position P1. When an M residue is found in position P1, the cleavage is blocked by the presence of a Y residue in position P1'. Finally, when H is located in position P1, the presence of a D, M or W residue also blocks the cleavage.

[00206] Membrane metallo-endopeptidase (NEP; neutral endopeptidase, kidney-brush-border neutral proteinase, enkephalinase, EC 3.4.24.11) cleaves peptides at the amino side of hydrophobic amino acid residues. (Connelly, JC et al., Neutral Endopeptidase 24.11 in Human Neutrophils: Cleavage of Chemotactic Peptide, PNAS, 82(24):8737-8741 (1985)).

[00207] Thrombin preferentially cleaves at an R residue in position P1. (Keil, 1992). The natural substrate of thrombin is fibrinogen. Optimum cleavage sites are when an R residue is in position P1 and Gly is in position P2 and position P1'. Likewise, when hydrophobic amino acid residues are found in position P4 and position P3, a proline residue in position P2, an R residue in position P1, and non-acidic amino acid residues in position P1' and position P2'. A very important residue for its natural substrate fibrinogen is a D residue in P10.

[00208] Caspases are a family of cysteine proteases bearing an active site with a conserved amino acid sequence and which cleave peptides specifically following D residues. (Earnshaw WC et al., Mammalian caspases: Structure, activation, substrates, and functions during apoptosis, Annual Review of Biochemistry, 68:383-424 (1999)).

[00209] The Arg-C proteinase preferentially cleaves at an R residue in position P1. The cleavage behavior seems to be only moderately affected by residues in position P1'. (Keil, 1992). The Asp-N endopeptidase cleaves specifically bonds with a D residue in position P1'. (Keil, 1992).

[00210] The foregoing is merely exemplary and by no means an exhaustive treatment of knowledge available to the skilled artisan concerning protease binding and/or cleavage sites that the skilled artisan may be interested in eliminating in practicing the invention.

[00211] Desired amino acid substitutions (whether conservative or non-conservative) can be determined by those skilled in the art at the time such substitutions are desired. For example, amino acid substitutions can be used to identify important residues of the peptide sequence, or to increase or decrease the affinity of the peptide or vehicle-conjugated peptide molecules described herein.

[00212] Naturally occurring residues may be divided into classes based on common side chain properties:

1) hydrophobic: norleucine (Nor or Nle), Met, Ala, Val, Leu, Ile;
2) neutral hydrophilic: Cys, Ser, Thr, Asn, Gln;
3) acidic: Asp, Glu;
4) basic: His, Lys, Arg;
5) residues that influence chain orientation: Gly, Pro; and
6) aromatic: Trp, Tyr, Phe.

[00213] Conservative amino acid substitutions may involve exchange of a member of one of these classes with another member of the same class. Conservative amino acid substitutions may encompass non-naturally occurring amino acid residues, which are typically incorporated by chemical peptide synthesis rather than by synthesis in biological systems. These include peptidomimetics and other reversed or inverted forms of amino acid moieties.

[00214] Non-conservative substitutions may involve the exchange of a member of one of these classes for a member from another class. Such substituted residues may be introduced into regions of the toxin peptide analog.

[00215] In making such changes, according to certain embodiments, the hydropathic index of amino acids may be considered. Each amino acid has been assigned a hydropathic index on the basis of its hydrophobicity and charge characteristics. They are: isoleucine (+4.5); valine (+4.2); leucine (+3.8); phenylalanine (+2.8); cysteine/cystine (+2.5); methionine (+1.9); alanine (+1.8); glycine (-0.4); threonine (-0.7); serine (-0.8); tryptophan (-0.9); tyrosine (-1.3); proline (-1.6); histidine (-3.2); glutamate (-3.5); glutamine (-3.5); aspartate (-3.5); asparagine (-3.5); lysine (-3.9); and arginine (-4.5).

[00216] The importance of the hydropathic amino acid index in conferring interactive biological function on a protein is understood in the art (see, *for example*,

Kyte *et al.*, 1982, *J. Mol. Biol.* 157:105-131). It is known that certain amino acids may be substituted for other amino acids having a similar hydropathic index or score and still retain a similar biological activity. In making changes based upon the hydropathic index, in certain embodiments, the substitution of amino acids whose hydropathic indices are within ±2 is included. In certain embodiments, those that are within ±1 are included, and in certain embodiments, those within ±0.5 are included.

[00217] It is also understood in the art that the substitution of like amino acids can be made effectively on the basis of hydrophilicity, particularly where the biologically functional protein or peptide thereby created is intended for use in immunological embodiments, as disclosed herein. In certain embodiments, the greatest local average hydrophilicity of a protein, as governed by the hydrophilicity of its adjacent amino acids, correlates with its immunogenicity and antigenicity, *i.e.*, with a biological property of the protein.

[00218] The following hydrophilicity values have been assigned to these amino acid residues: arginine (+3.0); lysine (+3.0); aspartate (+3.0 ± 1); glutamate (+3.0 ± 1); serine (+0.3); asparagine (+0.2); glutamine (+0.2); glycine (0); threonine (-0.4); proline (-0.5 ± 1); alanine (-0.5); histidine (-0.5); cysteine (-1.0); methionine (-1.3); valine (-1.5); leucine (-1.8); isoleucine (-1.8); tyrosine (-2.3); phenylalanine (-2.5) and tryptophan (-3.4). In making changes based upon similar hydrophilicity values, in certain embodiments, the substitution of amino acids whose hydrophilicity values are within ±2 is included, in certain embodiments, those that are within ±1 are included, and in certain embodiments, those within ±0.5 are included. One may also identify epitopes from primary amino acid sequences on the basis of hydrophilicity. These regions are also referred to as "epitopic core regions."

[00219] Examples of conservative substitutions include the substitution of one non-polar (hydrophobic) amino acid residue such as isoleucine, valine, leucine norleucine, alanine, or methionine for another, the substitution of one polar (hydrophilic) amino acid residue for another such as between arginine and lysine, between glutamine and asparagine, between glycine and serine, the substitution of one basic amino acid residue such as lysine, arginine or histidine for another, or the substitution of one acidic residue, such as aspartic acid or glutamic acid for another. The phrase “conservative amino acid substitution” also includes the use of a chemically

derivatized residue in place of a non-derivatized residue, provided that such polypeptide displays the requisite bioactivity. Other exemplary amino acid substitutions that can be useful in accordance with the present invention are set forth in Table 4 below.

Table 4. Some Useful Amino Acid Substitutions.

Original Residues	Exemplary Substitutions
Ala	Val, Leu, Ile, Gly
Arg	Lys, Gln, Asn, His
Asn	Gln
Asp	Glu
Cys	Ser, Ala
Gln	Asn
Glu	Asp
Gly	Pro, Ala
His	Asn, Gln, Lys, Arg
Ile	Leu, Val, Met, Ala, Phe, Norleucine
Leu	Norleucine, Ile, Val, Met, Ala, Phe
Lys	Arg, 1,4-Diamino-butyric Acid, Gln, Asn, His
Met	Leu, Phe, Ile
Phe	Leu, Val, Ile, Ala, Tyr
Pro	Ala
Ser	Thr, Ala, Cys
Thr	Ser
Trp	Tyr, Phe
Tyr	Trp, Phe, Thr, Ser

Val	Ile, Met, Leu, Phe, Ala, Norleucine

[00220] By way of illustration, in embodiments of the present invention directed to a composition of matter comprising an isolated polypeptide comprising the amino acid sequence of the formula:

$X_{aa}^{1}X_{aa}^{2}\ X_{aa}^{3}X_{aa}^{4}X_{aa}^{5}X_{aa}^{6}X_{aa}^{7}X_{aa}^{8}X_{aa}^{9}X_{aa}^{10}X_{aa}^{11}X_{aa}^{12}X_{aa}^{13}X_{aa}^{14}Asp^{15}\ X_{aa}^{16}\ X_{aa}^{17}$

$X_{aa}^{18}X_{aa}^{19}\ X_{aa}^{20}\ X_{aa}^{21}X_{aa}^{22}X_{aa}^{23}\ X_{aa}^{24}X_{aa}^{25}\ X_{aa}^{26}X_{aa}^{27}X_{aa}^{28}X_{aa}^{29}X_{aa}^{30}X_{aa}^{31}Lys^{32}$

$X_{aa}^{33}X_{aa}^{34}X_{aa}^{35}\ X_{aa}^{36}X_{aa}^{37}X_{aa}^{38}$ // SEQ ID NO:475

or a pharmaceutically acceptable salt thereof,

wherein:

[00221] $X_{aa}^{1}X_{aa}^{2}$ is absent; or X_{aa}^{1} is any amino acid residue and X_{aa}^{2} is any amino acid residue; or X_{aa}^{1} is absent and X_{aa}^{2} is any amino acid residue;

X_{aa}^{3} is Cys, if X_{aa}^{18} is Cys; or X_{aa}^{3} is SeCys, if X_{aa}^{18} is SeCys; or X_{aa}^{3} is an alkyl amino acid residue, if X_{aa}^{18} is an alkyl amino acid residue (for example, $X_{aa}^{3}$and X_{aa}^{18} can be, independently, Ala or 2-Abu residues);

X_{aa}^{4} is an acidic, hydrophobic, basic, or neutral hydrophilic amino acid residue (e.g., X_{aa}^{4} can be selected from Ala, Glu, Asp, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, Phe, Pro, Ile, Leu, Met, Val, Trp, Tyr, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, cyclohexylglycine (Chg), cyclohexylalanine (Cha), glycine, norleucine, norvaline, 1-Nal, 2-Nal, 4-phenyl-phenylalanine (Bip), Gln, Asn, Ser, Thr, and Cit residues);

X_{aa}^{5} is a Gly, Ala, hydrophobic, or basic amino acid residue (e.g., X_{aa}^{5} can be selected from Ala, Phe, Ile, Leu, Met, Val, Trp, Tyr, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, glycine, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues);

X_{aa}^{6} is a Gly, Ala, 2-Abu, norleucine (Nle), norvaline (Nva), or hydrophobic amino acid residue (e.g., X_{aa}^{6} can be selected from Ala, Phe, Ile, Leu, Met, Val, Trp, Tyr, proline,

thiaproline, methionine, glycine, 1-Nal, 2-Nal, 1'NMe-Trp, cyclopentylglycine (Cpg), phenylglycine, N-methylleucine, N-methylphenylalanine, N-methylvaline, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 2-chloro-phenylalanine, 4-chloro-phenylalanine, 3,4-dichlorophenylalanine, 4-trifluoromethyl-phenylalanine, and 4-phenyl-phenylalanine (Bip) residues);

X_{aa}^{7} is a Gly, Ala, aromatic, or hydrophobic amino acid residue (e.g., X_{aa}^{7} can be selected from Gly, Ala, Phe, Ile, Leu, Met, Val, Trp, Tyr, Pro, 2-pyridinylalanine, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 2-chloro-phenylalanine, 4-chloro-phenylalanine, 3,4-dichlorophenylalanine, 4-trifluoromethyl-phenylalanine, and 4-phenyl-phenylalanine (Bip) residues);

X_{aa}^{8} is a basic, acidic, or neutral hydrophilic amino acid residue, or an Ala residue (e.g., X_{aa}^{8} can be selected from Ala, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, Ser, Thr, Asn, Gln, Cit, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, Asp, and Glu residues);

X_{aa}^{9} is a basic or neutral hydrophilic amino acid residue (e.g., X_{aa}^{9} can be selected from Ala, Pro, Met, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, Gln, Asn, Ser, Thr, and Cit residues);

X_{aa}^{10} is Cys if X_{aa}^{24} is Cys; or X_{aa}^{10} is SeCys if X_{aa}^{24} is SeCys;

X_{aa}^{11} is any amino acid residue (e.g., X_{aa}^{11} can be selected from Ala, Asp, Glu, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, Pra, Atz, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues);

X_{aa}^{12} is a Pro, acidic, neutral, or hydrophobic amino acid residue (e.g., X_{aa}^{12} can be selected from alanine, valine, leucine, isoleucine, proline, serine, threonine, aspartic acid, glutamatic acid, glycine, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, Cha,

and 4-phenyl-phenylalanine (Bip), cyclohexylglycine (Chg), cyclohexylalanine (Cha), asparagine, glutamine, methionine, hydroxyproline, phenylalanine, tryptophan, and tyrosine);

X_{aa}^{13} is any amino acid residue (e.g., X_{aa}^{13} can be selected from Ala, Asp, Glu, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, Pra, Atz, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues);

X_{aa}^{14} is any amino acid residue (e.g., X_{aa}^{14} can be selected from Ala, Asp, Glu, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, Pra, Atz, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues);

X_{aa}^{16} is a basic, neutral hydrophilic, or acidic amino acid residue, or an Ala residue (e.g., X_{aa}^{16} can be selected from Ala, Pro, Met, Arg, Lys, His, Pra, Atz, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, Gln, Asn, Ser, Thr, Cit, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, Asp, and Glu residues);

X_{aa}^{17} is a Cys if X_{aa}^{31} is Cys; or X_{aa}^{17} is a SeCys if X_{aa}^{31} is SeCys;

X_{aa}^{18} is a Cys, SeCys, or an alkyl amino acid residue;

X_{aa}^{19} is any amino acid residue (e.g., X_{aa}^{19} can be selected from Ala, Asp, Glu, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues);

X_{aa}^{20} is a Pro, Gly, basic, or neutral hydrophilic residue (e.g., X_{aa}^{20} can be selected from Ala, Pro, Met, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine,

homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, Gln, Asn, Ser, Thr, and Cit residues);

X_{aa}^{21} is a basic, hydrophobic, or neutral hydrophilic amino acid residue (e.g., X_{aa}^{21} can be selected from Ala, Phe, Pro, Ile, Leu, Met, Val, Trp, Tyr, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, cyclohexylglycine (Chg), cyclohexylalanine (Cha), glycine, norleucine, norvaline, 1-Nal, 2-Nal, 4-phenyl-phenylalanine (Bip), Gln, Asn, Ser, Thr, and Cit residues);

X_{aa}^{22} is a hydrophobic or basic amino acid residue (e.g., X_{aa}^{22} can be selected from Ala, Phe, Ile, Leu, Met, Val, Trp, Tyr, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, glycine, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues);

X_{aa}^{23} is a hydrophobic, basic, or neutral hydrophilic amino acid residue (e.g., X_{aa}^{23} can be selected from Ala, Phe, Pro, Ile, Leu, Met, Val, Trp, Tyr, Arg, Lys, His, Pra, Atz, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, cyclohexylglycine (Chg), cyclohexylalanine (Cha), glycine, norleucine, norvaline, 1-Nal, 2-Nal, 4-phenyl-phenylalanine (Bip), Gln, Asn, Ser, Thr, and Cit residues);

X_{aa}^{24} is a Cys or SeCys residue;

X_{aa}^{25} is a Ser, Ala, or a neutral hydrophilic amino acid residue (e.g., X_{aa}^{25} is selected from Ala, Gly, Pro, Met, glycine, Gln, Asn, Ser, Thr, and Cit residues);

X_{aa}^{26} is an Ala, acidic, basic, or neutral hydrophilic amino acid residue (e.g., X_{aa}^{26} can be selected from Ala, Pro, Met, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, glycine, Asp, Glu, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, Gln, Asn, Ser, Thr, and Cit residues);

X_{aa}^{27} is an acidic, basic, neutral hydrophilic, or hydrophobic residue (e.g., X_{aa}^{27} can be selected from Thr, Leu, Ile, Val, Ser, Met, Gln, Asn, Phe, Tyr, Trp, Arg, Lys, His,

homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, Asp, Glu, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, cyclohexylglycine (Chg), cyclohexylalanine (Cha), norleucine, norvaline, 1-Nal, 2-Nal, 4-phenyl-phenylalanine (Bip), Glu, Asp, and Gly residues);

X_{aa}^{28} is an aromatic or basic amino acid residue (e.g., X_{aa}^{28} can be selected fromPhe, Trp, Tyr, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, 1-Nal, 2-Nal, 2-pyridyl-alanine, 3-pyridyl-alanine, 4-pyridyl-alanine, 4-piperidinyl-alanine, and 4-phenyl-phenylalanine (Bip) residues);

X_{aa}^{29} is an acidic, basic, or neutral hydrophilic amino acid residue (e.g., X_{aa}^{29} can be selected from Ala, Asp, Glu, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, Phe, Gly, His, Lys, Asn, Pro, Gln, Arg, Ser, Thr, Tyr, Pra, Atz, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, and Dab residues). In some useful embodiment X_{aa}^{29} is an acidic or neutral hydrophilic residue (e.g., an Ala, Asp, Glu, Gly, Asn, Gln, Ser, Thr, phosphoserine, phosphotyrosine, or gamma-carboxyglutamic acid residue [e.g., SEQ ID NOS: 1071-2798]);

X_{aa}^{30} is a Trp, 5-bromoTrp, 6-bromoTrp, 5-chloroTrp, 6-chloroTrp, 1-Nal, 2-Nal, or thioTrp residue;

X_{aa}^{31} is a Cys or SeCys;

X_{aa}^{33} is a hydrophobic or aromatic amino acid residue (e.g., X_{aa}^{33} can be selected from Phe, Ile, Leu, Met, Val, Trp, Tyr, norleucine, norvaline, 1-Nal, 2-Nal, 2-pyridyl-alanine, 3-pyridyl-alanine, 4-pyridyl-alanine, 4-piperidinyl-alanine, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 2-chloro-phenylalanine, 4-chloro-phenylalanine, 3,4-dichlorophenylalanine, 4-trifluoromethyl-phenylalanine, and 4-phenyl-phenylalanine (Bip) residues);

X_{aa}^{34} is any amino acid residue (e.g., X_{aa}^{34} can be selected from Ala, Asp, Glu, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, Pra, Atz, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine,

Dab, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 2-chloro-phenylalanine, 4-chloro-phenylalanine, 3,4-dichlorophenylalanine, 4-trifluoromethyl-phenylalanine, 2-pyridyl-alanine, 3-pyridyl-alanine, 4-carboxy-phenylalanine, and 4-phenyl-phenylalanine (Bip) residues);

X_{aa}^{35} is a hydrophobic amino acid residue (e.g., X_{aa}^{35} can be selected from Phe, Ile, Leu, Met, Val, Trp, Tyr, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 2-chloro-phenylalanine, 4-chloro-phenylalanine, 3,4-dichlorophenylalanine, 4-trifluoromethyl-phenylalanine, and 4-phenyl-phenylalanine (Bip) residues);

each of X_{aa}^{36}, X_{aa}^{37}, and X_{aa}^{38} is independently absent or is independently a neutral, basic, or hydrophobic amino acid residue (e.g., each of X_{aa}^{36}, X_{aa}^{37}, and X_{aa}^{38} can be independently absent or independently selected from Ala, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues);

and wherein:

if X_{aa}^{3} and X_{aa}^{18} are both Cys residues, there is a disulfide bond between residue X_{aa}^{3} and residue X_{aa}^{18}; or if X_{aa}^{3} and X_{aa}^{18} are both SeCys residues, there is a diselenide bond between residue X_{aa}^{3} and residue X_{aa}^{18};

if X_{aa}^{10} and X_{aa}^{24} are both Cys residues, there is a disulfide bond between residue X_{aa}^{10} and residue X_{aa}^{24}; or if X_{aa}^{10} and X_{aa}^{24} are both SeCys residues, there is a diselenide bond between residue X_{aa}^{10} and residue X_{aa}^{24};

if X_{aa}^{17} and X_{aa}^{31} are both Cys residues, there is a disulfide bond between residue X_{aa}^{17} and residue X_{aa}^{31}; or if X_{aa}^{17} and X_{aa}^{31} are both SeCys residues, there is a diselenide bond between residue X_{aa}^{17} and residue X_{aa}^{31};

the amino-terminal residue is optionally acetylated, biotinylated, 4-pentynoylated, or PEGylated; and

the carboxy-terminal residue is optionally amidated. Many particular examples of such C-terminally amidated appear in Table 5A and Table 5B.

Another example of the inventive composition described immediately above (SEQ ID NO:475) is the composition of matter wherein theisolated polypeptide comprises the amino acid sequence of the formula:

[00222] $X_{aa}^{1}X_{aa}^{2}$ $Cys^{3}X_{aa}^{4}X_{aa}^{5}Ala^{6}X_{aa}^{7}X_{aa}^{8}X_{aa}^{9}Cys^{10}X_{aa}^{11}X_{aa}^{12}X_{aa}^{13}X_{aa}^{14}Asp^{15}$ X_{aa}^{16} $Cys^{17}Cys^{18}X_{aa}^{19}X_{aa}^{20}X_{aa}^{21}X_{aa}^{22}X_{aa}^{23}$ $Cys^{24}X_{aa}^{25}X_{aa}^{26}X_{aa}^{27}X_{aa}^{28}X_{aa}^{29}X_{aa}^{30}$ $Cys^{31}Lys^{32}X_{aa}^{33}X_{aa}^{34}X_{aa}^{35}X_{aa}^{36}X_{aa}^{37}X_{aa}^{38}$// SEQ ID NO:476, and the variable positions of SEQ ID NO:476 are exemplified as in the immediately preceding paragraphs concerning the variable positions of SEQ ID NO:475. Particularly useful embodiments of the composition of matter comprise an Ala, Gly, 2-Abu, Nle, or Nva residue at position $X_{aa}^{6}$of SEQ ID NO:475, with some of these embodiments also having a Glu residue at position $X_{aa}^{27}$of SEQ ID NO:475, for example, [Ala5, Glu26]GpTx-1, [Gly5, Glu26]GpTx-1, [2-Abu5, Glu26]GpTx-1, [Nle5, Glu26]GpTx-1, or [Nva5, Glu26]GpTx-1 peptide analogs, which, optionally, can also have additional substituted amino acid residues at other amino acid positions and/or additional residues at the N-terminal and/or C-terminal end. Other useful examples comprise an Asp, Glu, or Gln residue at position X_{aa}^{29} of SEQ ID NO: 475 or X_{aa}^{29} of SEQ ID NO:476, with or without a Glu residue at position $X_{aa}^{27}$of SEQ ID NO:475, e.g., [Ala5, Asp28]GpTx-1, [Ala5, Glu28]GpTx-1, [Ala5, Gln28]GpTx-1, [Ala5, Glu26, Asp28]GpTx-1, [Ala5, Glu26, Glu28]GpTx-1, [Ala5, Glu26, Gln28]GpTx-1, [Gly5, Asp28]GpTx-1, [Gly5, Glu28]GpTx-1, [Gly5, Gln28]GpTx-1, [Gly5, Glu26, Asp28]GpTx-1, [Gly5, Glu26, Glu28]GpTx-1, [Gly5, Glu26, Gln28]GpTx-1, [2-Abu5, Asp28]GpTx-1, [2-Abu5, Glu28]GpTx-1, [2-Abu5, Gln28]GpTx-1, [2-Abu5, Glu26, Asp28]GpTx-1, [2-Abu5, Glu26, Glu28]GpTx-1, [2-Abu5, Glu26, Gln28]GpTx-1, [Nle5, Asp28]GpTx-1, [Nle5, Glu28]GpTx-1, [Nle5, Gln28]GpTx-1, [Nle5, Glu26, Asp28]GpTx-1, [Nle5, Glu26, Glu28]GpTx-1, and [Nle5, Glu26, Gln28]GpTx-1, [Nva5, Asp28]GpTx-1, [Nva5, Glu28]GpTx-1, [Nva5, Gln28]GpTx-1, [Nva5, Glu26, Asp28]GpTx-1, [Nva5, Glu26, Glu28]GpTx-1, and [Nva5, Glu26, Gln28]GpTx-1.

[00223] Some examples of the composition of matter comprising an amino acid sequence that comprises an Ala residue at position $X_{aa}^{6}$of SEQ ID NO:475 include: SEQ ID NOS: 22, 252-263, 419-439, 518-521, 524, 525, 562-580, 602, 691, 692, 696-703, 715, 721-735, 737-749, 756, 757, 761, 762, 764-771, 787-796, 798, 800, 802, 803, 809-812, 1028, 1030-1040, 1043-1047, 1062-1065, 1068-1070, 1082, 1096, 1110,

1124, 1135, 1146, 1157, 1165, 1173, 1181, 1192, 1203, 1214, 1222, 1230, 1238, 1249, 1260, 1271, 1279, 1287, 1295, 1306, 1317, 1328, 1336, 1344, 1352, 1360, 1368, 1376, 1384, 1392, 1400, 1408, 1416, 1424, 1432, 1440, 1448, 1456, 1464, 1472, 1480, 1488, 1496, 1504, 1512, 1520, 1528, 1536, 1544, 1552, 1560, 1568, 1576, 1584, 1592, 1600, 1608, 1616, 1624, 1632, 1640, 1658, 1672, 1686, 1700, 1711, 1722, 1733, 1741, 1749, 1757, 1768, 1779, 1790, 1798, 1806, 1814, 1825, 1836, 1847, 1855, 1863, 1871, 1882, 1893, 1904, 1912, 1920, 1928, 1936, 1944, 1952, 1960, 1968, 1976, 1984, 1992, 2000, 2008, 2016, 2024, 2032, 2040, 2048, 2056, 2064, 2072, 2080, 2088, 2096, 2104, 2112, 2120, 2128, 2136, 2144, 2152, 2160, 2168, 2176, 2184, 2192, 2200, 2208, 2216, 2234, 2248, 2262, 2276, 2287, 2298, 2309, 2317, 2325, 2333, 2344, 2355, 2366, 2374, 2382, 2390, 2401, 2412, 2423, 2431, 2439, 2447, 2458, 2469, 2480, 2488, 2496, 2504, 2512, 2520, 2528, 2536, 2544, 2552, 2560, 2568, 2576, 2584, 2592, 2600, 2608, 2616, 2624, 2632, 2640, 2648, 2656, 2664, 2672, 2680, 2688, 2696, 2704, 2712, 2720, 2728, 2736, 2744, 2752, 2760, 2768, 2776, 2784, 2792, 2808, 2822, 2833, 2844, 2855, 2863, 2871, 2879, 2890, 2901, 2912, 2920, 2928, 2936, 2944, 2952, 2960, 2968, 2976, 2984, 2992, 3000, 3008, 3016, 3024, 3032, 3040, 3048, 3056, 3064, 3072, and 3080, as set forth in Table 5A and Table 5B. Other examples comprise a free acid at the C-terminal (rather than an amidated C-terminal residue) of any of the foregoing, such as SEQ ID NOS: 597-601 and 813-1027, as set forth in Table 5A and Table 5B.

[00224] Some examples of the composition of matter comprising an amino acid sequence that comprises a Gly residue at position X_{aa}^{6} of SEQ ID NO:475 include: SEQ ID NOS: 265, 751, 752, 754, 755, 1081, 1095, 1109, 1123, 1134, 1145, 1156, 1164, 1172, 1180, 1191, 1202, 1213, 1221, 1229, 1237, 1248, 1259, 1270, 1278, 1286, 1294, 1305, 1316, 1327, 1335, 1343, 1351, 1359, 1367, 1375, 1383, 1391, 1399, 1407, 1415, 1423, 1431, 1439, 1447, 1455, 1463, 1471, 1479, 1487, 1495, 1503, 1511, 1519, 1527, 1535, 1543, 1551, 1559, 1567, 1575, 1583, 1591, 1599, 1607, 1615, 1623, 1631, 1639, 1657, 1671, 1685, 1699, 1710, 1721, 1732, 1740, 1748, 1756, 1767, 1778, 1789, 1797, 1805, 1813, 1824, 1835, 1846, 1854, 1862, 1870, 1881, 1892, 1903, 1911, 1919, 1927, 1935, 1943, 1951, 1959, 1967, 1975, 1983, 1991, 1999, 2007, 2015, 2023, 2031, 2039, 2047, 2055, 2063, 2071, 2079, 2087, 2095, 2103, 2111, 2119, 2127, 2135, 2143, 2151, 2159, 2167, 2175, 2183, 2191, 2199, 2207, 2215, 2233, 2247, 2261, 2275, 2286, 2297, 2308, 2316, 2324, 2332, 2343, 2354, 2365, 2373, 2381, 2389, 2400, 2411, 2422, 2430,

2438, 2446, 2457, 2468, 2479, 2487, 2495, 2503, 2511, 2519, 2527, 2535, 2543, 2551, 2559, 2567, 2575, 2583, 2591, 2599, 2607, 2615, 2623, 2631, 2639, 2647, 2655, 2663, 2671, 2679, 2687, 2695, 2703, 2711, 2719, 2727, 2735, 2743, 2751, 2759, 2767, 2775, 2783, 2791, 2807, 2821, 2832, 2843, 2854, 2862, 2870, 2878, 2889, 2900, 2911, 2919, 2927, 2935, 2943, 2951, 2959, 2967, 2975, 2983, 2991, 2999, 3007, 3015, 3023, 3031, 3039, 3047, 3055, 3063, 3071, and 3079, as set forth in Table 5A and Table 5B.

[00225] Some examples of the composition of matter comprising an amino acid sequence that comprises a 2-Abu residue at position $X_{aa}^{6}$of SEQ ID NO:475 include: SEQ ID NOS: 605, 636, 649, 706, 707, 718, 753, 758, 797, 799, 801, 804, 807, 808, 1029, 1041, 1042, 1048, 1066, 1067, 1083, 1097, 1111, 1125, 1136, 1147, 1158, 1166, 1174, 1182, 1193, 1204, 1215, 1223, 1231, 1239, 1250, 1261, 1272, 1280, 1288, 1296, 1307, 1318, 1329, 1337, 1345, 1353, 1361, 1369, 1377, 1385, 1393, 1401, 1409, 1417, 1425, 1433, 1441, 1449, 1457, 1465, 1473, 1481, 1489, 1497, 1505, 1513, 1521, 1529, 1537, 1545, 1553, 1561, 1569, 1577, 1585, 1593, 1601, 1609, 1617, 1625, 1633, 1641, 1659, 1673, 1687, 1701, 1712, 1723, 1734, 1742, 1750, 1758, 1769, 1780, 1791, 1799, 1807, 1815, 1826, 1837, 1848, 1856, 1864, 1872, 1883, 1894, 1905, 1913, 1921, 1929, 1937, 1945, 1953, 1961, 1969, 1977, 1985, 1993, 2001, 2009, 2017, 2025, 2033, 2041, 2049, 2057, 2065, 2073, 2081, 2089, 2097, 2105, 2113, 2121, 2129, 2137, 2145, 2153, 2161, 2169, 2177, 2185, 2193, 2201, 2209, 2217, 2235, 2249, 2263, 2277, 2288, 2299, 2310, 2318, 2326, 2334, 2345, 2356, 2367, 2375, 2383, 2391, 2402, 2413, 2424, 2432, 2440, 2448, 2459, 2470, 2481, 2489, 2497, 2505, 2513, 2521, 2529, 2537, 2545, 2553, 2561, 2569, 2577, 2585, 2593, 2601, 2609, 2617, 2625, 2633, 2641, 2649, 2657, 2665, 2673, 2681, 2689, 2697, 2705, 2713, 2721, 2729, 2737, 2745, 2753, 2761, 2769, 2777, 2785, 2793, 2809, 2823, 2834, 2845, 2856, 2864, 2872, 2880, 2891, 2902, 2913, 2921, 2929, 2937, 2945, 2953, 2961, 2969, 2977, 2985, 2993, 3001, 3009, 3017, 3025, 3033, 3041, 3049, 3057, 3065, 3073, and 3081, as set forth in Table 5A and Table 5B.

[00226] Some examples of the composition of matter comprising an amino acid sequence that comprises a Nle residue at position $X_{aa}^{6}$of SEQ ID NO:475 include: SEQ ID NOS: 607, 638, 651, 1085, 1099, 1113, 1127, 1138, 1149, 1160, 1168, 1176, 1184, 1195, 1206, 1217, 1225, 1233, 1241, 1252, 1263, 1274, 1282, 1290, 1298, 1309, 1320, 1331, 1339, 1347, 1355, 1363, 1371, 1379, 1387, 1395, 1403, 1411, 1419, 1427, 1435, 1443, 1451, 1459, 1467, 1475, 1483, 1491, 1499, 1507, 1515, 1523, 1531, 1539, 1547,

1555, 1563, 1571, 1579, 1587, 1595, 1603, 1611, 1619, 1627, 1635, 1643, 1661, 1675, 1689, 1703, 1714, 1725, 1736, 1744, 1752, 1760, 1771, 1782, 1793, 1801, 1809, 1817, 1828, 1839, 1850, 1858, 1866, 1874, 1885, 1896, 1907, 1915, 1923, 1931, 1939, 1947, 1955, 1963, 1971, 1979, 1987, 1995, 2003, 2011, 2019, 2027, 2035, 2043, 2051, 2059, 2067, 2075, 2083, 2091, 2099, 2107, 2115, 2123, 2131, 2139, 2147, 2155, 2163, 2171, 2179, 2187, 2195, 2203, 2211, 2219, 2237, 2251, 2265, 2279, 2290, 2301, 2312, 2320, 2328, 2336, 2347, 2358, 2369, 2377, 2385, 2393, 2404, 2415, 2426, 2434, 2442, 2450, 2461, 2472, 2483, 2491, 2499, 2507, 2515, 2523, 2531, 2539, 2547, 2555, 2563, 2571, 2579, 2587, 2595, 2603, 2611, 2619, 2627, 2635, 2643, 2651, 2659, 2667, 2675, 2683, 2691, 2699, 2707, 2715, 2723, 2731, 2739, 2747, 2755, 2763, 2771, 2779, 2787, 2795, 2811, 2825, 2836, 2847, 2858, 2866, 2874, 2882, 2893, 2904, 2915, 2923, 2931, 2939, 2947, 2955, 2963, 2971, 2979, 2987, 2995, 3003, 3011, 3019, 3027, 3035, 3043, 3051, 3059, 3067, 3075, and 3083, as set forth in Table 5A and Table 5B.

[00227] Some examples of the composition of matter comprising an amino acid sequence that comprises a Nva residue at position X_{aa}^{6} of SEQ ID NO:475 include: SEQ ID NOS: 606, 637, 650, 705, 708, 717, 759, 760, 805, 806, 1084, 1098, 1112, 1126, 1137, 1148, 1159, 1167, 1175, 1183, 1194, 1205, 1216, 1224, 1232, 1240, 1251, 1262, 1273, 1281, 1289, 1297, 1308, 1319, 1330, 1338, 1346, 1354, 1362, 1370, 1378, 1386, 1394, 1402, 1410, 1418, 1426, 1434, 1442, 1450, 1458, 1466, 1474, 1482, 1490, 1498, 1506, 1514, 1522, 1530, 1538, 1546, 1554, 1562, 1570, 1578, 1586, 1594, 1602, 1610, 1618, 1626, 1634, 1642, 1660, 1674, 1688, 1702, 1713, 1724, 1735, 1743, 1751, 1759, 1770, 1781, 1792, 1800, 1808, 1816, 1827, 1838, 1849, 1857, 1865, 1873, 1884, 1895, 1906, 1914, 1922, 1930, 1938, 1946, 1954, 1962, 1970, 1978, 1986, 1994, 2002, 2010, 2018, 2026, 2034, 2042, 2050, 2058, 2066, 2074, 2082, 2090, 2098, 2106, 2114, 2122, 2130, 2138, 2146, 2154, 2162, 2170, 2178, 2186, 2194, 2202, 2210, 2218, 2236, 2250, 2264, 2278, 2289, 2300, 2311, 2319, 2327, 2335, 2346, 2357, 2368, 2376, 2384, 2392, 2403, 2414, 2425, 2433, 2441, 2449, 2460, 2471, 2482, 2490, 2498, 2506, 2514, 2522, 2530, 2538, 2546, 2554, 2562, 2570, 2578, 2586, 2594, 2602, 2610, 2618, 2626, 2634, 2642, 2650, 2658, 2666, 2674, 2682, 2690, 2698, 2706, 2714, 2722, 2730, 2738, 2746, 2754, 2762, 2770, 2778, 2786, 2794, 2810, 2824, 2835, 2846, 2857, 2865, 2873, 2881, 2892, 2903, 2914, 2922, 2930, 2938, 2946, 2954, 2962, 2970, 2978, 2986, 2994, 3002,

3010, 3018, 3026, 3034, 3042, 3050, 3058, 3066, 3074, and 3082, as set forth in Table 5A and Table 5B.

[00228] Other exemplary embodiments of the inventive composition are unconjugated and conjugated peptide analogs of GpTx-1 having one of the amino acid sequences as set forth in Table 5A, Table 5B, and Table 31. Particular embodiments of the inventive isolated polypeptides include those having an amino acid sequence selected from SEQ ID NOS: 3-134, 136-305, 307-386, 388-474, 515-527, 532-588, 590, 591, 593-1049, and 1062-3086, and more particularly an amino acid sequence selected from SEQ ID NOS: 3-30, 32-72, 74-134, 136-178, 180-211, 218-239, 241-305, 307-363, 366-386, 388-432, 434-474, 515-527, 532-588, 590, 591, 593-775, 777, 778, 780-788, 790-1049, and 1062-3086. Any of these further comprising an optional linker moiety and a pharmaceutically acceptable, covalently linked half-life extending moiety, as described herein, are also encompassed within the present invention. A pharmaceutical composition comprising any of these polypeptides (with or without a covalently linked half-life extending moiety) and a pharmaceutically acceptable carrier is also encompassed within the present invention.

Table 5A. Amino acid sequences of GpTx-1 and GpTx-1 peptide analogs. {H}- = amino group of N-terminal; -{Amide} = amidated C-terminal; Ac- = acetylated N-terminal; -{Free Acid} = carboxylated C-terminal; {biotin}- = biotinylated N-terminal; {4-Pen}- = 4-pentynoylated N-terminal; {bromoacetamide-PEG11-triazole}- = 3-(1-(1-bromo-2-oxo-6,9,12,15,18,21,24,27,30,33,36-undecaoxa-3-azaoctatriacontan-38-yl)-1H-1,2,3-triazol-4-yl)propanoyl covalently conjugated to N-terminal.

Designation	Amino Acid Sequence	SEQ ID NO:
GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	1
[All D-isomer]GpTx-1(1-34)	{H}-dclgfmrkcipdndkccrpnlvcsrthkwckyvf-{Amide}	2
[SeMet6]GpTx-1(1-34)	{H}-DCLGF[SeMet]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-	3

	{Amide}	
[Ala12]GpTx-1(1-34)	{H}-DCLGFMRKCIPANDKCCRPNLVCSRTHKWCKYVF-{Amide}	4
[Ala13]GpTx-1(1-34)	{H}-DCLGFMRKCIPDADKCCRPNLVCSRTHKWCKYVF-{Amide}	5
[Ala15]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDACCRPNLVCSRTHKWCKYVF-{Amide}	6
[Ala20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPALVCSRTHKWCKYVF-{Amide}	7
[Ala22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLACSRTHKWCKYVF-{Amide}	8
[Ala25]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSATHKWCKYVF-{Amide}	9
[Ala26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRAHKWCKYVF-{Amide}	10
[Ala27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTAKWCKYVF-{Amide}	11
[Ala28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHAWCKYVF-{Amide}	12
[Ala31]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCAYVF-{Amide}	13
[Ala32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKAVF-{Amide}	14
[Ala33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYAF-{Amide}	15
GpTx-1(1-34)-Ala	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFA-{Amide}	16
Glu-GpTx-1(1-34)	{H}-EDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	17
[Glu1]GpTx-1(1-34)	{H}-ECLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	18
[Glu3]GpTx-1(1-34)	{H}-DCEGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	19
[Ala1]GpTx-1(1-34)	{H}-ACLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	20
[Ala3]GpTx-1(1-34)	{H}-DCAGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	21
[Ala5]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	22
[Ala6]GpTx-1(1-34)	{H}-DCLGFARKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	23
[Glu4]GpTx-1(1-34)	{H}-DCLEFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	24
[Glu8]GpTx-1(1-34)	{H}-DCLGFMRECIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	25
[Glu12]GpTx-1(1-34)	{H}-DCLGFMRKCIPENDKCCRPNLVCSRTHKWCKYVF-{Amide}	26
[Glu13]GpTx-1(1-34)	{H}-DCLGFMRKCIPDEDKCCRPNLVCSRTHKWCKYVF-{Amide}	27
[Glu15]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDECCRPNLVCSRTHKWCKYVF-{Amide}	28
[Glu27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTEKWCKYVF-{Amide}	29
[Glu29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKECKYVF-{Amide}	30
[Glu31]GpTx-1(1-	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCEYVF-	31

34)	{Amide}	
[Glu32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKEVF-{Amide}	32
[Glu33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYEF-{Amide}	33
[Glu34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVE-{Amide}	34
GpTx-1(1-34)-Glu	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFE-{Amide}	35
Lys-GpTx-1(1-34)	{H}-KDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	36
[Lys1]GpTx-1(1-34)	{H}-KCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	37
[Lys3]GpTx-1(1-34)	{H}-DCKGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	38
[Lys4]GpTx-1(1-34)	{H}-DCLKFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	39
[Lys7]GpTx-1(1-34)	{H}-DCLGFMKKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	40
[Lys10]GpTx-1(1-34)	{H}-DCLGFMRKCKPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	41
[Lys12]GpTx-1(1-34)	{H}-DCLGFMRKCIPKNDKCCRPNLVCSRTHKWCKYVF-{Amide}	42
[Ala7]GpTx-1(1-34)	{H}-DCLGFMAKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	43
[Ala8]GpTx-1(1-34)	{H}-DCLGFMRACIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	44
[Ala10]GpTx-1(1-34)	{H}-DCLGFMRKCAPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	45
[Ala11]GpTx-1(1-34)	{H}-DCLGFMRKCIADNDKCCRPNLVCSRTHKWCKYVF-{Amide}	46
[Ala29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKACKYVF-{Amide}	47
[Lys13]GpTx-1(1-34)	{H}-DCLGFMRKCIPDKDKCCRPNLVCSRTHKWCKYVF-{Amide}	48
[Lys18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCKPNLVCSRTHKWCKYVF-{Amide}	49
[Lys19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRKNLVCSRTHKWCKYVF-{Amide}	50
[Lys20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPKLVCSRTHKWCKYVF-{Amide}	51
[Lys22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLKCSRTHKWCKYVF-{Amide}	52
[Lys25]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSKTHKWCKYVF-{Amide}	53
[Lys26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRKHKWCKYVF-{Amide}	54
[Lys27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTKKWCKYVF-{Amide}	55
[Lys29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKKCKYVF-{Amide}	56
[Lys32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKKVF-{Amide}	57
[Lys33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYKF-{Amide}	58
[Lys34]GpTx-1(1-	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVK-	59

34)	{Amide}	
GpTx-1(1-34)-Lys	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFK-{Amide}	60
Arg-GpTx-1(1-34)	{H}-RDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	61
[Arg1]GpTx-1(1-34)	{H}-RCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	62
[Arg4]GpTx-1(1-34)	{H}-DCLRFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	63
[Arg6]GpTx-1(1-34)	{H}-DCLGFRRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	64
[Arg8]GpTx-1(1-34)	{H}-DCLGFMRRCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	65
[Arg10]GpTx-1(1-34)	{H}-DCLGFMRKCRPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	66
[Arg12]GpTx-1(1-34)	{H}-DCLGFMRKCIPRNDKCCRPNLVCSRTHKWCKYVF-{Amide}	67
[Arg15]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDRCCRPNLVCSRTHKWCKYVF-{Amide}	68
[Arg20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPRLVCSRTHKWCKYVF-{Amide}	69
[Arg26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRRHKWCKYVF-{Amide}	70
[Arg27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTRKWCKYVF-{Amide}	71
[Arg28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{Amide}	72
[Arg31]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCRYVF-{Amide}	73
[Arg33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYRF-{Amide}	74
[Arg34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVR-{Amide}	75
GpTx-1(1-34)-Arg	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFR-{Amide}	76
[1-Nal1]GpTx-1(1-34)	{H}-[1-Nal]CLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	77
[1-Nal10]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	78
[1-Nal29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[1-Nal]CKYVF-{Amide}	79
[1-Nal34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{Amide}	80
[Trp1]GpTx-1(1-34)	{H}-WCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	81
[Trp5]GpTx-1(1-34)	{H}-DCLGWMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	82
[Trp10]GpTx-1(1-34)	{H}-DCLGFMRKCWPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	83
[Trp27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTWKWCKYVF-{Amide}	84
[Trp32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKWVF-{Amide}	85
[Trp34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVW-{Amide}	86

GpTx-1(1-34)-Trp	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFW-{Amide}	87
[Ile5]GpTx-1(1-34)	{H}-DCLGIMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	88
[Phe6]GpTx-1(1-34)	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	89
[Asn10]GpTx-1(1-34)	{H}-DCLGFMRKCNPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	90
[Ser12]GpTx-1(1-34)	{H}-DCLGFMRKCIPSNDKCCRPNLVCSRTHKWCKYVF-{Amide}	91
[Gln15]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDQCCRPNLVCSRTHKWCKYVF-{Amide}	92
[Ser-Ser19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRSSNLVCSRTHKWCKYVF-{Amide}	93
[Lys26;Thr27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRKTKWCKYVF-{Amide}	94
[Gln33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYQF-{Amide}	95
[Ile34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVI-{Amide}	96
[Tyr1]GpTx-1(1-34)	{H}-YCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	97
[Gln3]GpTx-1(1-34)	{H}-DCQGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	98
[Lys32;1-Nal34]GpTx-1(1-34)-Trp	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKKV[1-Nal]W-{Amide}	99
Ala-GpTx-1(1-34)	{H}-ADCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	100
[Ala34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVA-{Amide}	101
[Glu22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLECSRTHKWCKYVF-{Amide}	102
[Arg13]GpTx-1(1-34)	{H}-DCLGFMRKCIPDRDKCCRPNLVCSRTHKWCKYVF-{Amide}	103
[Arg29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKRCKYVF-{Amide}	104
[1-Nal5]GpTx-1(1-34)	{H}-DCLG[1-Nal]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	105
Trp-GpTx-1(1-34)	{H}-WDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	106
GpTx-1(1-34)-FreeAcid	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{FreeAcid}	107
GpTx-1(2-34)	{H}-CLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	108
[Phe27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTFKWCKYVF-{Amide}	109
[Tyr27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTYKWCKYVF-{Amide}	110
[Leu27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTLKWCKYVF-{Amide}	111
[Phe29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKFCKYVF-{Amide}	112
[Tyr29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKYCKYVF-{Amide}	113
[Leu29]GpTx-1(1-	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKLCKYVF-	114

34)	{Amide}	
[Cit7]GpTx-1(1-34)	{H}-DCLGFM[Cit]KCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	115
[Cit18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCC[Cit]PNLVCSRTHKWCKYVF-{Amide}	116
[Cit25]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCS[Cit]THKWCKYVF-{Amide}	117
[Thr8]GpTx-1(1-34)	{H}-DCLGFMRTCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	118
[Asp10]GpTx-1(1-34)	{H}-DCLGFMRKCDPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	119
[Met21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNMVCSRTHKWCKYVF-{Amide}	120
[Leu26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKWCKYVF-{Amide}	121
[Leu34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVL-{Amide}	122
[Nle6]GpTx-1(1-34)	{H}-DCLGF[Nle]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	123
[2-Abu6]GpTx-1(1-34)	{H}-DCLGF[2-Abu]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	124
[2-Abu2,17]GpTx-1(1-34)	{H}-D[2-Abu]LGFMRKCIPDNDKC[2-Abu]RPNLVCSRTHKWCKYVF-{Amide}	125
[Gly19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRGNLVCSRTHKWCKYVF-{Amide}	126
[Lys32]GpTx-1(1-34)-Trp	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKKVFW-{Amide}	127
[2-Nal5]GpTx-1(1-34)	{H}-DCLG[2-Nal]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	128
[2-Nal29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[2-Nal]CKYVF-{Amide}	129
[2-Nal34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[2-Nal]-{Amide}	130
GpTx-1(1-34)-2-Nal	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[2-Nal]-{Amide}	131
Ac-GpTx-1(1-34)	{Acetyl}DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	132
GpTx-1(1-34)-Trp-FreeAcid	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFW{Free Acid}	133
[Glu18;desAsn20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCEGLVCSRTHKWCKYVF-{Amide}	134
[2-Abu9,23]GpTx-1(1-34)	{H}-DCLGFMRK[2-Abu]IPDNDKCCRPNLV[2-Abu]SRTHKWCKYVF-{Amide}	135
[2-Nal5,34]GpTx-1(1-34)	{H}-DCLG[2-Nal]MRKCIPDNDKCCRPNLVCSRTHKWCKYV[2-Nal]-{Amide}	136
[2-Nal5;1-Nal34]GpTx-1(1-34)	{H}-DCLG[2-Nal]MRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{Amide}	137
[1-Nal34]GpTx-1(1-34)-Trp	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]W-{Amide}	138
[2-Nal34]GpTx-1(1-34)-Trp	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[2-Nal]W-{Amide}	139
[Ala2,17]GpTx-1(1-34)	{H}-DALGFMRKCIPDNDKCARPNLVCSRTHKWCKYVF-{Amide}	140

[Ala4]GpTx-1(1-34)	{H}-DCLAFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	141
[Ala24]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCARTHKWCKYVF-{Amide}	142
[Glu5]GpTx-1(1-34)	{H}-DCLGEMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	143
[Glu6]GpTx-1(1-34)	{H}-DCLGFERKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	144
[Glu7]GpTx-1(1-34)	{H}-DCLGFMEKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	145
[Glu10]GpTx-1(1-34)	{H}-DCLGFMRKCEPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	146
[Glu11]GpTx-1(1-34)	{H}-DCLGFMRKCIEDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	147
[Glu18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCEPNLVCSRTHKWCKYVF-{Amide}	148
[Glu20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPELVCSRTHKWCKYVF-{Amide}	149
[Glu24]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCERTHKWCKYVF-{Amide}	150
[Glu25]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSETHKWCKYVF-{Amide}	151
[Glu26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSREHKWCKYVF-{Amide}	152
[Glu28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	153
[Lys6]GpTx-1(1-34)	{H}-DCLGFKRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	154
[Arg3]GpTx-1(1-34)	{H}-DCRGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	155
[Arg5]GpTx-1(1-34)	{H}-DCLGRMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	156
[Arg19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRRNLVCSRTHKWCKYVF-{Amide}	157
[Arg22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLRCSRTHKWCKYVF-{Amide}	158
[Arg32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKRVF-{Amide}	159
[1-Nal4]GpTx-1(1-34)	{H}-DCL[1-Nal]FMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	160
[1-Nal6]GpTx-1(1-34)	{H}-DCLGF[1-Nal]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	161
[1-Nal12]GpTx-1(1-34)	{H}-DCLGFMRKCIP[1-Nal]NDKCCRPNLVCSRTHKWCKYVF-{Amide}	162
[1-Nal13]GpTx-1(1-34)	{H}-DCLGFMRKCIPD[1-Nal]DKCCRPNLVCSRTHKWCKYVF-{Amide}	163
[1-Nal20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRP[1-Nal]LVCSRTHKWCKYVF-{Amide}	164
[1-Nal21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPN[1-Nal]VCSRTHKWCKYVF-{Amide}	165
[1-Nal27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[1-Nal]KWCKYVF-{Amide}	166
[1-Nal32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[1-Nal]VF-{Amide}	167
[1-Nal33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[1-Nal]F-{Amide}	168

[Trp4]GpTx-1(1-34)	{H}-DCLWFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	169
[Trp6]GpTx-1(1-34)	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	170
[Trp11]GpTx-1(1-34)	{H}-DCLGFMRKCIWDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	171
[Trp12]GpTx-1(1-34)	{H}-DCLGFMRKCIPWNDKCCRPNLVCSRTHKWCKYVF-{Amide}	172
[Trp13]GpTx-1(1-34)	{H}-DCLGFMRKCIPDWDKCCRPNLVCSRTHKWCKYVF-{Amide}	173
[Trp18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCWPNLVCSRTHKWCKYVF-{Amide}	174
[Trp20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPWLVCSRTHKWCKYVF-{Amide}	175
[Trp21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNWVCSRTHKWCKYVF-{Amide}	176
[Trp22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLWCSRTHKWCKYVF-{Amide}	177
[Trp26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRWHKWCKYVF-{Amide}	178
[Trp31]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCWYVF-{Amide}	179
[Trp33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYWF-{Amide}	180
[Ser19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRSNLVCSRTHKWCKYVF-{Amide}	181
[Gln33;1-Nal34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYQ[1-Nal]-{Amide}	182
[Arg28;Gln33;1-Nal34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCKYQ[1-Nal]-{Amide}	183
[Arg20;Gln33;1-Nal34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPRLVCSRTHKWCKYQ[1-Nal]-{Amide}	184
[Arg20,28;Gln33;1-Nal34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPRLVCSRTHRWCKYQ[1-Nal]-{Amide}	185
[Arg15;Gln33;1-Nal34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDRCCRPNLVCSRTHKWCKYQ[1-Nal]-{Amide}	186
Arg-GpTx-1(1-34)-Trp	{H}-RDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFW-{Amide}	187
[PE1]GpTx-1(1-34)	{H}-[PE]CLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	188
[Ile1]GpTx-1(1-34)	{H}-ICLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	189
[Pro1]GpTx-1(1-34)	{H}-PCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	190
[Ser1]GpTx-1(1-34)	{H}-SCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	191
[Thr1]GpTx-1(1-34)	{H}-TCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	192
[Leu12]GpTx-1(1-34)	{H}-DCLGFMRKCIPLNDKCCRPNLVCSRTHKWCKYVF-{Amide}	193

[Gly12]GpTx-1(1-34)	{H}-DCLGFMRKCIPGNDKCCRPNLVCSRTHKWCKYVF-{Amide}	194
[Ile12]GpTx-1(1-34)	{H}-DCLGFMRKCIPINDKCCRPNLVCSRTHKWCKYVF-{Amide}	195
[Thr12]GpTx-1(1-34)	{H}-DCLGFMRKCIPTNDKCCRPNLVCSRTHKWCKYVF-{Amide}	196
[Tyr12]GpTx-1(1-34)	{H}-DCLGFMRKCIPYNDKCCRPNLVCSRTHKWCKYVF-{Amide}	197
[Gly20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPGLVCSRTHKWCKYVF-{Amide}	198
[Phe20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPFLVCSRTHKWCKYVF-{Amide}	199
[Tyr20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPYLVCSRTHKWCKYVF-{Amide}	200
1-Nal-GpTx-1(1-34)	{H}-[1-Nal]DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	201
[Trp3]GpTx-1(1-34)	{H}-DCWGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	202
[1-Nal3]GpTx-1(1-34)	{H}-DC[1-Nal]GFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	203
[Lys5]GpTx-1(1-34)	{H}-DCLGKMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	204
[Trp7]GpTx-1(1-34)	{H}-DCLGFMWKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	205
[1-Nal7]GpTx-1(1-34)	{H}-DCLGFM[1-Nal]KCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	206
[Trp8]GpTx-1(1-34)	{H}-DCLGFMRWCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	207
[1-Nal8]GpTx-1(1-34)	{H}-DCLGFMR[1-Nal]CIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	208
[Lys11]GpTx-1(1-34)	{H}-DCLGFMRKCIKDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	209
[Arg11]GpTx-1(1-34)	{H}-DCLGFMRKCIRDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	210
[1-Nal11]GpTx-1(1-34)	{H}-DCLGFMRKCI[1-Nal]DNDKCCRPNLVCSRTHKWCKYVF-{Amide}	211
[Ala14]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNAKCCRPNLVCSRTHKWCKYVF-{Amide}	212
[Glu14]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNEKCCRPNLVCSRTHKWCKYVF-{Amide}	213
[Lys14]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNKKCCRPNLVCSRTHKWCKYVF-{Amide}	214
[Arg14]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNRKCCRPNLVCSRTHKWCKYVF-{Amide}	215
[Trp14]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNWKCCRPNLVCSRTHKWCKYVF-{Amide}	216
[1-Nal14]GpTx-1(1-34)	{H}-DCLGFMRKCIPDN[1-Nal]KCCRPNLVCSRTHKWCKYVF-{Amide}	217
[Trp15]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDWCCRPNLVCSRTHKWCKYVF-{Amide}	218
[1-Nal15]GpTx-1(1-34)	{H}-DCLGFMRKCIPDND[1-Nal]CCRPNLVCSRTHKWCKYVF-{Amide}	219
[Ala18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCAPNLVCSRTHKWCKYVF-{Amide}	220

[1-Nal18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCC[1-Nal]PNLVCSRTHKWCKYVF-{Amide}	221
[Ala19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRANLVCSRTHKWCKYVF-{Amide}	222
[Glu19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRENLVCSRTHKWCKYVF-{Amide}	223
[Trp19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRWNLVCSRTHKWCKYVF-{Amide}	224
[1-Nal19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCR[1-Nal]NLVCSRTHKWCKYVF-{Amide}	225
[Ala21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNAVCSRTHKWCKYVF-{Amide}	226
[Glu21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNEVCSRTHKWCKYVF-{Amide}	227
[Lys21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNKVCSRTHKWCKYVF-{Amide}	228
[Arg21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNRVCSRTHKWCKYVF-{Amide}	229
[1-Nal22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNL[1-Nal]CSRTHKWCKYVF-{Amide}	230
[Lys24]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCKRTHKWCKYVF-{Amide}	231
[Arg24]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCRRTHKWCKYVF-{Amide}	232
[Trp24]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCWRTHKWCKYVF-{Amide}	233
[1-Nal24]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVC[1-Nal]RTHKWCKYVF-{Amide}	234
[Trp25]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSWTHKWCKYVF-{Amide}	235
[1-Nal25]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCS[1-Nal]THKWCKYVF-{Amide}	236
[1-Nal26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSR[1-Nal]HKWCKYVF-{Amide}	237
[Trp28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHWWCKYVF-{Amide}	238
[1-Nal28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTH[1-Nal]WCKYVF-{Amide}	239
[1-Nal31]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWC[1-Nal]YVF-{Amide}	240
GpTx-1(1-34)-1-Nal	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[1Nal]-{Amide}	241
[Bip5]GpTx-1(1-34)	{H}-DCLG[Bip]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	242
[Cha5]GpTx-1(1-34)	{H}-DCLG[Cha]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	243
[Leu6]GpTx-1(1-34)	{H}-DCLGFLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	244
[Cha6]GpTx-1(1-34)	{H}-DCLGF[Cha]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	245
[1'NMeW32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[1'NMeW]VF-{Amide}	246

[pI-Phe5]GpTx-1(1-34)	{H}-DCLG[pI-Phe]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	247
[Ile33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYIF-{Amide}	248
[pI-Phe33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[pI-Phe]F-{Amide}	249
[1'NMeW33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[1'NMeW]F-{Amide}	250
[Arg28;1-Nal32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCK[1-Nal]VF-{Amide}	251
[Ala5;Trp33]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYWF-{Amide}	252
[Ala5;Trp32]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKWVF-{Amide}	253
[Ala5;1-Nal32]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCK[1-Nal]VF-{Amide}	254
[Ala5;Leu26]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRLHKWCKYVF-{Amide}	255
[Ala5;1-Nal6]GpTx-1(1-34)	{H}-DCLGA[1-Nal]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	256
[Ala5;Phe6]GpTx-1(1-34)	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	257
[Ala5;1-Nal33]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKY[1-Nal]F-{Amide}	258
[Ala5;1-Nal10]GpTx-1(1-34)	{H}-DCLGAMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	259
[Ala5;Arg28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{Amide}	260
[Ala5;Trp6]GpTx-1(1-34)	{H}-DCLGAWRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	261
[Ala5;Phe6;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRLHRWCKYVF-{Amide}	262
[Ala5;Phe6;Leu26]GpTx-1(1-34)	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRLHKWCKYVF-{Amide}	263
[1'NMeW5]GpTx-1(1-34)	{H}-DCLG[1'NMeW]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	264
[Gly5]GpTx-1(1-34)	{H}-DCLGGMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	265

[His5]GpTx-1(1-34)	{H}-DCLGHMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	266
[Leu5]GpTx-1(1-34)	{H}-DCLGLMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	267
[Met5]GpTx-1(1-34)	{H}-DCLGMMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	268
[Pro5]GpTx-1(1-34)	{H}-DCLGPMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	269
[Thr5]GpTx-1(1-34)	{H}-DCLGTMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	270
[Tyr5]GpTx-1(1-34)	{H}-DCLGYMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	271
[Val5]GpTx-1(1-34)	{H}-DCLGVMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	272
[D-Phe5]GpTx-1(1-34)	{H}-DCLGfMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	273
[NMeTrp5]GpTx-1(1-34)	{H}-DCLG[NMeTrp]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	274
[Phg5]GpTx-1(1-34)	{H}-DCLG[Phg]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	275
[4CO2-F5]GpTx-1(1-34)	{H}-DCLG[4CO2-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	276
[2PAL5]GpTx-1(1-34)	{H}-DCLG[2PAL]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	277
[Asn6]GpTx-1(1-34)	{H}-DCLGFNRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	278
[Gln6]GpTx-1(1-34)	{H}-DCLGFQRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	279
[Gly6]GpTx-1(1-34)	{H}-DCLGFGRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	280
[His6]GpTx-1(1-34)	{H}-DCLGFHRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	281
[Ile6]GpTx-1(1-34)	{H}-DCLGFIRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	282
[Pro6]GpTx-1(1-34)	{H}-DCLGFPRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	283
[Ser6]GpTx-1(1-34)	{H}-DCLGFSRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	284
[Thr6]GpTx-1(1-34)	{H}-DCLGFTRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	285
[Tyr6]GpTx-1(1-34)	{H}-DCLGFYRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	286
[Val6]GpTx-1(1-34)	{H}-DCLGFVRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	287
[Phg6]GpTx-1(1-34)	{H}-DCLGF[Phg]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	288
[NMeTrp6]GpTx-1(1-34)	{H}-DCLGF[NMeTrp]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	289
[NMePhe6]GpTx-1(1-34)	{H}-DCLGF[NMePhe]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	290

[pI-Phe6]GpTx-1(1-34)	{H}-DCLGF[pI-Phe]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	291
[1'NMeW6]GpTx-1(1-34)	{H}-DCLGF[1'NMeW]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	292
[4CO2-F6]GpTx-1(1-34)	{H}-DCLGF[4CO2-F]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	293
[2PAL6]GpTx-1(1-34)	{H}-DCLGF[2PAL]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	294
[K(Me2)7]GpTx-1(1-34)	{H}-DCLGFM[K(Me2)]KCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	295
[SDMA7]GpTx-1(1-34)	{H}-DCLGFM[SDMA]KCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	296
[SDMA8]GpTx-1(1-34)	{H}-DCLGFMR[SDMA]CIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	297
[K(Me2)8]GpTx-1(1-34)	{H}-DCLGFMR[K(Me2)]CIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	298
[Tyr10]GpTx-1(1-34)	{H}-DCLGFMRKCYPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	299
[NMeTrp10]GpTx-1(1-34)	{H}-DCLGFMRKC[NMeTrp]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	300
[Val10]GpTx-1(1-34)	{H}-DCLGFMRKCVPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	301
[Phe10]GpTx-1(1-34)	{H}-DCLGFMRKCFPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	302
[Leu10]GpTx-1(1-34)	{H}-DCLGFMRKCLPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	303
[His10]GpTx-1(1-34)	{H}-DCLGFMRKCHPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	304
[Ser10]GpTx-1(1-34)	{H}-DCLGFMRKCSPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	305
[Met10]GpTx-1(1-34)	{H}-DCLGFMRKCMPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	307
[Pro10]GpTx-1(1-34)	{H}-DCLGFMRKCPPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	308
[Thr10]GpTx-1(1-34)	{H}-DCLGFMRKCTPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	309
[4CO2-F10]GpTx-1(1-34)	{H}-DCLGFMRKC[4CO2-F]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	310
[2PAL10]GpTx-1(1-34)	{H}-DCLGFMRKC[2PAL]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	311
[SDMA15]GpTx-1(1-34)	{H}-DCLGFMRKCIPDND[SDMA]CCRPNLVCSRTHKWCKYVF-{Amide}	312
[K(Me2)15]GpTx-1(1-34)	{H}-DCLGFMRKCIPDND[K(Me2)]CCRPNLVCSRTHKWCKYVF-{Amide}	313
[K(Me2)18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCC[K(Me2)]PNLVCSRTHKWCKYVF-	314

	{Amide}	
[SDMA18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCC[SDMA]PNLVCSRTHKWCKYVF-{Amide}	315
[2PAL18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCC[2PAL]PNLVCSRTHKWCKYVF-{Amide}	316
[4CO2-F21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPN[4CO2-F]VCSRTHKWCKYVF-{Amide}	317
[2PAL21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPN[2PAL]VCSRTHKWCKYVF-{Amide}	318
[Phe22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLFCSRTHKWCKYVF-{Amide}	319
[Pro22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLPCSRTHKWCKYVF-{Amide}	320
[Ile22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLICSRTHKWCKYVF-{Amide}	321
[Leu22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLLCSRTHKWCKYVF-{Amide}	322
[Ser22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLSCSRTHKWCKYVF-{Amide}	323
[Gly22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLGCSRTHKWCKYVF-{Amide}	324
[Asn22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLNCSRTHKWCKYVF-{Amide}	325
[His22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLHCSRTHKWCKYVF-{Amide}	326
[Asp22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLDCSRTHKWCKYVF-{Amide}	327
[NMePhe22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNL[NMePhe]CSRTHKWCKYVF-{Amide}	328
[Thr22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLTCSRTHKWCKYVF-{Amide}	329
[Phg22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNL[Phg]CSRTHKWCKYVF-{Amide}	330
[Tyr22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLYCSRTHKWCKYVF-{Amide}	331
[Met22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLMCSRTHKWCKYVF-{Amide}	332
[4CO2-F22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNL[4CO2-F]CSRTHKWCKYVF-{Amide}	333
[2PAL22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNL[2PAL]CSRTHKWCKYVF-{Amide}	334
[K(Me2)25]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCS[K(Me2)]THKWCKYVF-{Amide}	335
[SDMA25]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCS[SDMA]THKWCKYVF-{Amide}	336
[His26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRHHKWCKYVF-{Amide}	337
[Ser26]GpTx-1(1-	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRSHKWCKYVF-	338

34)	{Amide}	
[Gln26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRQHKWCKYVF-{Amide}	339
[Tyr26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRYHKWCKYVF-{Amide}	340
[Phe26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRFHKWCKYVF-{Amide}	341
[Asn26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRNHKWCKYVF-{Amide}	342
[Gly26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRGHKWCKYVF-{Amide}	343
[Val26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRVHKWCKYVF-{Amide}	344
[Pro26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRPHKWCKYVF-{Amide}	345
[Met26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRMHKWCKYVF-{Amide}	346
[Asp26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRDHKWCKYVF-{Amide}	347
[Ile26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRIHKWCKYVF-{Amide}	348
[2PAL26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSR[2PAL]HKWCKYVF-{Amide}	349
[4CO2-F26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSR[4CO2-F]HKWCKYVF-{Amide}	350
[4CO2-F27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[4CO2-F]KWCKYVF-{Amide}	351
[2PAL27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[2PAL]KWCKYVF-{Amide}	352
[SDMA27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[SDMA]KWCKYVF-{Amide}	353
[K(Me2)27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[K(Me2)]KWCKYVF-{Amide}	354
[K(Me2)28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTH[K(Me2)]WCKYVF-{Amide}	355
[SDMA28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTH[SDMA]WCKYVF-{Amide}	356
[NMeTrp29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[NMeTrp]CKYVF-{Amide}	357
[pI-Phe29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[pI-Phe]CKYVF-{Amide}	358
[NMePhe29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[NMePhe]CKYVF-{Amide}	359
[Bip29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[Bip]CKYVF-{Amide}	360
[1'NMeW29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[1'NMeW]CKYVF-{Amide}	361

[Phg29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[Phg]CKYVF-{Amide}	362
[4CO2-F29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[4CO2-F]CKYVF-{Amide}	363
[2PAL31]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWC[2PAL]YVF-{Amide}	364
[SDMA31]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWC[SDMA]YVF-{Amide}	365
[Gln32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKQVF-{Amide}	366
[Ile32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKIVF-{Amide}	367
[Met32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKMVF-{Amide}	368
[Thr32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKTVF-{Amide}	369
[NMePhe32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[NMePhe]VF-{Amide}	370
[NMeTrp32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[NMeTrp]VF-{Amide}	371
[Val32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKVVF-{Amide}	372
[Leu32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKLVF-{Amide}	373
[Phg32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[Phg]VF-{Amide}	374
[Cha32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[Cha]VF-{Amide}	375
[Bip32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[Bip]VF-{Amide}	376
[Phe32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKFVF-{Amide}	377
[Gly32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKGVF-{Amide}	378
[Asn32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKNVF-{Amide}	379
[His32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKHVF-{Amide}	380
[pI-Phe32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[pI-Phe]VF-{Amide}	381
[Ser32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKSVF-{Amide}	382
[Pro32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKPVF-{Amide}	383
[2PAL32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[2PAL]VF-{Amide}	384
[4CO2-F32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[4CO2-F]VF-{Amide}	385
[Cha33]GpTx-1(1-	{H}-	386

34)	DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[Cha]F-{Amide}	
[NMePhe33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[NMePhe]F-{Amide}	388
[NMeTrp33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[NMeTrp]F-{Amide}	389
[Phe33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYFF-{Amide}	390
[Met33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYMF-{Amide}	391
[His33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYHF-{Amide}	392
[Phg33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[Phg]F-{Amide}	393
[Asn33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYNF-{Amide}	394
[Asp33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYDF-{Amide}	395
[Thr33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYTF-{Amide}	396
[Ser33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYSF-{Amide}	397
[Pro33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYPF-{Amide}	398
[Tyr33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYYF-{Amide}	399
[Leu33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYLF-{Amide}	400
[Gly33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYGF-{Amide}	401
[2PAL33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[2PAL]F-{Amide}	402
[4CO2-F33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[4CO2-F]F-{Amide}	403
[D-Phe34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVf-{Amide}	404
[Cha34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[Cha]-{Amide}	405
[Phg34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[Phg]-{Amide}	406
[NMeTrp34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[NMeTrp]-{Amide}	407
[NMePhe34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[NMePhe]-{Amide}	408
[1'NMeW34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[1'NMeW]-{Amide}	409

[4CO2-F34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[4CO2-F]-{Amide}	410
[2PAL34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[2PAL]-{Amide}	411
GpTx-1(1-34)-2-Nal	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[2-Nal]-{Amide}	412
GpTx-1(1-34)-4CO2-F	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[4CO2-F]-{Amide}	413
GpTx-1(1-34)-2PAL	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[2PAL]-{Amide}	414
GpTx-1(1-33)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV-{Amide}	415
GpTx-1(1-32)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY-{Amide}	416
GpTx-1(1-31)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK-{Amide}	417
GpTx-1(1-30)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWC-{Amide}	418
[Ala5;Glu33]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYEF-{Amide}	419
[Ala5;Arg28;1-Nal33]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHRWCKY[1-Nal]F-{Amide}	420
[Ala5;1-Nal20]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRP[1-Nal]LVCSRTHKWCKYVF-{Amide}	421
[Ala5;Trp20]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPWLVCSRTHKWCKYVF-{Amide}	422
[Ala5;Trp12]GpTx-1(1-34)	{H}-DCLGAMRKCIPWNDKCCRPNLVCSRTHKWCKYVF-{Amide}	423
[Trp4;Ala5]GpTx-1(1-34)	{H}-DCLWAMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	424
[1-Nal1;Ala5]GpTx-1(1-34)	{H}-[1-Nal]CLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	425
[Ala5,33]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYAF-{Amide}	426
[Ala5;1-Nal13]GpTx-1(1-34)	{H}-DCLGAMRKCIPD[1-Nal]DKCCRPNLVCSRTHKWCKYVF-{Amide}	427
[Ala5;Trp13]GpTx-1(1-34)	{H}-DCLGAMRKCIPDWDKCCRPNLVCSRTHKWCKYVF-{Amide}	428
[Glu4;Ala5]GpTx-1(1-34)	{H}-DCLEAMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	429
[Ala5;Glu34]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYVE-{Amide}	430
[Ala5,34]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYVA-{Amide}	431
[Ala5,32]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKAVF-{Amide}	432
[Ala5,31]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCAYVF-{Amide}	433
[Ala5,29]GpTx-	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKACKYVF-	434

1(1-34)	{Amide}	
[Ala5;Glu28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	435
[Ala5;Glu7]GpTx-1(1-34)	{H}-DCLGAMEKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	436
[Ala5;Glu29]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKECKYVF-{Amide}	437
[Ala5;Glu25]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSETHKWCKYVF-{Amide}	438
[Ala5;Glu15]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDECCRPNLVCSRTHKWCKYVF-{Amide}	439
[1-Nal10;Trp32]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKWVF-{Amide}	440
[1-Nal10;Arg28]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHRWCKYVF-{Amide}	441
[Arg28;1-Nal33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCKY[1-Nal]F-{Amide}	442
[Arg28;Trp32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCKWVF-{Amide}	443
[Arg28;Trp33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCKYWF-{Amide}	444
[Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHRWCKYVF-{Amide}	445
[Leu26;Trp32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKWCKWVF-{Amide}	446
[Leu26;Trp33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKWCKYWF-{Amide}	447
[Trp6;Arg28]GpTx-1(1-34)	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{Amide}	448
[Trp6,32]GpTx-1(1-34)	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRTHKWCKWVF-{Amide}	449
[Trp32,33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKWWF-{Amide}	450
[1-Nal6;Trp32]GpTx-1(1-34)	{H}-DCLGF[1-Nal]RKCIPDNDKCCRPNLVCSRTHKWCKWVF-{Amide}	451
[1-Nal10,32]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCK[1-Nal]VF-{Amide}	452
[Leu26;1-Nal32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKWCK[1-Nal]VF-{Amide}	453
[1-Nal6;Arg28]GpTx-1(1-34)	{H}-DCLGF[1-Nal]RKCIPDNDKCCRPNLVCSRTHRWCKYVF-{Amide}	454
[Trp32;1-Nal33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKW[1-Nal]F-{Amide}	455
[Trp6;Leu26]GpTx-1(1-34)	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRLHKWCKYVF-{Amide}	456
[1-Nal10;Leu26]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRLHKWCKYVF-{Amide}	457
[Trp6;1-	{H}-DCLGFWRKC[1-	458

Nal10]GpTx-1(1-34)	Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	
[1-Nal10;Trp12]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PWNDKCCRPNLVCSRTHKWCKYVF-{Amide}	459
[1-Nal32;Trp33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[1-Nal]WF-{Amide}	460
[Trp6;1-Nal33]GpTx-1(1-34)	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRTHKWCKY[1-Nal]F-{Amide}	461
[1-Nal10,33]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKY[1-Nal]F-{Amide}	462
[Leu26;1-Nal33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKWCKY[1-Nal]F-{Amide}	463
Trp-[1-Nal10]GpTx-1(1-34)	{H}-WDCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	464
[Trp1;1-Nal10]GpTx-1(1-34)	{H}-WCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	465
[1-Nal1,10]GpTx-1(1-34)	{H}-[1-Nal]CLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	466
GpTx-2	{H}-DCLGFMRKCSPDNDKCCRPNLVCSRKHKWCKYEI-{Amide}	467
GpTx-3	{H}-DCLGWFKGCDPDNDKCCEGYKCNRRDKWCKYKL-{Amide}	468
GpTx-4	{H}-DCLGWFKGCDPDNDKCCENYKCNRREQWCKYKL-{Amide}	469
GpTx-5(1-35)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFK-{FreeAcid}	470
GpTx-6(1-35)	{H}-DCLGWFKGCDPDNDKCCEGYKCNRRDKWCKYKLWK-{FreeAcid}	471
GpTx-6(1-34)	{H}-DCLGWFKGCDPDNDKCCEGYKCNRRDKWCKYKLW-{FreeAcid}	472
GpTx-7(1-35)	{H}-DCLGWFKGCDPDNDKCCENYKCNRRDKWCKYKLWK-{FreeAcid}	473
GpTx-7(1-34)	{H}-DCLGWFKGCDPDNDKCCENYKCNRRDKWCKYKLW-{FreeAcid}	474
[Phe6;Atz(20kDa PEG)13]GpTx-1(1-34)	{H}-DCLGFFRKCIPD[Atz(20kDa PEG)]DKCCRPNLVCSRTHKWCKYVF-{Amide}	590
[Phe6;Atz13]GpTx-1(1-34)	DCLGFFRKCIPD[Atz]DKCCRPNLVCSRTHKWCKYVF{Amide}	591
[Phe6,Atz(20kDa Peg)28]GpTx-1(1-34)	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTH[Atz(20kDa PEG)]WCKYVF-{Amide}	593
[Phe6,Atz(20kDa Peg)22]GpTx-1(1-34)	{H}-DCLGFFRKCIPDNDKCCRPNL[Atz(20kDa PEG)]CSRTHKWCKYVF-{Amide}	594
[1-Nal10;Glu29]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKECKYVF-{Amide}	595

[3Pal5]GpTx-1(1-34)	{H}-DCLG[3Pal]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	596
[Ala5;Phe6;Tyr13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDYDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	597
[Ala5;Leu6;Gly28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHGWCKYVF-{FreeAcid}	598
[Ala5;Leu6;His28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHHWCKYVF-{FreeAcid}	599
[Ala5;Leu6]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{FreeAcid}	600
[Ala5;Leu6;Asn28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHNWCKYVF-{FreeAcid}	601
[D-Ala5;Phe6]GpTx-1(1-34)	{H}-DCLGaFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	602
[bAla5;Phe6]GpTx-1(1-34)	{H}-DCLG[bAla]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	603
[Aib5;Phe6]GpTx-1(1-34)	{H}-DCLG[Aib]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	604
[2-Abu5;Phe6]GpTx-1(1-34)	{H}-DCLG[2-Abu]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	605
[Nva5;Phe6]GpTx-1(1-34)	{H}-DCLG[Nva]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	606
[Nle5;Phe6]GpTx-1(1-34)	{H}-DCLG[Nle]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	607
[OctylG5;Phe6]GpTx-1(1-34)	{H}-DCLG[OctylG]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	608
[Tle5;Phe6]GpTx-1(1-34)	{H}-DCLG[Tle]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	609
[hLeu5;Phe6]GpTx-1(1-34)	{H}-DCLG[hLeu]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	610
[Met5;Phe6]GpTx-1(1-34)	{H}-DCLGMFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	611
[Leu5;Phe6]GpTx-1(1-34)	{H}-DCLGLFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	612
[3Pal5;Phe6]GpTx-1(1-34)	{H}-DCLG[3Pal]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	613
[Thi5;Phe6]GpTx-1(1-34)	{H}-DCLG[Thi]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	614
[Cpg5;Phe6]GpTx-1(1-34)	{H}-DCLG[Cpg]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	615
[Chg5;Phe6]GpTx-1(1-34)	{H}-DCLG[Chg]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	616

[Ser5;Phe6]GpTx-1(1-34)	{H}-DCLGSFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	617
[Val5;Phe6]GpTx-1(1-34)	{H}-DCLGVFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	618
[4-Bz-F5;Phe6]GpTx-1(1-34)	{H}-DCLG[4-Bz-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	619
[DiMeO-F5;Phe6]GpTx-1(1-34)	{H}-DCLG[DiMeO-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	620
[DiCl-F5;Phe6]GpTx-1(1-34)	{H}-DCLG[DiCl-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	621
[pI-Phe5;Phe6]GpTx-1(1-34)	{H}-DCLG[pI-Phe]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	622
[4CF3-F5;Phe6]GpTx-1(1-34)	{H}-DCLG[4CF3-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	623
[4-F-F5;Phe6]GpTx-1(1-34)	{H}-DCLG[4-F-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	624
[4-Me-F5;Phe6]GpTx-1(1-34)	{H}-DCLG[4-Me-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	625
[4tBu-F5;Phe6]GpTx-1(1-34)	{H}-DCLG[4tBu-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	626
[NMeVal5;Phe6]GpTx-1(1-34)	{H}-DCLG[NMeVal]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	627
[NMeLeu5;Phe6]GpTx-1(1-34)	{H}-DCLG[NMeLeu]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	628
[NMePhe5;Phe6]GpTx-1(1-34)	{H}-DCLG[NMePhe]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	629
[2-Cl-F5;Phe6]GpTx-1(1-34)	{H}-DCLG[2-Cl-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	630
[hPhe5;Phe6]GpTx-1(1-34)	{H}-DCLG[hPhe]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	631
[Sar5;Phe6]GpTx-1(1-34)	{H}-DCLG[Sar]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	632
[D-Ala5;Leu6]GpTx-1(1-34)	{H}-DCLGaLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	633
[bAla5;Leu6]GpTx-1(1-34)	{H}-DCLG[bAla]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	634
[Aib5;Leu6]GpTx-1(1-34)	{H}-DCLG[Aib]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	635
[2-Abu5;Leu6]GpTx-1(1-34)	{H}-DCLG[2-Abu]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	636

[Nva5;Leu6]GpTx-1(1-34)	{H}-DCLG[Nva]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	637
[Nle5;Leu6]GpTx-1(1-34)	{H}-DCLG[Nle]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	638
[OctylG5;Leu6]GpTx-1(1-34)	{H}-DCLG[OctylG]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	639
[Ala5,Phe6,Pra13,Leu26,Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPD[Pra]DKCCRPNLVCSRLHRWCKYVF-{Amide}	640
[Met5;Leu6]GpTx-1(1-34)	{H}-DCLGMLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	641
[3Pal5;Leu6]GpTx-1(1-34)	{H}-DCLG[3Pal]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	642
[Ser5;Leu6]GpTx-1(1-34)	{H}-DCLGSLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	643
[Val5;Leu6]GpTx-1(1-34)	{H}-DCLGVLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	644
[DiMeO-F5;Leu6]GpTx-1(1-34)	{H}-DCLG[DiMeO-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	645
[Sar5;Leu6]GpTx-1(1-34)	{H}-DCLG[Sar]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	646
[D-Ala5]GpTx-1(1-34)	{H}-DCLGaMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	647
[bAla5]GpTx-1(1-34)	{H}-DCLG[bAla]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	648
[2-Abu5]GpTx-1(1-34)	{H}-DCLG[2-Abu]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	649
[Nva5]GpTx-1(1-34)	{H}-DCLG[Nva]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	650
[Nle5]GpTx-1(1-34)	{H}-DCLG[Nle]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	651
[DiMeO-F5]GpTx-1(1-34)	{H}-DCLG[DiMeO-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	652
[DiCl-F5]GpTx-1(1-34)	{H}-DCLG[DiCl-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	653
[4CF3-F5]GpTx-1(1-34)	{H}-DCLG[4CF3-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	654
[4-F-F5]GpTx-1(1-34)	{H}-DCLG[4-F-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	655
[NMeVal5]GpTx-1(1-34)	{H}-DCLG[NMeVal]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	656
[NMePhe5]GpTx-1(1-34)	{H}-DCLG[NMePhe]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	657
[Sar5]GpTx-1(1-34)	{H}-DCLG[Sar]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	658
[Tle5;Leu6]GpTx-1(1-34)	{H}-DCLG[Tle]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	659
[hLeu5;Leu6]GpTx	{H}-	660

-1(1-34)	DCLG[hLeu]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	
[Leu5,6]GpTx-1(1-34)	{H}-DCLGLLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	661
[Thi5;Leu6]GpTx-1(1-34)	{H}-DCLG[Thi]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	662
[Cpg5;Leu6]GpTx-1(1-34)	{H}-DCLG[Cpg]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	663
[Chg5;Leu6]GpTx-1(1-34)	{H}-DCLG[Chg]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	664
[4-Bz-F5;Leu6]GpTx-1(1-34)	{H}-DCLG[4-Bz-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	665
[DiCl-F5;Leu6]GpTx-1(1-34)	{H}-DCLG[DiCl-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	666
[pI-Phe5;Leu6]GpTx-1(1-34)	{H}-DCLG[pI-Phe]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	667
[4CF3-F5;Leu6]GpTx-1(1-34)	{H}-DCLG[4CF3-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	668
[4-F-F5;Leu6]GpTx-1(1-34)	{H}-DCLG[4-F-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	669
[4-Me-F5;Leu6]GpTx-1(1-34)	{H}-DCLG[4-Me-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	670
[4tBu-F5;Leu6]GpTx-1(1-34)	{H}-DCLG[4tBu-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	671
[NMeVal5;Leu6]GpTx-1(1-34)	{H}-DCLG[NMeVal]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	672
[NMeLeu5;Leu6]GpTx-1(1-34)	{H}-DCLG[NMeLeu]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	673
[NMePhe5;Leu6]GpTx-1(1-34)	{H}-DCLG[NMePhe]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	674
[2-Cl-F5;Leu6]GpTx-1(1-34)	{H}-DCLG[2-Cl-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	675
[hPhe5;Leu6]GpTx-1(1-34)	{H}-DCLG[hPhe]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	676
[OctylG5]GpTx-1(1-34)	{H}-DCLG[OctylG]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	677
[Tle5]GpTx-1(1-34)	{H}-DCLG[Tle]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	678
[hLeu5]GpTx-1(1-34)	{H}-DCLG[hLeu]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	679

[Cha5;Phe6]GpTx-1(1-34)	{H}-DCLG[Cha]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	680
[Cha5;Leu6]GpTx-1(1-34)	{H}-DCLG[Cha]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	681
[Thi5]GpTx-1(1-34)	{H}-DCLG[Thi]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	682
[Cpg5]GpTx-1(1-34)	{H}-DCLG[Cpg]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	683
[Chg5]GpTx-1(1-34)	{H}-DCLG[Chg]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	684
[4-Bz-F5]GpTx-1(1-34)	{H}-DCLG[4-Bz-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	685
[4-Me-F5]GpTx-1(1-34)	{H}-DCLG[4-Me-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	686
[4tBu-F5]GpTx-1(1-34)	{H}-DCLG[4tBu-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	687
[NMeLeu5]GpTx-1(1-34)	{H}-DCLG[NMeLeu]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	688
[2-Cl-F5]GpTx-1(1-34)	{H}-DCLG[2-Cl-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	689
[hPhe5]GpTx-1(1-34)	{H}-DCLG[hPhe]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	690
[Ala5;Glu28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	691
[Ala5;1'NMeW32]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCK[1'NMeW]VF-{Amide}	692
[Met5;1'NMeW32]GpTx-1(1-34)	{H}-DCLGMMRKCIPDNDKCCRPNLVCSRTHKWCK[1'NMeW]VF-{Amide}	693
[Arg4;Met5]GpTx-1(1-34)	{H}-DCLRMMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	694
[Ser19;1'NMeW32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRSNLVCSRTHKWCK[1'NMeW]VF-{Amide}	695
[Ala5;Leu6]GpTx-1(1-34)	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	696
[Ala5;Gly6]GpTx-1(1-34)	{H}-DCLGAGRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	697
[Ala5;Tyr6]GpTx-1(1-34)	{H}-DCLGAYRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	698
[Ala5;1'NMeW6]GpTx-1(1-34)	{H}-DCLGA[1'NMeW]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	699
[Ala5;Asp10]GpTx-1(1-34)	{H}-DCLGAMRKCDPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	700
[Ala5;Asp10;Glu12]GpTx-1(1-34)	{H}-DCLGAMRKCDPENDKCCRPNLVCSRTHKWCKYVF-{Amide}	701
[Ala5;Phe6;Asp10]GpTx-1(1-34)	{H}-DCLGAFRKCDPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	702

[Ala5;Phe6;Glu12] GpTx-1(1-34)	{H}-DCLGAFRKCIPENDKCCRPNLVCSRTHKWCKYVF-{Amide}	703
[Val5;Glu28]GpTx-1(1-34)	{H}-DCLGVMRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	704
[Nva5;Glu28]GpTx-1(1-34)	{H}-DCLG[Nva]MRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	705
[2-Abu5;Glu28]GpTx-1(1-34)	{H}-DCLG[2-Abu]MRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	706
[2-Abu5;Leu6;Glu28] GpTx-1(1-34)	{H}-DCLG[2-Abu]LRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	707
[Nva5;Leu6;Glu28] GpTx-1(1-34)	{H}-DCLG[Nva]LRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	708
[Val5;Leu6;Glu28] GpTx-1(1-34)	{H}-DCLGVLRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	709
[Val5;Asp10]GpTx-1(1-34)	{H}-DCLGVMRKCDPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	710
[Val5;Glu12]GpTx-1(1-34)	{H}-DCLGVMRKCIPENDKCCRPNLVCSRTHKWCKYVF-{Amide}	711
[Val5;Asp10;Glu12]GpTx-1(1-34)	{H}-DCLGVMRKCDPENDKCCRPNLVCSRTHKWCKYVF-{Amide}	712
[Val5;Cit25]GpTx-1(1-34)	{H}-DCLGVMRKCIPDNDKCCRPNLVCS[Cit]THKWCKYVF-{Amide}	713
[Thr5;Asp10]GpTx-1(1-34)	{H}-DCLGTMRKCDPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	714
[Ala5;Gly28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHGWCKYVF-{Amide}	715
[2-Abu2,17;Ala5;Asp 10]GpTx-1(1-34)	{H}-D[2-Abu]LGAMRKCDPDNDKC[2-Abu]RPNLVCSRTHKWCKYVF-{Amide}	716
[2-Abu2,17;Nva5;Leu 6;Glu28]GpTx-1(1-34)	{H}-D[2-Abu]LG[Nva]LRKCIPDNDKC[2-Abu]RPNLVCSRTHEWCKYVF-{Amide}	717
[2-Abu2,5,17;Leu6;Gl u28]GpTx-1(1-34)	{H}-D[2-Abu]LG[2-Abu]LRKCIPDNDKC[2-Abu]RPNLVCSRTHEWCKYVF-{Amide}	718
[2-Abu2,17;Ala5;Leu 6;Glu28]GpTx-1(1-34)	{H}-D[2-Abu]LGALRKCIPDNDKC[2-Abu]RPNLVCSRTHEWCKYVF-{Amide}	719
[2-Abu2,17;Val5;Leu 6;Glu28]GpTx-1(1-34)	{H}-D[2-Abu]LGVLRKCIPDNDKC[2-Abu]RPNLVCSRTHEWCKYVF-{Amide}	720
[Ala5;Nle6]GpTx-1(1-34)	{H}-DCLGA[Nle]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	721
[Ala5;Nle6;Glu10] GpTx-1(1-34)	{H}-DCLGA[Nle]RKCEPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	722
[Ala5;Leu6;Glu10] GpTx-1(1-34)	{H}-DCLGALRKCEPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	723
[Ala5;Phe6;Glu10] GpTx-1(1-34)	{H}-DCLGAFRKCEPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	724

[Ala5;Nle6;Glu12] GpTx-1(1-34)	{H}-DCLGA[Nle]RKCIPENDKCCRPNLVCSRTHKWCKYVF-{Amide}	725
[Ala5;Leu6;Glu12] GpTx-1(1-34)	{H}-DCLGALRKCIPENDKCCRPNLVCSRTHKWCKYVF-{Amide}	726
[Ala5;Nle6;Glu28] GpTx-1(1-34)	{H}-DCLGA[Nle]RKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	727
[Ala5;Leu6;Glu28] GpTx-1(1-34)	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	728
[Ala5;Phe6;Glu28] GpTx-1(1-34)	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	729
[Ala5,25;Nle6]GpTx-1(1-34)	{H}-DCLGA[Nle]RKCIPDNDKCCRPNLVCSATHKWCKYVF-{Amide}	730
[Ala5,25;Leu6]GpTx-1(1-34)	{H}-DCLGALRKCIPDNDKCCRPNLVCSATHKWCKYVF-{Amide}	731
[Ala5,25;Phe6]GpTx-1(1-34)	{H}-DCLGAFRKCIPDNDKCCRPNLVCSATHKWCKYVF-{Amide}	732
[Ala5;Nle6;Glu25] GpTx-1(1-34)	{H}-DCLGA[Nle]RKCIPDNDKCCRPNLVCSETHKWCKYVF-{Amide}	733
[Ala5;Leu6;Glu25] GpTx-1(1-34)	{H}-DCLGALRKCIPDNDKCCRPNLVCSETHKWCKYVF-{Amide}	734
[Ala5;Phe6;Glu25] GpTx-1(1-34)	{H}-DCLGAFRKCIPDNDKCCRPNLVCSETHKWCKYVF-{Amide}	735
[Phe6,Pra15]GpTx-1(1-34)	{H}-DCLGFFRKCIPDND[Pra]CCRPNLVCSRTHKWCKYVF-{Amide}	736
[Ala5;His28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHHWCKYVF-{Amide}	737
[Ala5;Ser28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHSWCKYVF-{Amide}	738
[Ala5;Gln28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHQWCKYVF-{Amide}	739
[Ala5;3Pal28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[3Pal]WCKYVF-{Amide}	740
[Ala5;4-aminoF28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[4-aminoF]WCKYVF-{Amide}	741
[Ala5;K(Ac)28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[K(Ac)]WCKYVF-{Amide}	742
[Ala5;SDMA28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[SDMA]WCKYVF-{Amide}	743
[Ala5;hArg28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[hArg]WCKYVF-{Amide}	744
[Ala5;R(Me)28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[R(Me)]WCKYVF-{Amide}	745
[Ala5;Orn28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Orn]WCKYVF-{Amide}	746
[Ala5;Dap28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Dap]WCKYVF-{Amide}	747
[Ala5;Cit28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Cit]WCKYVF-{Amide}	748

[Ala5;HCit28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[HCit]WCKYVF-{Amide}	749
[Asp28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHDWCKYVF-{Amide}	750
[Gly5;Val6]GpTx-1(1-34)	{H}-DCLGGVRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	751
[Gly5;Ile6]GpTx-1(1-34)	{H}-DCLGGIRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	752
[2-Abu5;Nle6]GpTx-1(1-34)	{H}-DCLG[2-Abu][Nle]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	753
[Gly5;Phe6;Glu10]GpTx-1(1-34)	{H}-DCLGGFRKCEPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	754
[Gly5;Phe6;Glu28]GpTx-1(1-34)	{H}-DCLGGFRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	755
4-Pen-[Ala5;Phe6;2-Abu13;Arg28]GpTx-1(1-34)	{4-Pen}-DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{Amide}	756
4-Pen-[Ala5;Phe6;2-Abu13]GpTx-1(1-34)	{4-Pen}-DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHKWCKYVF-{Amide}	757
4-Pen-[2-Abu5,13;Leu6]GpTx-1(1-34)	{4-Pen}-DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHKWCKYVF-{Amide}	758
4-Pen-[Nva5;Leu6;2-Abu13;Arg28]GpTx-1(1-34)	{4-Pen}-DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{Amide}	759
4-Pen-[Nva5;Leu6;2-Abu13]GpTx-1(1-34)	{4-Pen}-DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRTHKWCKYVF-{Amide}	760
[Ala5;Guf28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Guf]WCKYVF-{Amide}	761
[Ala5;Dab28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Dab]WCKYVF-{Amide}	762
[Gln28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHQWCKYVF-{Amide}	763
[Ala5;Phe28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHFWCKYVF-{Amide}	764
[Ala5;Tyr28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHYWCKYVF-{Amide}	765
[Ala5;Leu28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHLWCKYVF-{Amide}	766
[Ala5;Asn28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHNWCKYVF-{Amide}	767
[Ala5;Cit25]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCS[Cit]THKWCKYVF-{Amide}	768
[Ala5;Asp28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHDWCKYVF-{Amide}	769
[Ala5;Met28]GpTx-	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHMWCKYVF-	770

1(1-34)	{Amide}	
[Ala5;K(Me)28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[K(Me)]WCKYVF-{Amide}	771
[pS28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTH[pS]WCKYVF-{Amide}	772
[Thr5;Asp10;Glu12]GpTx-1(1-34)	{H}-DCLGTMRKCDPENDKCCRPNLVCSRTHKWCKYVF-{Amide}	773
[1-Nal10;Glu33]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYEF-{Amide}	774
[1-Nal10;Glu32]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKEVF-{Amide}	775
[1-Nal10;Glu31]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCEYVF-{Amide}	776
[1-Nal10;Ala33]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYAF-{Amide}	777
[1-Nal10;Ala32]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKAVF-{Amide}	778
[1-Nal10;Ala31]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCAYVF-{Amide}	779
[1-Nal10;Glu28]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	780
[1-Nal10;Glu15]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDECCRPNLVCSRTHKWCKYVF-{Amide}	781
[Glu8;1-Nal10]GpTx-1(1-34)	{H}-DCLGFMREC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	782
[Glu4;1-Nal10]GpTx-1(1-34)	{H}-DCLEFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	783
[1-Nal1;Glu8]GpTx-1(1-34)	{H}-[1-Nal]CLGFMRECIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	784
[1-Nal1;Glu7]GpTx-1(1-34)	{H}-[1-Nal]CLGFMEKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	785
[1-Nal1;Glu6]GpTx-1(1-34)	{H}-[1-Nal]CLGFERKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	786
[Ala5;Glu26]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSREHKWCKYVF-{Amide}	787
[Ala5;Glu27]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTEKWCKYVF-{Amide}	788
[Ala5;Glu31]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCEYVF-{Amide}	789
[Ala5]GpTx-1(1-34)-Glu	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYVFE-{Amide}	790
[Ala5,Met(O)6]GpT	{H}-	791

x-1 isomer1	DCLGA[METO1]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	
[Ala5,Met(O)6]GpTx-1 isomer2	{H}-DCLGA[METO1]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	792
[Ala5;Phe6;Pra13]GpTx-1(1-34)	{H}-DCLGAFRKCIPD[Pra]DKCCRPNLVCSRTHKWCKYVF-{Amide}	793
[Ala5;Phe6;K(Ac-Pra)13]GpTx-1(1-34)	{H}-DCLGAFRKCIPD[K(Ac-Pra)]DKCCRPNLVCSRTHKWCKYVF-{Amide}	794
[Ala5;Phe6;K(Ac-Pra)13;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPD[K(Ac-Pra)]DKCCRPNLVCSRTHRWCKYVF-{Amide}	795
[Ala5;Leu6,26;Pra13;Arg28]GpTx-1(1-34)	{H}-DCLGALRKCIPD[Pra]DKCCRPNLVCSRLHRWCKYVF-{Amide}	796
[2-Abu5;Leu6;Pra13]GpTx-1(1-34)	{H}-DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSRTHKWCKYVF-{Amide}	797
[Ala5;Phe6;Glu10;Pra13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCEPD[Pra]DKCCRPNLVCSRLHRWCKYVF-{Amide}	798
[2-Abu5;Leu6;K(Ac-Pra)13]GpTx-1(1-34)	{H}-DCLG[2-Abu]LRKCIPD[K(Ac-Pra)]DKCCRPNLVCSRTHKWCKYVF-{Amide}	799
[Ala5;Leu6,26;Glu10;Pra13;Arg28]GpTx-1(1-34)	{H}-DCLGALRKCEPD[Pra]DKCCRPNLVCSRLHRWCKYVF-{Amide}	800
[2-Abu5;Leu6;K(4-Pen)13;Arg28]GpTx-1(1-34)	{H}-DCLG[2-Abu]LRKCIPD[K(4-Pen)]DKCCRPNLVCSRTHRWCKYVF-{Amide}	801
[Ala5;Leu6,26;Pra12;Arg28]GpTx-1(1-34)	{H}-DCLGALRKCIP[Pra]NDKCCRPNLVCSRLHRWCKYVF-{Amide}	802
[Ala5;Phe6;Pra12;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIP[Pra]NDKCCRPNLVCSRLHRWCKYVF-{Amide}	803
[2-Abu5;Phe6;K(4-Pen)13]GpTx-1(1-34)	{H}-DCLG[2-Abu]FRKCIPD[K(4-Pen)]DKCCRPNLVCSRTHKWCKYVF-{Amide}	804
[Nva5;Leu6;K(4-Pen)13;Arg28]GpTx-1(1-34)	{H}-DCLG[Nva]LRKCIPD[K(4-Pen)]DKCCRPNLVCSRTHRWCKYVF-{Amide}	805
[Nva5;Leu6;K(4-Pen)13]GpTx-1(1-34)	{H}-DCLG[Nva]LRKCIPD[K(4-Pen)]DKCCRPNLVCSRTHKWCKYVF-{Amide}	806
4-Pen-[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34)	{4-Pen}-DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{Amide}	807
[2-Abu5;Leu6;K(4-Pen)13;Glu28]GpTx-1(1-34)	{H}-DCLG[2-Abu]LRKCIPD[K(4-Pen)]DKCCRPNLVCSRTHEWCKYVF-{Amide}	808
[Ala5;Phe6;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{Amide}	809
[Ala5;Leu6;Arg28]	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVF-	810

GpTx-1(1-34)	{Amide}	
Gly-Ser-[Ala5;Phe6;Arg28] GpTx-1(1-34)	{H}-GSDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{Amide}	811
Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{Amide}	812
[Ala5;Phe6;Arg28] GpTx-1(1-34)-Trp-FreeAcid	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFW-{FreeAcid}	813
[Ala5;Leu6;Arg28] GpTx-1(1-34)-Trp-FreeAcid	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFW-{FreeAcid}	814
Gly-Ser-[Ala5;Phe6;Arg28] GpTx-1(1-34)-Trp-FreeAcid	{H}-GSDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFW-{FreeAcid}	815
Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Trp-FreeAcid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFW-{FreeAcid}	816
[Ala5;Phe6;Arg28] GpTx-1(1-34)-Phe-FreeAcid	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	817
[Ala5;Leu6;Arg28] GpTx-1(1-34)-Phe-FreeAcid	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	818
Gly-Ser-[Ala5;Phe6;Arg28] GpTx-1(1-34)-Phe-FreeAcid	{H}-GSDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	819
Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Phe-FreeAcid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	820
Gly-Ser-[Ala5;Phe6;Arg28] GpTx-1(1-34)-FreeAcid	{H}-GSDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	821
Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-FreeAcid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	822
[Ala5;Phe6;Arg28] GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	823
[Ala5,28;Phe6]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHAWCKYVF-{FreeAcid}	824
[Ala5;Phe6;Asp28] GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHDWCKYVF-{FreeAcid}	825
[Ala5;Phe6;Glu28] GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{FreeAcid}	826
[Ala5;Phe6;Gly28]	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHGWCKYVF-	827

GpTx-1(1-34)-FreeAcid	{FreeAcid}	
[Ala5;Phe6;His28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHHWCKYVF-{FreeAcid}	828
[Ala5;Phe6]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{FreeAcid}	829
[Ala5;Phe6;Leu28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHLWCKYVF-{FreeAcid}	830
[Ala5;Phe6;Met28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHMWCKYVF-{FreeAcid}	831
[Ala5;Phe6;Asn28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHNWCKYVF-{FreeAcid}	832
[Ala5;Phe6;Pro28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHPWCKYVF-{FreeAcid}	833
[Ala5;Phe6;Gln28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHQWCKYVF-{FreeAcid}	834
[Ala5;Phe6;Ser28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHSWCKYVF-{FreeAcid}	835
[Ala5,13;Phe6;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDADKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	836
[Ala5;Phe6;Asp13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDDDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	837
[Ala5;Phe6;Glu13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDEDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	838
[Ala5;Phe6,13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDFDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	839
[Ala5;Phe6;Gly13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDGDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	840
[Ala5;Phe6;His13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDHDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	841
[Ala5;Phe6;Ile13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDIDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	842
[Ala5;Phe6;Lys13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDKDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	843
[Ala5;Phe6;Leu13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDLDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	844
[Ala5;Phe6;Met13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDMDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	845
[Ala5;Phe6;Pro13;	{H}-DCLGAFRKCIPDPDKCCRPNLVCSRTHRWCKYVF-	846

Arg28]GpTx-1(1-34)-FreeAcid	{FreeAcid}	
[Ala5;Phe6;Gln13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDQDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	847
[Ala5;Phe6;Arg13,28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDRDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	848
[Ala5;Phe6;Ser13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDSDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	849
[Ala5;Phe6;Thr13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDTDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	850
[Ala5;Phe6;Val13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDVDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	851
[Ala5;Phe6;Trp13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGAFRKCIPDWDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	852
[Ala5;Leu6;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	853
[Ala5;Leu6;Asp28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHDWCKYVF-{FreeAcid}	854
[Ala5;Leu6;Glu28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{FreeAcid}	855
[Ala5;Leu6,28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHLWCKYVF-{FreeAcid}	856
[Ala5;Leu6;Met28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHMWCKYVF-{FreeAcid}	857
[Ala5;Leu6;Gln28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHQWCKYVF-{FreeAcid}	858
[Ala5;Leu6;Ser28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHSWCKYVF-{FreeAcid}	859
[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	860
[Ala5;Leu6;Asp13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDDDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	861
[Ala5;Leu6;Glu13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDEDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	862
[Ala5;Leu6;Phe13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDFDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	863
[Ala5;Leu6;His13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDHDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	864
[Ala5;Leu6;Ile13;A	{H}-DCLGALRKCIPDIDKCCRPNLVCSRTHRWCKYVF-	865

rg28]GpTx-1(1-34)-FreeAcid	{FreeAcid}	
[Ala5;Leu6;Lys13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDKDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	866
[Ala5;Leu6,13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDLDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	867
[Ala5;Leu6;Met13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDMDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	868
[Ala5;Leu6;Gln13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDQDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	869
[Ala5;Leu6;Arg13,28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDRDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	870
[Ala5;Leu6;Ser13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDSDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	871
[Ala5;Leu6;Val13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDVDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	872
[Ala5;Leu6;Tyr13;Arg28]GpTx-1(1-34)-FreeAcid	{H}-DCLGALRKCIPDYDKCCRPNLVCSRTHRWCKYVF-{FreeAcid}	873
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Gly-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFG -{FreeAcid}	874
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Gly-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFG -{FreeAcid}	875
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Gly-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFG -{FreeAcid}	876
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Ile-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFI -{FreeAcid}	877
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Ile-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFI -{FreeAcid}	878
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Ile-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFI -{FreeAcid}	879
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Ile-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFI -{FreeAcid}	880
Gly-Ser-[Ala5;Leu6;Arg28]	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFL -	881

GpTx-1(1-34)-Leu-Free Acid	{FreeAcid}	
Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Phe-Leu-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFL-{FreeAcid}	882
Gly-Ser-[Ala5,13;Leu6;Arg 28]GpTx-1(1-34)-Leu-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFL-{FreeAcid}	883
Gly-Ser-[Ala5,13;Leu6;Arg 28]GpTx-1(1-34)-Phe-Leu-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFL-{FreeAcid}	884
Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Ser-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFS-{FreeAcid}	885
Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Phe-Ser-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFS-{FreeAcid}	886
Gly-Ser-[Ala5,13;Leu6;Arg 28]GpTx-1(1-34)-Ser-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFS-{FreeAcid}	887
Gly-Ser-[Ala5,13;Leu6;Arg 28]GpTx-1(1-34)-Phe-Ser-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFS-{FreeAcid}	888
Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Thr-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFT-{FreeAcid}	889
Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Phe-Thr-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFT-{FreeAcid}	890
Gly-Ser-[Ala5,13;Leu6;Arg 28]GpTx-1(1-34)-Thr-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFT-{FreeAcid}	891
Gly-Ser-[Ala5,13;Leu6;Arg 28]GpTx-1(1-34)-Phe-Thr-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFT-{FreeAcid}	892
Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Tyr-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFY-{FreeAcid}	893
Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Phe-Tyr-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFY-{FreeAcid}	894
Gly-Ser-[Ala5,13;Leu6;Arg 28]GpTx-1(1-34)-	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFY-{FreeAcid}	895

Tyr-Free Acid		
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Tyr-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFY-{FreeAcid}	896
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Ala-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFA-{FreeAcid}	897
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Ala-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFA-{FreeAcid}	898
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Phe-Ala-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFFA-{FreeAcid}	899
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Tyr-Ala-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFYA-{FreeAcid}	900
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Leu-Ala-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFLA-{FreeAcid}	901
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Ile-Ala-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFIA-{FreeAcid}	902
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Ala-Ala-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFAA-{FreeAcid}	903
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Ser-Ala-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFSA-{FreeAcid}	904
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Thr-Ala-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFTA-{FreeAcid}	905
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Ala-Ala-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFAA-{FreeAcid}	906
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Gly-Ala-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFGA-{FreeAcid}	907
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Ala-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFA-{FreeAcid}	908
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFA-{FreeAcid}	909

Phe-Ala-Free Acid		
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Phe-Ala-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFFA-{FreeAcid}	910
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Tyr-Ala-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFYA-{FreeAcid}	911
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Leu-Ala-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFLA-{FreeAcid}	912
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Ile-Ala-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFIA-{FreeAcid}	913
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Ala-Ala-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFAA-{FreeAcid}	914
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Ser-Ala-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFSA-{FreeAcid}	915
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Thr-Ala-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFTA-{FreeAcid}	916
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Ala-Ala-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFAA-{FreeAcid}	917
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Gly-Ala-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFGA-{FreeAcid}	918
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Ala-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFA-{FreeAcid}	919
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Ala-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFA-{FreeAcid}	920
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFA-{FreeAcid}	921

Ala-Free Acid		
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Ala-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFA-{FreeAcid}	922
Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Phe-Phe-Free Acid	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFF-{FreeAcid}	923
Gly-Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-GGSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	924
Gly-Gly-Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-GGGSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	925
Gly-Gly-Gly-Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-GGGGSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	926
Ser-Gly-Gly-Gly-Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-SGGGGSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	927
Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-GSGGGGSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	928
Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-GGSGGGGSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	929
Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-GGGSGGGGSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	930
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5;Leu6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-GGGGSGGGGSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	931
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5;Phe6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-GGGGSGGGGSDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	932
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-	{H}-GGGGSGGGGSDCLGAFRKCIPDADKCCRPNLVCSRTHR	933

Gly-Ser-[Ala5,13;Phe6;Arg28]GpTx-1(1-34)-Phe-Free Acid	WCKYVFF-{FreeAcid}	
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	934
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Gly-Phe-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFGF-{FreeAcid}	935
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	936
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	937
Gly-Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	938
Gly-Gly-Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGGSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	939
Gly-Gly-Gly-Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGGGSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	940
Ser-Gly-Gly-Gly-Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-SGGGGSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	941
Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSGGGGSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	942
Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGSGGGGSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	943
Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGGSGGGGSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	944
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-	{H}-GGGGSGGGGSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	945

[Ala5,13;Leu6;Arg 28]GpTx-1(1-34)-Phe-Free Acid		
Gly-Ser-[Ala5;Leu6;Gly13; Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGALRKCIPDGDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	946
Gly-Ser-[Ala5;Leu6;Ser13; Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGALRKCIPDSDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	947
Gly-Ser-[Ala5;Leu6;Ile13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGALRKCIPDIDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	948
Gly-Ser-[Ala5;Leu6;Pro13; Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGALRKCIPDPDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	949
Gly-Ser-[Ala5;Leu6;Met13; Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGALRKCIPDMDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	950
Gly-Ser-[Ala5;Leu6;Val13; Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGALRKCIPDVDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	951
Gly-Ser-[Ala5;Leu6;Thr13; Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGALRKCIPDTDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	952
Gly-Ser-[Ala5;Leu6;Phe13; Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGALRKCIPDFDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	953
Gly-Ser-[Ala5;Leu6;Tyr13; Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGALRKCIPDYDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	954
Gly-Ser-[Ala5;Phe6;Gly13; Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGAFRKCIPDGDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	955
Gly-Ser-[Ala5;Phe6;Ser13; Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGAFRKCIPDSDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	956
Gly-Ser-[Ala5;Phe6;Ile13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGAFRKCIPDIDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	957
Gly-Ser-[Ala5;Phe6;Leu13; Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGAFRKCIPDLDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	958
Gly-Ser-[Ala5;Phe6;Met13;	{H}-GSDCLGAFRKCIPDMDKCCRPNLVCSRTHRWCKYVFF-	959

Arg28]GpTx-1(1-34)-Phe-Free Acid	{FreeAcid}	
Gly-Ser-[Ala5;Phe6;Val13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGAFRKCIPDVDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	960
Gly-Ser-[Ala5;Phe6;Thr13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGAFRKCIPDTDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	961
Gly-Ser-[Ala5;Phe6,13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGAFRKCIPDFDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	962
Gly-Ser-[Ala5;Phe6;Tyr13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GSDCLGAFRKCIPDYDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	963
Gly-Ile-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GIDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	964
Gly-Ala-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	965
Gly-Thr-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GTDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	966
Gly-Ala-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	967
Gly-Gly-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	968
Gly-Phe-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GFDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	969
Gly-Tyr-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GYDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	970
Gly-Leu-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GLDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	971
Gly-Val-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GVDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	972
Gly-Ile-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-	{H}-GIDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	973

Free Acid		
Gly-Ala-[Ala5;Phe6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	974
Gly-Thr-[Ala5;Phe6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-GTDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	975
Gly-Ala-[Ala5;Phe6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	976
Gly-Gly-[Ala5;Phe6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-GGDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	977
Gly-Phe-[Ala5;Phe6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-GFDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	978
Gly-Tyr-[Ala5;Phe6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-GYDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	979
Gly-Leu-[Ala5;Phe6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-GLDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	980
Gly-Val-[Ala5;Phe6;Arg28] GpTx-1(1-34)-Phe-Free Acid	{H}-GVDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	981
Gly-Ala-[Ala5;Phe6;Gly13; Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGAFRKCIPDGDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	982
Gly-Ala-[Ala5;Phe6;Ser13; Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGAFRKCIPDSDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	983
Gly-Ala-[Ala5;Phe6;Ile13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGAFRKCIPDIDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	984
Gly-Ala-[Ala5;Phe6;Leu13; Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGAFRKCIPDLDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	985
Gly-Ala-[Ala5;Phe6;Met13; Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGAFRKCIPDMDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	986
Gly-Ala-[Ala5;Phe6;Val13; Arg28]GpTx-1(1-	{H}-GADCLGAFRKCIPDVDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	987

34)-Phe-Free Acid		
Gly-Ala-[Ala5;Phe6;Thr13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGAFRKCIPDTDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	988
Gly-Ala-[Ala5;Phe6,13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGAFRKCIPDFDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	989
Gly-Ala-[Ala5;Phe6;Tyr13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGAFRKCIPDYDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	990
Gly-Ala-[Ala5;Leu6;Gly13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGALRKCIPDGDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	991
Gly-Ala-[Ala5;Leu6;Ser13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGALRKCIPDSDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	992
Gly-Ala-[Ala5;Leu6;Ile13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGALRKCIPDIDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	993
Gly-Ala-[Ala5;Leu6,13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGALRKCIPDLDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	994
Gly-Ala-[Ala5;Leu6;Met13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGALRKCIPDMDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	995
Gly-Ala-[Ala5;Leu6;Val13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGALRKCIPDVDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	996
Gly-Ala-[Ala5;Leu6;Thr13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGALRKCIPDTDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	997
Gly-Ala-[Ala5;Leu6;Phe13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGALRKCIPDFDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	998
Gly-Ala-[Ala5;Leu6;Tyr13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GADCLGALRKCIPDYDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	999
Gly-Gly-[Ser1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGSCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1000
Gly-Gly-[Trp1;Ala5;Leu6;Arg28]GpTx-1(1-34)-	{H}-GGWCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1001

Phe-Free Acid		
Gly-Gly-[Phe1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGFCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1002
Gly-Gly-[Ile1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGICLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1003
Gly-Gly-Ser-[Ser1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGSSCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1004
Gly-Gly-Ser-[Trp1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGSWCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1005
Gly-Gly-Ser-[Phe1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGSFCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1006
Gly-Gly-Ser-[Ile1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGSICLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1007
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ile1;Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGGGSGGGGSICLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1008
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Phe1;Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGGGSGGGGSFCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1009
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Trp1;Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGGGSGGGGSWCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1010
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ile1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGGGSGGGGSICLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1011
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Phe1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGGGSGGGGSFCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1012
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-	{H}-GGGGSGGGGSWCLGALRKCIPDNDKCCRPNLVCSRTHR	1013

Gly-Ser-[Trp1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Free Acid	WCKYVFF-{FreeAcid}	
Gly-Gly-[Ser1;Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGSCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1014
Gly-Gly-[Trp1;Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGWCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1015
Gly-Gly-[Phe1,6;Ala5;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGFCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1016
Gly-Gly-[Ile1;Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGICLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1017
Gly-Gly-Ser-[Ser1;Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGSSCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1018
Gly-Gly-Ser-[Trp1;Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGSWCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1019
Gly-Gly-Ser-[Phe1,6;Ala5;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGSFCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1020
Gly-Gly-Ser-[Ile1;Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGSICLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1021
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ile1;Ala5,13;Phe6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGGGSGGGGSICLGAFRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1022
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Phe1,6;Ala5,13;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGGGSGGGGSFCLGAFRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1023
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Trp1;Ala5,13;Phe6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGGGSGGGGSWCLGAFRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1024
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-	{H}-GGGGSGGGGSICLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1025

[Ile1;Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-Free Acid		
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Phe1,6;Ala5;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGGGSGGGGSFCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1026
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Trp1;Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-Free Acid	{H}-GGGGSGGGGSWCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{FreeAcid}	1027
[Ala5;Phe6;Atz13]GpTx-1(1-34)	DCLGAFRKCIPD[Atz]DKCCRPNLVCSRTHKWCKYVF-{Amide}	1028
Biotin-Ahx-[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34)	{Biotin}-[Ahx]DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{Amide}	1029
[Ala5;Phe6;Glu10;K(Biotin)13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCEPD[K(Biotin)]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1030
Biotin-Ahx--[Ala5,Phe6,Atz13,Leu26,Arg28]GpTx-1(1-34)}	{Biotin}[Ahx]DCLGAFRKCIPD[Atz]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1031
DOTA-[Ala5]GpTx-1(1-34)	{DOTA}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	1032
[Ala5;Phe6;K(DOTA)13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPDK(DOTA)DKCCRPNLVCSRLHRWCKYVF-{Amide}	1033
[Ala5,Phe6,2-Abu13,Leu26,Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1034
[Ala5,Phe6,Glu10,2-Abu13,Leu26,Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCEPD[2-Abu]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1035
[Ala5,Leu6,2-Abu13,Leu26,Arg28]GpTx-1(1-34)	{H}-DCLGALRKCIPD[2-Abu]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1036
[Ala5,Phe6,Atz(PEG11-((2-hydroxyethyl)thio)acetamide)13,Leu26,Arg28]GpTx-1	{H}-DCLGAFRKCIPD[Atz(PEG11-((2-hydroxyethyl)thio)acetamide)]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1037
[Ala5,Phe6,Atz(**PEG3**-(2-hydroxyethyl)thioacetamide)13,Leu26,Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPD[Atz(PEG3-((2-hydroxyethyl)thio)acetamide)]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1038
[Ala5;Phe6;**Glu10**;Atz(PEG11-((2-	{H}-DCLGAFRKCEPD[Atz(PEG11-((2-hydroxyethyl)thio)acetamide)]DKCCRPNLVCSRLHRWCKY	1039

hydroxyethyl)thio)acetamide)13;Leu26;Arg28]GpTx-1(1-34)	VF-{Amide}	
[Ala5;Phe6;**Glu10**;Atz(**PEG3**-((2-hydroxyethyl)thio)acetamide)13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCEPD[Atz(PEG3-((2-hydroxyethyl)thio)acetamide)]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1040
((2-Hydroxyethyl)thio)acetamide-NPEG11-triazole-[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34)	{((2-Hydroxyethyl)thio)acetamide-NPEG11-triazole}-DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{Amide}	1041
[2-Abu5,Leu6,K(ethyl-triazole-PEG11-((2-hydroxyethyl)thio)acetamide)13,Arg28]GpTx-1(1-34)	{H}-DCLG[2-Abu]LRKCIPDK(ethyl-triazole-PEG11-((2-hydroxyethyl)thio)acetamide)DKCCRPNLVCSRTHRWCKYVF-{Amide}	1042
[Ala5;**Leu6**,26;Atz(PEG11-((2-hydroxyethyl)thio)acetamide)13;Arg28]GpTx-1(1-34)	{H}-DCLGALRKCIPD[Atz(PEG3-((2-hydroxyethyl)thio)acetamide)]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1043
[Ala5;**Leu6**,26;**Glu10**;Atz(PEG11-((2-hydroxyethyl)thio)acetamide)13;Arg28]GpTx-1(1-34)	{H}-DCLGALRKCEPD[Atz(PEG11-((2-hydroxyethyl)thio)acetamide)]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1044
((2-hydroxyethyl)thio)acetamide-NPEG11-triazole-[Ala5,Phe6,2-Abu13,Arg28]GpTx-1(1-34)	{((2-Hydroxyethyl)thio)acetamide-NPEG11-triazole}-DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{Amide}	1045
[Ala5;Phe6;Atz13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPD[Atz]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1046
[Ala5;Phe6;Glu10;Atz13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCEPD[Atz]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1047
[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34	{H}-DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{Amide}	1048
[Ala5,Phe6,Atz(PEG11-bromoacetamide)13,Leu26,Arg28]GpTx-1	{H}-DCLGAFRKCIPD[Atz(PEG11-bromoacetamide)]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1062
[Ala5,Phe6,Atz(**PE**	{H}-DCLGAFRKCIPD[Atz(PEG3-	1063

G3-bromoacetamide)13,Leu26,Arg28]GpTx-1(1-34)	bromoacetamide)]DKCCRPNLVCSRLHRWCKYVF-{Amide}	
[Ala5;Phe6;Glu10;Atz(PEG11-bromoacetamide)13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCEPD[Atz(PEG11-bromoacetamide)]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1064
[Ala5;Phe6;Glu10;Atz(PEG3-bromoacetamide)13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCEPD[Atz(PEG3-bromoacetamide)]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1065
bromoacetamide-PEG11-triazole-[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34)	{bromoacetamide-PEG11-triazole}-DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{Amide}	1066
[2-Abu5,Leu6,K(ethyl-triazole-PEG11-bromoacetamide)13,Arg28]GpTx-1(1-34)	{H}-DCLG[2-Abu]LRKCIPDK(ethyl-triazole-PEG11-bromoacetamide)DKCCRPNLVCSRTHRWCKYVF-{Amide}	1067
[Ala5;Leu6,26;Atz(PEG11-bromoacetamide)13;Arg28]GpTx-1(1-34)	{H}-DCLGALRKCIPD[Atz(PEG3-bromoacetamide)]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1068
[Ala5;Leu6,26;Glu10;Atz(PEG11-bromoacetamide)13;Arg28]GpTx-1(1-34)	{H}-DCLGALRKCEPD[Atz(PEG11-bromoacetamide)]DKCCRPNLVCSRLHRWCKYVF-{Amide}	1069
bromoacetamide-PEG11-triazole-[Ala5,Phe6,2-Abu13,Arg28]GpTx-1(1-34)	{bromoacetamide-PEG11-triazole}-DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{Amide}	1070

Table 5B. Amino acid sequences of GpTx-1 and GpTx-1 peptide analogs. -{Amide} = amidated C-terminal.

Amino Acid Sequence	Designation	SEQ ID NO.
DCLGFMRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu13;Glu28]GpTx-1(1-34)	1071
DCLGFMRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Pra13;Glu28]GpTx-1(1-34)	1072
DCLGFMRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1073
DCLGFMRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Pra13;Leu26;Glu28]GpTx-1(1-34)	1074
DCLGFMRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Glu11,28;2-Abu13]GpTx-1(1-34)	1075
DCLGFMRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Glu10,28;2-Abu13]GpTx-1(1-34)	1076
DCLGFMRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1077
DCLGFFRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1078
DCLGFLRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu6;2-Abu13;Glu28]GpTx-1(1-34)	1079
DCLGF[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle6;2-Abu13;Glu28]GpTx-1(1-34)	1080
DCLGGMRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;2-Abu13;Glu28]GpTx-1(1-34)	1081
DCLGAMRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;2-Abu13;Glu28]GpTx-1(1-34)	1082
DCLG[2-Abu]MRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5,13;Glu28]GpTx-1(1-34)	1083
DCLG[Nva]MRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;2-Abu13;Glu28]GpTx-1(1-34)	1084
DCLG[Nle]MRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;2-Abu13;Glu28]GpTx-1(1-34)	1085
DCLGVMRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;2-Abu13;Glu28]GpTx-1(1-34)	1086

DCLGLMRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;2-Abu13;Glu28]GpTx-1(1-34)	1087
DCLGIMRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;2-Abu13;Glu28]GpTx-1(1-34)	1088
DCLGFMRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Glu11,28;Pra13]GpTx-1(1-34)	1089
DCLGFMRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Glu10,28;Pra13]GpTx-1(1-34)	1090
DCLGFMRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Asp10;Pra13;Glu28]GpTx-1(1-34)	1091
DCLGFFRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Phe6;Pra13;Glu28]GpTx-1(1-34)	1092
DCLGFLRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu6;Pra13;Glu28]GpTx-1(1-34)	1093
DCLGF[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle6;Pra13;Glu28]GpTx-1(1-34)	1094
DCLGGMRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Pra13;Glu28]GpTx-1(1-34)	1095
DCLGAMRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Pra13;Glu28]GpTx-1(1-34)	1096
DCLG[2-Abu]MRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Pra13;Glu28]GpTx-1(1-34)	1097
DCLG[Nva]MRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Pra13;Glu28]GpTx-1(1-34)	1098
DCLG[Nle]MRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Pra13;Glu28]GpTx-1(1-34)	1099
DCLGVMRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Pra13;Glu28]GpTx-1(1-34)	1100
DCLGLMRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Pra13;Glu28]GpTx-1(1-34)	1101
DCLGIMRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Pra13;Glu28]GpTx-1(1-34)	1102
DCLGFMRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1103
DCLGFMRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1104
DCLGFMRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1105
DCLGFFRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Phe6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1106

DCLGFLRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu6,26;2-Abu13;Glu28]GpTx-1(1-34)	1107
DCLGF[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1108
DCLGGMRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1109
DCLGAMRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1110
DCLG[2-Abu]MRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5,13;Leu26;Glu28]GpTx-1(1-34)	1111
DCLG[Nva]MRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1112
DCLG[Nle]MRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1113
DCLGVMRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1114
DCLGLMRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;2-Abu13;Glu28]GpTx-1(1-34)	1115
DCLGIMRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1116
DCLGFMRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1117
DCLGFMRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1118
DCLGFMRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1119
DCLGFFRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Phe6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1120
DCLGFLRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu6,26;Pra13;Glu28]GpTx-1(1-34)	1121
DCLGF[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1122
DCLGGMRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Pra13;Leu26;Glu28]GpTx-1(1-34)	1123
DCLGAMRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Pra13;Leu26;Glu28]GpTx-1(1-34)	1124
DCLG[2-Abu]MRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5;Pra13;Leu26;Glu28]GpTx-1(1-34)	1125
DCLG[Nva]MRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Pra13;Leu26;Glu28]GpTx-1(1-34)	1126

DCLG[Nle]MRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Pra13;Leu26;Glu28]GpTx-1(1-34)	1127
DCLGVMRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Pra13;Leu26;Glu28]GpTx-1(1-34)	1128
DCLGLMRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Pra13;Glu28]GpTx-1(1-34)	1129
DCLGIMRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Pra13;Leu26;Glu28]GpTx-1(1-34)	1130
DCLGFFRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1131
DCLGFLRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu6;Glu11,28;2-Abu13]GpTx-1(1-34)	1132
DCLGF[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle6;Glu11,28;2-Abu13]GpTx-1(1-34)	1133
DCLGGMRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Glu11,28;2-Abu13]GpTx-1(1-34)	1134
DCLGAMRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Glu11,28;2-Abu13]GpTx-1(1-34)	1135
DCLG[2-Abu]MRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5,13;Glu11,28]GpTx-1(1-34)	1136
DCLG[Nva]MRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Glu11,28;2-Abu13]GpTx-1(1-34)	1137
DCLG[Nle]MRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Glu11,28;2-Abu13]GpTx-1(1-34)	1138
DCLGVMRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Glu11,28;2-Abu13]GpTx-1(1-34)	1139
DCLGLMRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Glu11,28;2-Abu13]GpTx-1(1-34)	1140
DCLGIMRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Glu11,28;2-Abu13]GpTx-1(1-34)	1141
DCLGFFRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1142
DCLGFLRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu6;Glu10,28;2-Abu13]GpTx-1(1-34)	1143
DCLGF[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle6;Glu10,28;2-Abu13]GpTx-1(1-34)	1144
DCLGGMRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Glu10,28;2-Abu13]GpTx-1(1-34)	1145
DCLGAMRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Glu10,28;2-Abu13]GpTx-1(1-34)	1146

DCLG[2-Abu]MRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5,13;Glu10,28]GpTx-1(1-34)	1147
DCLG[Nva]MRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Glu10,28;2-Abu13]GpTx-1(1-34)	1148
DCLG[Nle]MRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Glu10,28;2-Abu13]GpTx-1(1-34)	1149
DCLGVMRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Glu10,28;2-Abu13]GpTx-1(1-34)	1150
DCLGLMRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Glu10,28;2-Abu13]GpTx-1(1-34)	1151
DCLGIMRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Glu10,28;2-Abu13]GpTx-1(1-34)	1152
DCLGFFRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1153
DCLGFLRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1154
DCLGF[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1155
DCLGGMRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1156
DCLGAMRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1157
DCLG[2-Abu]MRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5,13;Asp10;Glu28]GpTx-1(1-34)	1158
DCLG[Nva]MRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1159
DCLG[Nle]MRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1160
DCLGVMRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1161
DCLGLMRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1162
DCLGIMRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1163
DCLGGFRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1164
DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1165
DCLG[2-Abu]FRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5,13;Phe6;Glu28]GpTx-1(1-34)	1166

DCLG[Nva]FRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1167
DCLG[Nle]FRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1168
DCLGVFRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1169
DCLGLFRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1170
DCLGIFRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1171
DCLGGLRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Leu6;2-Abu13;Glu28]GpTx-1(1-34)	1172
DCLGALRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Leu6;2-Abu13;Glu28]GpTx-1(1-34)	1173
DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5,13;Leu6;Glu28]GpTx-1(1-34)	1174
DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Leu6;2-Abu13;Glu28]GpTx-1(1-34)	1175
DCLG[Nle]LRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Leu6;2-Abu13;Glu28]GpTx-1(1-34)	1176
DCLGVLRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Leu6;2-Abu13;Glu28]GpTx-1(1-34)	1177
DCLGLLRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5,6;2-Abu13;Glu28]GpTx-1(1-34)	1178
DCLGILRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Leu6;2-Abu13;Glu28]GpTx-1(1-34)	1179
DCLGG[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Nle6;2-Abu13;Glu28]GpTx-1(1-34)	1180
DCLGA[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Nle6;2-Abu13;Glu28]GpTx-1(1-34)	1181
DCLG[2-Abu][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5,13;Nle6;Glu28]GpTx-1(1-34)	1182
DCLG[Nva][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Nle6;2-Abu13;Glu28]GpTx-1(1-34)	1183
DCLG[Nle][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5,6;2-Abu13;Glu28]GpTx-1(1-34)	1184
DCLGV[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Nle6;2-Abu13;Glu28]GpTx-1(1-34)	1185
DCLGL[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Nle6;2-Abu13;Glu28]GpTx-1(1-34)	1186

DCLGI[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Nle6;2-Abu13;Glu28]GpTx-1(1-34)	1187
DCLGFFRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1188
DCLGFLRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu6;Glu11,28;Pra13]GpTx-1(1-34)	1189
DCLGF[Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1190
DCLGGMRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Glu11,28;Pra13]GpTx-1(1-34)	1191
DCLGAMRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Glu11,28;Pra13]GpTx-1(1-34)	1192
DCLG[2-Abu]MRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Glu11,28;Pra13]GpTx-1(1-34)	1193
DCLG[Nva]MRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Glu11,28;Pra13]GpTx-1(1-34)	1194
DCLG[Nle]MRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Glu11,28;Pra13]GpTx-1(1-34)	1195
DCLGVMRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Glu11,28;Pra13]GpTx-1(1-34)	1196
DCLGLMRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Glu11,28;Pra13]GpTx-1(1-34)	1197
DCLGIMRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Glu11,28;Pra13]GpTx-1(1-34)	1198
DCLGFFRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1199
DCLGFLRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu6;Glu10,28;Pra13]GpTx-1(1-34)	1200
DCLGF[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1201
DCLGGMRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Glu10,28;Pra13]GpTx-1(1-34)	1202
DCLGAMRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Glu10,28;Pra13]GpTx-1(1-34)	1203
DCLG[2-Abu]MRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Glu10,28;Pra13]GpTx-1(1-34)	1204
DCLG[Nva]MRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Glu10,28;Pra13]GpTx-1(1-34)	1205
DCLG[Nle]MRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Glu10,28;Pra13]GpTx-1(1-34)	1206

DCLGVMRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Glu10,28;Pra13]GpTx-1(1-34)	1207
DCLGLMRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Glu10,28;Pra13]GpTx-1(1-34)	1208
DCLGIMRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Glu10,28;Pra13]GpTx-1(1-34)	1209
DCLGFFRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1210
DCLGFLRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1211
DCLGF[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1212
DCLGGMRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Asp10;Pra13;Glu28]GpTx-1(1-34)	1213
DCLGAMRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Asp10;Pra13;Glu28]GpTx-1(1-34)	1214
DCLG[2-Abu]MRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Asp10;Pra13;Glu28]GpTx-1(1-34)	1215
DCLG[Nva]MRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Asp10;Pra13;Glu28]GpTx-1(1-34)	1216
DCLG[Nle]MRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Asp10;Pra13;Glu28]GpTx-1(1-34)	1217
DCLGVMRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Asp10;Pra13;Glu28]GpTx-1(1-34)	1218
DCLGLMRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Asp10;Pra13;Glu28]GpTx-1(1-34)	1219
DCLGIMRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Asp10;Pra13;Glu28]GpTx-1(1-34)	1220
DCLGGFRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Phe6;Pra13;Glu28]GpTx-1(1-34)	1221
DCLGAFRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Phe6;Pra13;Glu28]GpTx-1(1-34)	1222
DCLG[2-Abu]FRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Phe6;Pra13;Glu28]GpTx-1(1-34)	1223
DCLG[Nva]FRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Phe6;Pra13;Glu28]GpTx-1(1-34)	1224
DCLG[Nle]FRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Phe6;Pra13;Glu28]GpTx-1(1-34)	1225
DCLGVFRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Phe6;Pra13;Glu28]GpTx-1(1-34)	1226

DCLGLFRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Phe6;Pra13;Glu28]GpTx-1(1-34)	1227
DCLGIFRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Phe6;Pra13;Glu28]GpTx-1(1-34)	1228
DCLGGLRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Leu6;Pra13;Glu28]GpTx-1(1-34)	1229
DCLGALRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Leu6;Pra13;Glu28]GpTx-1(1-34)	1230
DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Leu6;Pra13;Glu28]GpTx-1(1-34)	1231
DCLG[Nva]LRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Leu6;Pra13;Glu28]GpTx-1(1-34)	1232
DCLG[Nle]LRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Leu6;Pra13;Glu28]GpTx-1(1-34)	1233
DCLGVLRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Leu6;Pra13;Glu28]GpTx-1(1-34)	1234
DCLGLLRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5,6;Pra13;Glu28]GpTx-1(1-34)	1235
DCLGILRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Leu6;Pra13;Glu28]GpTx-1(1-34)	1236
DCLGG[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Nle6;Pra13;Glu28]GpTx-1(1-34)	1237
DCLGA[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Nle6;Pra13;Glu28]GpTx-1(1-34)	1238
DCLG[2-Abu][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Nle6;Pra13;Glu28]GpTx-1(1-34)	1239
DCLG[Nva][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Nle6;Pra13;Glu28]GpTx-1(1-34)	1240
DCLG[Nle][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5,6;Pra13;Glu28]GpTx-1(1-34)	1241
DCLGV[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Nle6;Pra13;Glu28]GpTx-1(1-34)	1242
DCLGL[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Nle6;Pra13;Glu28]GpTx-1(1-34)	1243
DCLGI[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Nle6;Pra13;Glu28]GpTx-1(1-34)	1244
DCLGFFRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Phe6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1245
DCLGFLRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu6,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1246

DCLGF[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1247
DCLGGMRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1248
DCLGAMRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1249
DCLG[2-Abu]MRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5,13;Glu11,28;Leu26]GpTx-1(1-34)	1250
DCLG[Nva]MRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1251
DCLG[Nle]MRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1252
DCLGVMRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1253
DCLGLMRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1254
DCLGIMRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1255
DCLGFFRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Phe6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1256
DCLGFLRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu6,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1257
DCLGF[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1258
DCLGGMRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1259
DCLGAMRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1260
DCLG[2-Abu]MRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5,13;Glu10,28;Leu26]GpTx-1(1-34)	1261
DCLG[Nva]MRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1262
DCLG[Nle]MRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1263
DCLGVMRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1264
DCLGLMRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1265
DCLGIMRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1266

DCLGFFRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Phe6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1267
DCLGFLRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu6,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1268
DCLGF[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1269
DCLGGMRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1270
DCLGAMRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1271
DCLG[2-Abu]MRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5,13;Asp10;Leu26;Glu28]GpTx-1(1-34)	1272
DCLG[Nva]MRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1273
DCLG[Nle]MRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1274
DCLGVMRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1275
DCLGLMRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1276
DCLGIMRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1277
DCLGGFRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Phe6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1278
DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Phe6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1279
DCLG[2-Abu]FRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5,13;Phe6;Leu26;Glu28]GpTx-1(1-34)	1280
DCLG[Nva]FRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Phe6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1281
DCLG[Nle]FRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Phe6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1282
DCLGVFRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Phe6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1283
DCLGLFRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1284
DCLGIFRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Phe6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1285
DCLGGLRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Leu6,26;2-Abu13;Glu28]GpTx-1(1-34)	1286

DCLGALRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Leu6,26;2-Abu13;Glu28]GpTx-1(1-34)	1287
DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5,13;Leu6,26;Glu28]GpTx-1(1-34)	1288
DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Leu6,26;2-Abu13;Glu28]GpTx-1(1-34)	1289
DCLG[Nle]LRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Leu6,26;2-Abu13;Glu28]GpTx-1(1-34)	1290
DCLGVLRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Leu6,26;2-Abu13;Glu28]GpTx-1(1-34)	1291
DCLGLLRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,6,26;2-Abu13;Glu28]GpTx-1(1-34)	1292
DCLGILRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Leu6,26;2-Abu13;Glu28]GpTx-1(1-34)	1293
DCLGG[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Nle6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1294
DCLGA[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Nle6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1295
DCLG[2-Abu][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5,13;Nle6;Leu26;Glu28]GpTx-1(1-34)	1296
DCLG[Nva][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Nle6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1297
DCLG[Nle][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5,6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1298
DCLGV[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Nle6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1299
DCLGL[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Nle6;2-Abu13;Glu28]GpTx-1(1-34)	1300
DCLGI[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Nle6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1301
DCLGFFRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Phe6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1302
DCLGFLRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu6,26;Glu11,28;Pra13]GpTx-1(1-34)	1303
DCLGF[Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1304
DCLGGMRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1305
DCLGAMRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1306

DCLG[2-Abu]MRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1307
DCLG[Nva]MRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1308
DCLG[Nle]MRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1309
DCLGVMRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1310
DCLGLMRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Glu11,28;Pra13]GpTx-1(1-34)	1311
DCLGIMRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1312
DCLGFFRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Phe6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1313
DCLGFLRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu6,26;Glu10,28;Pra13]GpTx-1(1-34)	1314
DCLGF[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1315
DCLGGMRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1316
DCLGAMRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1317
DCLG[2-Abu]MRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1318
DCLG[Nva]MRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1319
DCLG[Nle]MRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1320
DCLGVMRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1321
DCLGLMRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Glu10,28;Pra13]GpTx-1(1-34)	1322
DCLGIMRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1323
DCLGFFRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Phe6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1324
DCLGFLRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1325
DCLGF[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1326

DCLGGMRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1327
DCLGAMRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1328
DCLG[2-Abu]MRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1329
DCLG[Nva]MRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1330
DCLG[Nle]MRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1331
DCLGVMRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1332
DCLGLMRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1333
DCLGIMRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1334
DCLGGFRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Phe6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1335
DCLGAFRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Phe6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1336
DCLG[2-Abu]FRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5;Phe6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1337
DCLG[Nva]FRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Phe6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1338
DCLG[Nle]FRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Phe6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1339
DCLGVFRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Phe6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1340
DCLGLFRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Phe6;Pra13;Glu28]GpTx-1(1-34)	1341
DCLGIFRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Phe6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1342
DCLGGLRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Leu6,26;Pra13;Glu28]GpTx-1(1-34)	1343
DCLGALRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Leu6,26;Pra13;Glu28]GpTx-1(1-34)	1344
DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5;Leu6,26;Pra13;Glu28]GpTx-1(1-34)	1345
DCLG[Nva]LRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Leu6,26;Pra13;Glu28]GpTx-1(1-34)	1346

DCLG[Nle]LRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Leu6,26;Pra13;Glu28]GpTx-1(1-34)	1347
DCLGVLRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Leu6,26;Pra13;Glu28]GpTx-1(1-34)	1348
DCLGLLRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,6,26;Pra13;Glu28]GpTx-1(1-34)	1349
DCLGILRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Leu6,26;Pra13;Glu28]GpTx-1(1-34)	1350
DCLGG[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Nle6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1351
DCLGA[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Nle6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1352
DCLG[2-Abu][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5;Nle6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1353
DCLG[Nva][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Nle6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1354
DCLG[Nle][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5,6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1355
DCLGV[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Nle6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1356
DCLGL[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Nle6;Pra13;Glu28]GpTx-1(1-34)	1357
DCLGI[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Nle6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1358
DCLGGFRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1359
DCLGAFRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1360
DCLG[2-Abu]FRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5,13;Phe6;Glu11,28]GpTx-1(1-34)	1361
DCLG[Nva]FRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1362
DCLG[Nle]FRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1363
DCLGVFRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1364
DCLGLFRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1365
DCLGIFRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1366

DCLGGLRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Leu6;Glu11,28;2-Abu13]GpTx-1(1-34)	1367
DCLGALRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Leu6;Glu11,28;2-Abu13]GpTx-1(1-34)	1368
DCLG[2-Abu]LRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5,13;Leu6;Glu11,28]GpTx-1(1-34)	1369
DCLG[Nva]LRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Leu6;Glu11,28;2-Abu13]GpTx-1(1-34)	1370
DCLG[Nle]LRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Leu6;Glu11,28;2-Abu13]GpTx-1(1-34)	1371
DCLGVLRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Leu6;Glu11,28;2-Abu13]GpTx-1(1-34)	1372
DCLGLLRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5,6;Glu11,28;2-Abu13]GpTx-1(1-34)	1373
DCLGILRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Leu6;Glu11,28;2-Abu13]GpTx-1(1-34)	1374
DCLGG[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Nle6;Glu11,28;2-Abu13]GpTx-1(1-34)	1375
DCLGA[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Nle6;Glu11,28;2-Abu13]GpTx-1(1-34)	1376
DCLG[2-Abu][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5,13;Nle6;Glu11,28]GpTx-1(1-34)	1377
DCLG[Nva][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Nle6;Glu11,28;2-Abu13]GpTx-1(1-34)	1378
DCLG[Nle][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5,6;Glu11,28;2-Abu13]GpTx-1(1-34)	1379
DCLGV[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Nle6;Glu11,28;2-Abu13]GpTx-1(1-34)	1380
DCLGL[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Nle6;Glu11,28;2-Abu13]GpTx-1(1-34)	1381
DCLGI[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Nle6;Glu11,28;2-Abu13]GpTx-1(1-34)	1382
DCLGGFRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1383
DCLGAFRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1384
DCLG[2-Abu]FRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5,13;Phe6;Glu10,28]GpTx-1(1-34)	1385
DCLG[Nva]FRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1386

DCLG[Nle]FRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1387
DCLGVFRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1388
DCLGLFRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1389
DCLGIFRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1390
DCLGGLRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Leu6;Glu10,28;2-Abu13]GpTx-1(1-34)	1391
DCLGALRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Leu6;Glu10,28;2-Abu13]GpTx-1(1-34)	1392
DCLG[2-Abu]LRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5,13;Leu6;Glu10,28]GpTx-1(1-34)	1393
DCLG[Nva]LRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Leu6;Glu10,28;2-Abu13]GpTx-1(1-34)	1394
DCLG[Nle]LRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Leu6;Glu10,28;2-Abu13]GpTx-1(1-34)	1395
DCLGVLRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Leu6;Glu10,28;2-Abu13]GpTx-1(1-34)	1396
DCLGLLRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5,6;Glu10,28;2-Abu13]GpTx-1(1-34)	1397
DCLGILRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Leu6;Glu10,28;2-Abu13]GpTx-1(1-34)	1398
DCLGG[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Nle6;Glu10,28;2-Abu13]GpTx-1(1-34)	1399
DCLGA[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Nle6;Glu10,28;2-Abu13]GpTx-1(1-34)	1400
DCLG[2-Abu][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5,13;Nle6;Glu10,28]GpTx-1(1-34)	1401
DCLG[Nva][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Nle6;Glu10,28;2-Abu13]GpTx-1(1-34)	1402
DCLG[Nle][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5,6;Glu10,28;2-Abu13]GpTx-1(1-34)	1403
DCLGV[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Nle6;Glu10,28;2-Abu13]GpTx-1(1-34)	1404
DCLGL[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Nle6;Glu10,28;2-Abu13]GpTx-1(1-34)	1405
DCLGI[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Nle6;Glu10,28;2-Abu13]GpTx-1(1-34)	1406

DCLGGFRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1407
DCLGAFRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1408
DCLG[2-Abu]FRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5,13;Phe6;Asp10;Glu28]GpTx-1(1-34)	1409
DCLG[Nva]FRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1410
DCLG[Nle]FRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1411
DCLGVFRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1412
DCLGLFRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1413
DCLGIFRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1414
DCLGGLRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Leu6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1415
DCLGALRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Leu6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1416
DCLG[2-Abu]LRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5,13;Leu6;Asp10;Glu28]GpTx-1(1-34)	1417
DCLG[Nva]LRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Leu6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1418
DCLG[Nle]LRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Leu6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1419
DCLGVLRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Leu6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1420
DCLGLLRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5,6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1421
DCLGILRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Leu6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1422
DCLGG[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Nle6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1423
DCLGA[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Nle6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1424
DCLG[2-Abu][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5,13;Nle6;Asp10;Glu28]GpTx-1(1-34)	1425
DCLG[Nva][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Nle6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1426

DCLG[Nle][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5,6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1427
DCLGV[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Nle6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1428
DCLGL[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Nle6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1429
DCLGI[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Nle6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1430
DCLGGFRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1431
DCLGAFRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1432
DCLG[2-Abu]FRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1433
DCLG[Nva]FRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1434
DCLG[Nle]FRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1435
DCLGVFRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1436
DCLGLFRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1437
DCLGIFRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1438
DCLGGLRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Leu6;Glu11,28;Pra13]GpTx-1(1-34)	1439
DCLGALRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Leu6;Glu11,28;Pra13]GpTx-1(1-34)	1440
DCLG[2-Abu]LRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Leu6;Glu11,28;Pra13]GpTx-1(1-34)	1441
DCLG[Nva]LRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Leu6;Glu11,28;Pra13]GpTx-1(1-34)	1442
DCLG[Nle]LRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Leu6;Glu11,28;Pra13]GpTx-1(1-34)	1443
DCLGVLRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Leu6;Glu11,28;Pra13]GpTx-1(1-34)	1444
DCLGLLRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5,6;Glu11,28;Pra13]GpTx-1(1-34)	1445
DCLGILRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Leu6;Glu11,28;Pra13]GpTx-1(1-34)	1446

DCLGG[Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1447
DCLGA[Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1448
DCLG[2-Abu][Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1449
DCLG[Nva][Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1450
DCLG[Nle][Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5,6;Glu11,28;Pra13]GpTx-1(1-34)	1451
DCLGV[Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1452
DCLGL[Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1453
DCLGI[Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1454
DCLGGFRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1455
DCLGAFRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1456
DCLG[2-Abu]FRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1457
DCLG[Nva]FRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1458
DCLG[Nle]FRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1459
DCLGVFRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1460
DCLGLFRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1461
DCLGIFRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1462
DCLGGLRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Leu6;Glu10,28;Pra13]GpTx-1(1-34)	1463
DCLGALRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Leu6;Glu10,28;Pra13]GpTx-1(1-34)	1464
DCLG[2-Abu]LRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Leu6;Glu10,28;Pra13]GpTx-1(1-34)	1465
DCLG[Nva]LRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Leu6;Glu10,28;Pra13]GpTx-1(1-34)	1466

DCLG[Nle]LRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Leu6;Glu10,28;Pra13]GpTx-1(1-34)	1467
DCLGVLRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Leu6;Glu10,28;Pra13]GpTx-1(1-34)	1468
DCLGLLRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5,6;Glu10,28;Pra13]GpTx-1(1-34)	1469
DCLGILRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Leu6;Glu10,28;Pra13]GpTx-1(1-34)	1470
DCLGG[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1471
DCLGA[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1472
DCLG[2-Abu][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1473
DCLG[Nva][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1474
DCLG[Nle][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5,6;Glu10,28;Pra13]GpTx-1(1-34)	1475
DCLGV[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1476
DCLGL[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1477
DCLGI[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1478
DCLGGFRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1479
DCLGAFRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1480
DCLG[2-Abu]FRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1481
DCLG[Nva]FRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1482
DCLG[Nle]FRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1483
DCLGVFRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1484
DCLGLFRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1485
DCLGIFRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1486

DCLGGLRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Leu6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1487
DCLGALRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Leu6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1488
DCLG[2-Abu]LRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Leu6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1489
DCLG[Nva]LRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Leu6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1490
DCLG[Nle]LRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5;Leu6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1491
DCLGVLRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Leu6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1492
DCLGLLRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5,6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1493
DCLGILRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Leu6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1494
DCLGG[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1495
DCLGA[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1496
DCLG[2-Abu][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1497
DCLG[Nva][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1498
DCLG[Nle][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nle5,6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1499
DCLGV[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1500
DCLGL[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Leu5;Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1501
DCLGI[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ile5;Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1502
DCLGGFRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Phe6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1503
DCLGAFRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Phe6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1504
DCLG[2-Abu]FRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5,13;Phe6;Glu11,28;Leu26]GpTx-1(1-34)	1505
DCLG[Nva]FRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Phe6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1506

DCLG[Nle]FRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Phe6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1507
DCLGVFRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Phe6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1508
DCLGLFRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1509
DCLGIFRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Phe6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1510
DCLGGLRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Leu6,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1511
DCLGALRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Leu6,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1512
DCLG[2-Abu]LRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5,13;Leu6,26;Glu11,28]GpTx-1(1-34)	1513
DCLG[Nva]LRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Leu6,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1514
DCLG[Nle]LRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Leu6,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1515
DCLGVLRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Leu6,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1516
DCLGLLRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,6,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1517
DCLGILRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Leu6,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1518
DCLGG[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Nle6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1519
DCLGA[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Nle6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1520
DCLG[2-Abu][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5,13;Nle6;Glu11,28;Leu26]GpTx-1(1-34)	1521
DCLG[Nva][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Nle6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1522
DCLG[Nle][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5,6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1523
DCLGV[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Nle6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1524
DCLGL[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Nle6;Glu11,28;2-Abu13]GpTx-1(1-34)	1525
DCLGI[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Nle6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1526

DCLGGFRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Phe6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1527
DCLGAFRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Phe6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1528
DCLG[2-Abu]FRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5,13;Phe6;Glu10,28;Leu26]GpTx-1(1-34)	1529
DCLG[Nva]FRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Phe6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1530
DCLG[Nle]FRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Phe6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1531
DCLGVFRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Phe6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1532
DCLGLFRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1533
DCLGIFRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Phe6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1534
DCLGGLRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Leu6,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1535
DCLGALRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Leu6,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1536
DCLG[2-Abu]LRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5,13;Leu6,26;Glu10,28]GpTx-1(1-34)	1537
DCLG[Nva]LRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Leu6,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1538
DCLG[Nle]LRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Leu6,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1539
DCLGVLRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Leu6,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1540
DCLGLLRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,6,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1541
DCLGILRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Leu6,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1542
DCLGG[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Nle6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1543
DCLGA[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Nle6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1544
DCLG[2-Abu][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5,13;Nle6;Glu10,28;Leu26]GpTx-1(1-34)	1545
DCLG[Nva][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Nle6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1546

DCLG[Nle][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5,6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1547
DCLGV[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Nle6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1548
DCLGL[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Nle6;Glu10,28;2-Abu13]GpTx-1(1-34)	1549
DCLGI[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Nle6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1550
DCLGGFRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Phe6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1551
DCLGAFRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Phe6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1552
DCLG[2-Abu]FRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5,13;Phe6;Asp10;Leu26;Glu28]GpTx-1(1-34)	1553
DCLG[Nva]FRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Phe6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1554
DCLG[Nle]FRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Phe6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1555
DCLGVFRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Phe6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1556
DCLGLFRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1557
DCLGIFRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Phe6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1558
DCLGGLRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Leu6,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1559
DCLGALRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Leu6,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1560
DCLG[2-Abu]LRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5,13;Leu6,26;Asp10;Glu28]GpTx-1(1-34)	1561
DCLG[Nva]LRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Leu6,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1562
DCLG[Nle]LRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Leu6,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1563
DCLGVLRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Leu6,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1564
DCLGLLRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,6,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1565
DCLGILRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Leu6,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1566

DCLGG[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Nle6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1567
DCLGA[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Nle6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1568
DCLG[2-Abu][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5,13;Nle6;Asp10;Leu26;Glu28]GpTx-1(1-34)	1569
DCLG[Nva][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Nle6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1570
DCLG[Nle][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5,6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1571
DCLGV[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Nle6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1572
DCLGL[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Nle6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1573
DCLGI[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Nle6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1574
DCLGGFRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Phe6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1575
DCLGAFRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Phe6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1576
DCLG[2-Abu]FRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5;Phe6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1577
DCLG[Nva]FRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Phe6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1578
DCLG[Nle]FRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Phe6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1579
DCLGVFRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Phe6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1580
DCLGLFRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1581
DCLGIFRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Phe6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1582
DCLGGLRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Leu6,26;Glu11,28;Pra13]GpTx-1(1-34)	1583
DCLGALRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Leu6,26;Glu11,28;Pra13]GpTx-1(1-34)	1584
DCLG[2-Abu]LRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5;Leu6,26;Glu11,28;Pra13]GpTx-1(1-34)	1585
DCLG[Nva]LRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Leu6,26;Glu11,28;Pra13]GpTx-1(1-34)	1586

DCLG[Nle]LRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Leu6,26;Glu11,28;Pra13]GpTx-1(1-34)	1587
DCLGVLRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Leu6,26;Glu11,28;Pra13]GpTx-1(1-34)	1588
DCLGLLRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,6,26;Glu11,28;Pra13]GpTx-1(1-34)	1589
DCLGILRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Leu6,26;Glu11,28;Pra13]GpTx-1(1-34)	1590
DCLGG[Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Nle6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1591
DCLGA[Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Nle6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1592
DCLG[2-Abu][Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5;Nle6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1593
DCLG[Nva][Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Nle6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1594
DCLG[Nle][Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5,6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1595
DCLGV[Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Nle6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1596
DCLGL[Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1597
DCLGI[Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Nle6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1598
DCLGGFRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Phe6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1599
DCLGAFRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Phe6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1600
DCLG[2-Abu]FRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5;Phe6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1601
DCLG[Nva]FRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Phe6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1602
DCLG[Nle]FRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Phe6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1603
DCLGVFRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Phe6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1604
DCLGLFRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1605
DCLGIFRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Phe6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1606

DCLGGLRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Leu6,26;Glu10,28;Pra13]GpTx-1(1-34)	1607
DCLGALRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Leu6,26;Glu10,28;Pra13]GpTx-1(1-34)	1608
DCLG[2-Abu]LRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5;Leu6,26;Glu10,28;Pra13]GpTx-1(1-34)	1609
DCLG[Nva]LRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Leu6,26;Glu10,28;Pra13]GpTx-1(1-34)	1610
DCLG[Nle]LRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Leu6,26;Glu10,28;Pra13]GpTx-1(1-34)	1611
DCLGVLRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Leu6,26;Glu10,28;Pra13]GpTx-1(1-34)	1612
DCLGLLRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,6,26;Glu10,28;Pra13]GpTx-1(1-34)	1613
DCLGILRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Leu6,26;Glu10,28;Pra13]GpTx-1(1-34)	1614
DCLGG[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Nle6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1615
DCLGA[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Nle6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1616
DCLG[2-Abu][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5;Nle6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1617
DCLG[Nva][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Nle6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1618
DCLG[Nle][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5,6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1619
DCLGV[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Nle6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1620
DCLGL[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1621
DCLGI[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Nle6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1622
DCLGGFRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Phe6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1623
DCLGAFRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Phe6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1624
DCLG[2-Abu]FRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5;Phe6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1625
DCLG[Nva]FRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Phe6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1626

DCLG[Nle]FRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Phe6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1627
DCLGVFRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Phe6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1628
DCLGLFRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1629
DCLGIFRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Phe6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1630
DCLGGLRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Leu6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1631
DCLGALRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Leu6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1632
DCLG[2-Abu]LRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5;Leu6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1633
DCLG[Nva]LRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Leu6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1634
DCLG[Nle]LRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5;Leu6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1635
DCLGVLRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Leu6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1636
DCLGLLRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1637
DCLGILRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Leu6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1638
DCLGG[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Gly5;Nle6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1639
DCLGA[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ala5;Nle6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1640
DCLG[2-Abu][Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[2-Abu5;Nle6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1641
DCLG[Nva][Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nva5;Nle6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1642
DCLG[Nle][Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Nle5,6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1643
DCLGV[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Val5;Nle6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1644
DCLGL[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Leu5,26;Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1645
DCLGI[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{Amide}	[Ile5;Nle6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1646

DCLGFMRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu13;Asp28]GpTx-1(1-34)	1647
DCLGFMRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Pra13;Asp28]GpTx-1(1-34)	1648
DCLGFMRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1649
DCLGFMRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Pra13;Leu26;Asp28]GpTx-1(1-34)	1650
DCLGFMRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1651
DCLGFMRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1652
DCLGFMRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Asp10,28;2-Abu13]GpTx-1(1-34)	1653
DCLGFFRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1654
DCLGFLRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu6;2-Abu13;Asp28]GpTx-1(1-34)	1655
DCLGF[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle6;2-Abu13;Asp28]GpTx-1(1-34)	1656
DCLGGMRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;2-Abu13;Asp28]GpTx-1(1-34)	1657
DCLGAMRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;2-Abu13;Asp28]GpTx-1(1-34)	1658
DCLG[2-Abu]MRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5,13;Asp28]GpTx-1(1-34)	1659
DCLG[Nva]MRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;2-Abu13;Asp28]GpTx-1(1-34)	1660
DCLG[Nle]MRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;2-Abu13;Asp28]GpTx-1(1-34)	1661
DCLGVMRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;2-Abu13;Asp28]GpTx-1(1-34)	1662
DCLGLMRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;2-Abu13;Asp28]GpTx-1(1-34)	1663
DCLGIMRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;2-Abu13;Asp28]GpTx-1(1-34)	1664
DCLGFMRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Glu11;Pra13;Asp28]GpTx-1(1-34)	1665
DCLGFMRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Glu10;Pra13;Asp28]GpTx-1(1-34)	1666

DCLGFMRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Asp10,28;Pra13]GpTx-1(1-34)	1667
DCLGFFRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Phe6;Pra13;Asp28]GpTx-1(1-34)	1668
DCLGFLRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu6;Pra13;Asp28]GpTx-1(1-34)	1669
DCLGF[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle6;Pra13;Asp28]GpTx-1(1-34)	1670
DCLGGMRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Pra13;Asp28]GpTx-1(1-34)	1671
DCLGAMRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Pra13;Asp28]GpTx-1(1-34)	1672
DCLG[2-Abu]MRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5;Pra13;Asp28]GpTx-1(1-34)	1673
DCLG[Nva]MRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Pra13;Asp28]GpTx-1(1-34)	1674
DCLG[Nle]MRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Pra13;Asp28]GpTx-1(1-34)	1675
DCLGVMRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Pra13;Asp28]GpTx-1(1-34)	1676
DCLGLMRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Pra13;Asp28]GpTx-1(1-34)	1677
DCLGIMRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Pra13;Asp28]GpTx-1(1-34)	1678
DCLGFMRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1679
DCLGFMRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1680
DCLGFMRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1681
DCLGFFRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Phe6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1682
DCLGFLRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu6,26;2-Abu13;Asp28]GpTx-1(1-34)	1683
DCLGF[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1684
DCLGGMRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1685
DCLGAMRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1686

DCLG[2-Abu]MRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5,13;Leu26;Asp28]GpTx-1(1-34)	1687
DCLG[Nva]MRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1688
DCLG[Nle]MRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1689
DCLGVMRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1690
DCLGLMRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;2-Abu13;Asp28]GpTx-1(1-34)	1691
DCLGIMRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1692
DCLGFMRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1693
DCLGFMRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1694
DCLGFMRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1695
DCLGFFRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Phe6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1696
DCLGFLRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu6,26;Pra13;Asp28]GpTx-1(1-34)	1697
DCLGF[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1698
DCLGGMRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Pra13;Leu26;Asp28]GpTx-1(1-34)	1699
DCLGAMRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Pra13;Leu26;Asp28]GpTx-1(1-34)	1700
DCLG[2-Abu]MRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5;Pra13;Leu26;Asp28]GpTx-1(1-34)	1701
DCLG[Nva]MRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Pra13;Leu26;Asp28]GpTx-1(1-34)	1702
DCLG[Nle]MRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Pra13;Leu26;Asp28]GpTx-1(1-34)	1703
DCLGVMRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Pra13;Leu26;Asp28]GpTx-1(1-34)	1704
DCLGLMRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Pra13;Asp28]GpTx-1(1-34)	1705
DCLGIMRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Pra13;Leu26;Asp28]GpTx-1(1-34)	1706

DCLGFFRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1707
DCLGFLRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1708
DCLGF[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1709
DCLGGMRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1710
DCLGAMRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1711
DCLG[2-Abu]MRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5,13;Glu11;Asp28]GpTx-1(1-34)	1712
DCLG[Nva]MRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1713
DCLG[Nle]MRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1714
DCLGVMRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1715
DCLGLMRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1716
DCLGIMRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1717
DCLGFFRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1718
DCLGFLRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1719
DCLGF[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1720
DCLGGMRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1721
DCLGAMRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1722
DCLG[2-Abu]MRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5,13;Glu10;Asp28]GpTx-1(1-34)	1723
DCLG[Nva]MRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1724
DCLG[Nle]MRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1725
DCLGVMRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1726

DCLGLMRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1727
DCLGIMRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1728
DCLGFFRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	1729
DCLGFLRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu6;Asp10,28;2-Abu13]GpTx-1(1-34)	1730
DCLGF[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle6;Asp10,28;2-Abu13]GpTx-1(1-34)	1731
DCLGGMRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Asp10,28;2-Abu13]GpTx-1(1-34)	1732
DCLGAMRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Asp10,28;2-Abu13]GpTx-1(1-34)	1733
DCLG[2-Abu]MRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5,13;Asp10,28]GpTx-1(1-34)	1734
DCLG[Nva]MRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Asp10,28;2-Abu13]GpTx-1(1-34)	1735
DCLG[Nle]MRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Asp10,28;2-Abu13]GpTx-1(1-34)	1736
DCLGVMRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Asp10,28;2-Abu13]GpTx-1(1-34)	1737
DCLGLMRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Asp10,28;2-Abu13]GpTx-1(1-34)	1738
DCLGIMRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Asp10,28;2-Abu13]GpTx-1(1-34)	1739
DCLGGFRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1740
DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1741
DCLG[2-Abu]FRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5,13;Phe6;Asp28]GpTx-1(1-34)	1742
DCLG[Nva]FRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1743
DCLG[Nle]FRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1744
DCLGVFRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1745
DCLGLFRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1746

DCLGIFRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1747
DCLGGLRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Leu6;2-Abu13;Asp28]GpTx-1(1-34)	1748
DCLGALRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Leu6;2-Abu13;Asp28]GpTx-1(1-34)	1749
DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5,13;Leu6;Asp28]GpTx-1(1-34)	1750
DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Leu6;2-Abu13;Asp28]GpTx-1(1-34)	1751
DCLG[Nle]LRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Leu6;2-Abu13;Asp28]GpTx-1(1-34)	1752
DCLGVLRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Leu6;2-Abu13;Asp28]GpTx-1(1-34)	1753
DCLGLLRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5,6;2-Abu13;Asp28]GpTx-1(1-34)	1754
DCLGILRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Leu6;2-Abu13;Asp28]GpTx-1(1-34)	1755
DCLGG[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Nle6;2-Abu13;Asp28]GpTx-1(1-34)	1756
DCLGA[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Nle6;2-Abu13;Asp28]GpTx-1(1-34)	1757
DCLG[2-Abu][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5,13;Nle6;Asp28]GpTx-1(1-34)	1758
DCLG[Nva][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Nle6;2-Abu13;Asp28]GpTx-1(1-34)	1759
DCLG[Nle][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5,6;2-Abu13;Asp28]GpTx-1(1-34)	1760
DCLGV[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Nle6;2-Abu13;Asp28]GpTx-1(1-34)	1761
DCLGL[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Nle6;2-Abu13;Asp28]GpTx-1(1-34)	1762
DCLGI[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Nle6;2-Abu13;Asp28]GpTx-1(1-34)	1763
DCLGFFRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	1764
DCLGFLRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu6;Glu11;Pra13;Asp28]GpTx-1(1-34)	1765
DCLGF[Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	1766

DCLGGMRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Glu11;Pra13;Asp28]GpTx-1(1-34)	1767
DCLGAMRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Glu11;Pra13;Asp28]GpTx-1(1-34)	1768
DCLG[2-Abu]MRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5;Glu11;Pra13;Asp28]GpTx-1(1-34)	1769
DCLG[Nva]MRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Glu11;Pra13;Asp28]GpTx-1(1-34)	1770
DCLG[Nle]MRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Glu11;Pra13;Asp28]GpTx-1(1-34)	1771
DCLGVMRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Glu11;Pra13;Asp28]GpTx-1(1-34)	1772
DCLGLMRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Glu11;Pra13;Asp28]GpTx-1(1-34)	1773
DCLGIMRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Glu11;Pra13;Asp28]GpTx-1(1-34)	1774
DCLGFFRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	1775
DCLGFLRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu6;Glu10;Pra13;Asp28]GpTx-1(1-34)	1776
DCLGF[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	1777
DCLGGMRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Glu10;Pra13;Asp28]GpTx-1(1-34)	1778
DCLGAMRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Glu10;Pra13;Asp28]GpTx-1(1-34)	1779
DCLG[2-Abu]MRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5;Glu10;Pra13;Asp28]GpTx-1(1-34)	1780
DCLG[Nva]MRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Glu10;Pra13;Asp28]GpTx-1(1-34)	1781
DCLG[Nle]MRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Glu10;Pra13;Asp28]GpTx-1(1-34)	1782
DCLGVMRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Glu10;Pra13;Asp28]GpTx-1(1-34)	1783
DCLGLMRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Glu10;Pra13;Asp28]GpTx-1(1-34)	1784
DCLGIMRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Glu10;Pra13;Asp28]GpTx-1(1-34)	1785
DCLGFFRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Phe6;Asp10,28;Pra13]GpTx-1(1-34)	1786

DCLGFLRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu6;Asp10,28;Pra13]GpTx-1(1-34)	1787
DCLGF[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle6;Asp10,28;Pra13]GpTx-1(1-34)	1788
DCLGGMRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Asp10,28;Pra13]GpTx-1(1-34)	1789
DCLGAMRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Asp10,28;Pra13]GpTx-1(1-34)	1790
DCLG[2-Abu]MRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5;Asp10,28;Pra13]GpTx-1(1-34)	1791
DCLG[Nva]MRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Asp10,28;Pra13]GpTx-1(1-34)	1792
DCLG[Nle]MRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Asp10,28;Pra13]GpTx-1(1-34)	1793
DCLGVMRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Asp10,28;Pra13]GpTx-1(1-34)	1794
DCLGLMRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Asp10,28;Pra13]GpTx-1(1-34)	1795
DCLGIMRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Asp10,28;Pra13]GpTx-1(1-34)	1796
DCLGGFRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Phe6;Pra13;Asp28]GpTx-1(1-34)	1797
DCLGAFRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Phe6;Pra13;Asp28]GpTx-1(1-34)	1798
DCLG[2-Abu]FRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5;Phe6;Pra13;Asp28]GpTx-1(1-34)	1799
DCLG[Nva]FRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Phe6;Pra13;Asp28]GpTx-1(1-34)	1800
DCLG[Nle]FRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Phe6;Pra13;Asp28]GpTx-1(1-34)	1801
DCLGVFRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Phe6;Pra13;Asp28]GpTx-1(1-34)	1802
DCLGLFRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Phe6;Pra13;Asp28]GpTx-1(1-34)	1803
DCLGIFRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Phe6;Pra13;Asp28]GpTx-1(1-34)	1804
DCLGGLRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Leu6;Pra13;Asp28]GpTx-1(1-34)	1805
DCLGALRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Leu6;Pra13;Asp28]GpTx-1(1-34)	1806

DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5;Leu6;Pra13;Asp28]GpTx-1(1-34)	1807
DCLG[Nva]LRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Leu6;Pra13;Asp28]GpTx-1(1-34)	1808
DCLG[Nle]LRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Leu6;Pra13;Asp28]GpTx-1(1-34)	1809
DCLGVLRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Leu6;Pra13;Asp28]GpTx-1(1-34)	1810
DCLGLLRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5,6;Pra13;Asp28]GpTx-1(1-34)	1811
DCLGILRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Leu6;Pra13;Asp28]GpTx-1(1-34)	1812
DCLGG[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Nle6;Pra13;Asp28]GpTx-1(1-34)	1813
DCLGA[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Nle6;Pra13;Asp28]GpTx-1(1-34)	1814
DCLG[2-Abu][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5;Nle6;Pra13;Asp28]GpTx-1(1-34)	1815
DCLG[Nva][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Nle6;Pra13;Asp28]GpTx-1(1-34)	1816
DCLG[Nle][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5,6;Pra13;Asp28]GpTx-1(1-34)	1817
DCLGV[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Nle6;Pra13;Asp28]GpTx-1(1-34)	1818
DCLGL[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Nle6;Pra13;Asp28]GpTx-1(1-34)	1819
DCLGI[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Nle6;Pra13;Asp28]GpTx-1(1-34)	1820
DCLGFFRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Phe6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1821
DCLGFLRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu6,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1822
DCLGF[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1823
DCLGGMRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1824
DCLGAMRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1825
DCLG[2-Abu]MRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5,13;Glu11;Leu26;Asp28]GpTx-1(1-34)	1826

DCLG[Nva]MRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1827
DCLG[Nle]MRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1828
DCLGVMRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1829
DCLGLMRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1830
DCLGIMRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1831
DCLGFFRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Phe6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1832
DCLGFLRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu6,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1833
DCLGF[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1834
DCLGGMRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1835
DCLGAMRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1836
DCLG[2-Abu]MRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5,13;Glu10;Leu26;Asp28]GpTx-1(1-34)	1837
DCLG[Nva]MRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1838
DCLG[Nle]MRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1839
DCLGVMRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1840
DCLGLMRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1841
DCLGIMRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1842
DCLGFFRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Phe6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1843
DCLGFLRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu6,26;Asp10,28;2-Abu13]GpTx-1(1-34)	1844
DCLGF[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1845
DCLGGMRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1846

DCLGAMRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1847
DCLG[2-Abu]MRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5,13;Asp10,28;Leu26]GpTx-1(1-34)	1848
DCLG[Nva]MRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1849
DCLG[Nle]MRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1850
DCLGVMRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1851
DCLGLMRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Asp10,28;2-Abu13]GpTx-1(1-34)	1852
DCLGIMRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1853
DCLGGFRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Phe6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1854
DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Phe6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1855
DCLG[2-Abu]FRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5,13;Phe6;Leu26;Asp28]GpTx-1(1-34)	1856
DCLG[Nva]FRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Phe6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1857
DCLG[Nle]FRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Phe6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1858
DCLGVFRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Phe6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1859
DCLGLFRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1860
DCLGIFRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Phe6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1861
DCLGGLRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Leu6,26;2-Abu13;Asp28]GpTx-1(1-34)	1862
DCLGALRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Leu6,26;2-Abu13;Asp28]GpTx-1(1-34)	1863
DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5,13;Leu6,26;Asp28]GpTx-1(1-34)	1864
DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Leu6,26;2-Abu13;Asp28]GpTx-1(1-34)	1865
DCLG[Nle]LRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Leu6,26;2-Abu13;Asp28]GpTx-1(1-34)	1866

DCLGVLRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Leu6,26;2-Abu13;Asp28]GpTx-1(1-34)	1867
DCLGLLRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,6,26;2-Abu13;Asp28]GpTx-1(1-34)	1868
DCLGILRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Leu6,26;2-Abu13;Asp28]GpTx-1(1-34)	1869
DCLGG[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Nle6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1870
DCLGA[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Nle6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1871
DCLG[2-Abu][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5,13;Nle6;Leu26;Asp28]GpTx-1(1-34)	1872
DCLG[Nva][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Nle6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1873
DCLG[Nle][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5,6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1874
DCLGV[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Nle6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1875
DCLGL[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Nle6;2-Abu13;Asp28]GpTx-1(1-34)	1876
DCLGI[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Nle6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1877
DCLGFFRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Phe6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1878
DCLGFLRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	1879
DCLGF[Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1880
DCLGGMRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1881
DCLGAMRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1882
DCLG[2-Abu]MRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1883
DCLG[Nva]MRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1884
DCLG[Nle]MRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1885
DCLGVMRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1886

DCLGLMRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	1887
DCLGIMRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1888
DCLGFFRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Phe6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1889
DCLGFLRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	1890
DCLGF[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1891
DCLGGMRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1892
DCLGAMRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1893
DCLG[2-Abu]MRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1894
DCLG[Nva]MRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1895
DCLG[Nle]MRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1896
DCLGVMRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1897
DCLGLMRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	1898
DCLGIMRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1899
DCLGFFRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Phe6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1900
DCLGFLRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu6,26;Asp10,28;Pra13]GpTx-1(1-34)	1901
DCLGF[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1902
DCLGGMRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1903
DCLGAMRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1904
DCLG[2-Abu]MRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1905
DCLG[Nva]MRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1906

DCLG[Nle]MRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1907
DCLGVMRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1908
DCLGLMRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Asp10,28;Pra13]GpTx-1(1-34)	1909
DCLGIMRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1910
DCLGGFRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Phe6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1911
DCLGAFRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Phe6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1912
DCLG[2-Abu]FRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5;Phe6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1913
DCLG[Nva]FRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Phe6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1914
DCLG[Nle]FRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Phe6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1915
DCLGVFRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Phe6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1916
DCLGLFRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Phe6;Pra13;Asp28]GpTx-1(1-34)	1917
DCLGIFRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Phe6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1918
DCLGGLRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Leu6,26;Pra13;Asp28]GpTx-1(1-34)	1919
DCLGALRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Leu6,26;Pra13;Asp28]GpTx-1(1-34)	1920
DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5;Leu6,26;Pra13;Asp28]GpTx-1(1-34)	1921
DCLG[Nva]LRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Leu6,26;Pra13;Asp28]GpTx-1(1-34)	1922
DCLG[Nle]LRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Leu6,26;Pra13;Asp28]GpTx-1(1-34)	1923
DCLGVLRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Leu6,26;Pra13;Asp28]GpTx-1(1-34)	1924
DCLGLLRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,6,26;Pra13;Asp28]GpTx-1(1-34)	1925
DCLGILRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Leu6,26;Pra13;Asp28]GpTx-1(1-34)	1926

DCLGG[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Nle6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1927
DCLGA[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Nle6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1928
DCLG[2-Abu][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5;Nle6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1929
DCLG[Nva][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Nle6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1930
DCLG[Nle][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5,6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1931
DCLGV[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Nle6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1932
DCLGL[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Nle6;Pra13;Asp28]GpTx-1(1-34)	1933
DCLGI[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Nle6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1934
DCLGGFRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1935
DCLGAFRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1936
DCLG[2-Abu]FRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5,13;Phe6;Glu11;Asp28]GpTx-1(1-34)	1937
DCLG[Nva]FRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1938
DCLG[Nle]FRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1939
DCLGVFRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1940
DCLGLFRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1941
DCLGIFRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1942
DCLGGLRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Leu6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1943
DCLGALRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Leu6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1944
DCLG[2-Abu]LRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5,13;Leu6;Glu11;Asp28]GpTx-1(1-34)	1945
DCLG[Nva]LRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Leu6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1946

DCLG[Nle]LRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Leu6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1947
DCLGVLRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Leu6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1948
DCLGLLRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5,6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1949
DCLGILRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Leu6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1950
DCLGG[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Nle6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1951
DCLGA[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Nle6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1952
DCLG[2-Abu][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5,13;Nle6;Glu11;Asp28]GpTx-1(1-34)	1953
DCLG[Nva][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Nle6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1954
DCLG[Nle][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5,6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1955
DCLGV[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Nle6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1956
DCLGL[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Nle6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1957
DCLGI[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Nle6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1958
DCLGGFRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1959
DCLGAFRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1960
DCLG[2-Abu]FRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5,13;Phe6;Glu10;Asp28]GpTx-1(1-34)	1961
DCLG[Nva]FRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1962
DCLG[Nle]FRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1963
DCLGVFRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1964
DCLGLFRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1965
DCLGIFRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1966

DCLGGLRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Leu6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1967
DCLGALRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Leu6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1968
DCLG[2-Abu]LRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5,13;Leu6;Glu10;Asp28]GpTx-1(1-34)	1969
DCLG[Nva]LRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Leu6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1970
DCLG[Nle]LRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Leu6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1971
DCLGVLRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Leu6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1972
DCLGLLRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5,6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1973
DCLGILRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Leu6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1974
DCLGG[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Nle6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1975
DCLGA[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Nle6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1976
DCLG[2-Abu][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5,13;Nle6;Glu10;Asp28]GpTx-1(1-34)	1977
DCLG[Nva][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Nle6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1978
DCLG[Nle][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5,6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1979
DCLGV[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Nle6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1980
DCLGL[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Nle6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1981
DCLGI[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Nle6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1982
DCLGGFRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	1983
DCLGAFRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	1984
DCLG[2-Abu]FRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5,13;Phe6;Asp10,28]GpTx-1(1-34)	1985
DCLG[Nva]FRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	1986

DCLG[Nle]FRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	1987
DCLGVFRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	1988
DCLGLFRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	1989
DCLGIFRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	1990
DCLGGLRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Leu6;Asp10,28;2-Abu13]GpTx-1(1-34)	1991
DCLGALRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Leu6;Asp10,28;2-Abu13]GpTx-1(1-34)	1992
DCLG[2-Abu]LRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5,13;Leu6;Asp10,28]GpTx-1(1-34)	1993
DCLG[Nva]LRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Leu6;Asp10,28;2-Abu13]GpTx-1(1-34)	1994
DCLG[Nle]LRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Leu6;Asp10,28;2-Abu13]GpTx-1(1-34)	1995
DCLGVLRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Leu6;Asp10,28;2-Abu13]GpTx-1(1-34)	1996
DCLGLLRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5,6;Asp10,28;2-Abu13]GpTx-1(1-34)	1997
DCLGILRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Leu6;Asp10,28;2-Abu13]GpTx-1(1-34)	1998
DCLGG[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Nle6;Asp10,28;2-Abu13]GpTx-1(1-34)	1999
DCLGA[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Nle6;Asp10,28;2-Abu13]GpTx-1(1-34)	2000
DCLG[2-Abu][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5,13;Nle6;Asp10,28]GpTx-1(1-34)	2001
DCLG[Nva][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Nle6;Asp10,28;2-Abu13]GpTx-1(1-34)	2002
DCLG[Nle][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5,6;Asp10,28;2-Abu13]GpTx-1(1-34)	2003
DCLGV[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Nle6;Asp10,28;2-Abu13]GpTx-1(1-34)	2004
DCLGL[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Nle6;Asp10,28;2-Abu13]GpTx-1(1-34)	2005
DCLGI[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Nle6;Asp10,28;2-Abu13]GpTx-1(1-34)	2006

DCLGGFRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2007
DCLGAFRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2008
DCLG[2-Abu]FRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2009
DCLG[Nva]FRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2010
DCLG[Nle]FRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2011
DCLGVFRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2012
DCLGLFRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2013
DCLGIFRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2014
DCLGGLRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Leu6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2015
DCLGALRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Leu6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2016
DCLG[2-Abu]LRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5;Leu6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2017
DCLG[Nva]LRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Leu6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2018
DCLG[Nle]LRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Leu6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2019
DCLGVLRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Leu6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2020
DCLGLLRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5,6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2021
DCLGILRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Leu6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2022
DCLGG[Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2023
DCLGA[Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2024
DCLG[2-Abu][Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5;Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2025
DCLG[Nva][Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2026

DCLG[Nle][Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5,6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2027
DCLGV[Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2028
DCLGL[Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2029
DCLGI[Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2030
DCLGGFRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2031
DCLGAFRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2032
DCLG[2-Abu]FRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2033
DCLG[Nva]FRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2034
DCLG[Nle]FRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2035
DCLGVFRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2036
DCLGLFRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2037
DCLGIFRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2038
DCLGGLRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Leu6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2039
DCLGALRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Leu6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2040
DCLG[2-Abu]LRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5;Leu6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2041
DCLG[Nva]LRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Leu6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2042
DCLG[Nle]LRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Leu6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2043
DCLGVLRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Leu6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2044
DCLGLLRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5,6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2045
DCLGILRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Leu6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2046

DCLGG[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2047
DCLGA[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2048
DCLG[2-Abu][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5;Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2049
DCLG[Nva][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2050
DCLG[Nle][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5,6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2051
DCLGV[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2052
DCLGL[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2053
DCLGI[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2054
DCLGGFRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2055
DCLGAFRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2056
DCLG[2-Abu]FRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2057
DCLG[Nva]FRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2058
DCLG[Nle]FRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2059
DCLGVFRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2060
DCLGLFRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2061
DCLGIFRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2062
DCLGGLRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Leu6;Asp10,28;Pra13]GpTx-1(1-34)	2063
DCLGALRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Leu6;Asp10,28;Pra13]GpTx-1(1-34)	2064
DCLG[2-Abu]LRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5;Leu6;Asp10,28;Pra13]GpTx-1(1-34)	2065
DCLG[Nva]LRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Leu6;Asp10,28;Pra13]GpTx-1(1-34)	2066

DCLG[Nle]LRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5;Leu6;Asp10,28;Pra13]GpTx-1(1-34)	2067
DCLGVLRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Leu6;Asp10,28;Pra13]GpTx-1(1-34)	2068
DCLGLLRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5,6;Asp10,28;Pra13]GpTx-1(1-34)	2069
DCLGILRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Leu6;Asp10,28;Pra13]GpTx-1(1-34)	2070
DCLGG[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Gly5;Nle6;Asp10,28;Pra13]GpTx-1(1-34)	2071
DCLGA[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ala5;Nle6;Asp10,28;Pra13]GpTx-1(1-34)	2072
DCLG[2-Abu][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[2-Abu5;Nle6;Asp10,28;Pra13]GpTx-1(1-34)	2073
DCLG[Nva][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nva5;Nle6;Asp10,28;Pra13]GpTx-1(1-34)	2074
DCLG[Nle][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Nle5,6;Asp10,28;Pra13]GpTx-1(1-34)	2075
DCLGV[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Val5;Nle6;Asp10,28;Pra13]GpTx-1(1-34)	2076
DCLGL[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Leu5;Nle6;Asp10,28;Pra13]GpTx-1(1-34)	2077
DCLGI[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{Amide}	[Ile5;Nle6;Asp10,28;Pra13]GpTx-1(1-34)	2078
DCLGGFRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Phe6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2079
DCLGAFRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Phe6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2080
DCLG[2-Abu]FRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5,13;Phe6;Glu11;Leu26;Asp28]GpTx-1(1-34)	2081
DCLG[Nva]FRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Phe6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2082
DCLG[Nle]FRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Phe6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2083
DCLGVFRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Phe6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2084
DCLGLFRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2085
DCLGIFRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Phe6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2086

DCLGGLRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Leu6,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2087
DCLGALRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Leu6,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2088
DCLG[2-Abu]LRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5,13;Leu6,26;Glu11;Asp28]GpTx-1(1-34)	2089
DCLG[Nva]LRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Leu6,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2090
DCLG[Nle]LRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Leu6,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2091
DCLGVLRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Leu6,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2092
DCLGLLRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,6,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2093
DCLGILRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Leu6,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2094
DCLGG[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Nle6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2095
DCLGA[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Nle6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2096
DCLG[2-Abu][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5,13;Nle6;Glu11;Leu26;Asp28]GpTx-1(1-34)	2097
DCLG[Nva][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Nle6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2098
DCLG[Nle][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5,6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2099
DCLGV[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Nle6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2100
DCLGL[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Nle6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2101
DCLGI[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Nle6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2102
DCLGGFRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Phe6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2103
DCLGAFRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Phe6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2104
DCLG[2-Abu]FRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5,13;Phe6;Glu10;Leu26;Asp28]GpTx-1(1-34)	2105
DCLG[Nva]FRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Phe6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2106

DCLG[Nle]FRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Phe6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2107
DCLGVFRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Phe6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2108
DCLGLFRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2109
DCLGIFRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Phe6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2110
DCLGGLRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Leu6,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2111
DCLGALRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Leu6,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2112
DCLG[2-Abu]LRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5,13;Leu6,26;Glu10;Asp28]GpTx-1(1-34)	2113
DCLG[Nva]LRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Leu6,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2114
DCLG[Nle]LRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Leu6,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2115
DCLGVLRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Leu6,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2116
DCLGLLRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,6,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2117
DCLGILRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Leu6,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2118
DCLGG[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Nle6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2119
DCLGA[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Nle6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2120
DCLG[2-Abu][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5,13;Nle6;Glu10;Leu26;Asp28]GpTx-1(1-34)	2121
DCLG[Nva][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Nle6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2122
DCLG[Nle][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5,6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2123
DCLGV[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Nle6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2124
DCLGL[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Nle6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2125
DCLGI[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Nle6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2126

DCLGGFRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Phe6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2127
DCLGAFRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Phe6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2128
DCLG[2-Abu]FRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5,13;Phe6;Asp10,28;Leu26]GpTx-1(1-34)	2129
DCLG[Nva]FRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Phe6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2130
DCLG[Nle]FRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Phe6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2131
DCLGVFRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Phe6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2132
DCLGLFRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	2133
DCLGIFRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Phe6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2134
DCLGGLRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Leu6,26;Asp10,28;2-Abu13]GpTx-1(1-34)	2135
DCLGALRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Leu6,26;Asp10,28;2-Abu13]GpTx-1(1-34)	2136
DCLG[2-Abu]LRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5,13;Leu6,26;Asp10,28]GpTx-1(1-34)	2137
DCLG[Nva]LRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Leu6,26;Asp10,28;2-Abu13]GpTx-1(1-34)	2138
DCLG[Nle]LRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Leu6,26;Asp10,28;2-Abu13]GpTx-1(1-34)	2139
DCLGVLRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Leu6,26;Asp10,28;2-Abu13]GpTx-1(1-34)	2140
DCLGLLRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,6,26;Asp10,28;2-Abu13]GpTx-1(1-34)	2141
DCLGILRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Leu6,26;Asp10,28;2-Abu13]GpTx-1(1-34)	2142
DCLGG[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Nle6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2143
DCLGA[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Nle6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2144
DCLG[2-Abu][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5,13;Nle6;Asp10,28;Leu26]GpTx-1(1-34)	2145
DCLG[Nva][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Nle6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2146

DCLG[Nle][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5,6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2147
DCLGV[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Nle6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2148
DCLGL[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Nle6;Asp10,28;2-Abu13]GpTx-1(1-34)	2149
DCLGI[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Nle6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2150
DCLGGFRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Phe6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2151
DCLGAFRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Phe6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2152
DCLG[2-Abu]FRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5;Phe6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2153
DCLG[Nva]FRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Phe6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2154
DCLG[Nle]FRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Phe6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2155
DCLGVFRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Phe6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2156
DCLGLFRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2157
DCLGIFRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Phe6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2158
DCLGGLRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Leu6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	2159
DCLGALRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Leu6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	2160
DCLG[2-Abu]LRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5;Leu6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	2161
DCLG[Nva]LRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Leu6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	2162
DCLG[Nle]LRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Leu6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	2163
DCLGVLRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Leu6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	2164
DCLGLLRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	2165
DCLGILRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Leu6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	2166

DCLGG[Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Nle6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2167
DCLGA[Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Nle6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2168
DCLG[2-Abu][Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5;Nle6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2169
DCLG[Nva][Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Nle6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2170
DCLG[Nle][Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5,6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2171
DCLGV[Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Nle6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2172
DCLGL[Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2173
DCLGI[Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Nle6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2174
DCLGGFRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Phe6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2175
DCLGAFRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Phe6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2176
DCLG[2-Abu]FRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5;Phe6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2177
DCLG[Nva]FRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Phe6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2178
DCLG[Nle]FRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Phe6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2179
DCLGVFRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Phe6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2180
DCLGLFRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2181
DCLGIFRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Phe6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2182
DCLGGLRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Leu6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	2183
DCLGALRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Leu6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	2184
DCLG[2-Abu]LRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5;Leu6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	2185
DCLG[Nva]LRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Leu6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	2186

DCLG[Nle]LRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Leu6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	2187
DCLGVLRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Leu6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	2188
DCLGLLRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	2189
DCLGILRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Leu6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	2190
DCLGG[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Nle6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2191
DCLGA[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Nle6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2192
DCLG[2-Abu][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5;Nle6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2193
DCLG[Nva][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Nle6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2194
DCLG[Nle][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5,6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2195
DCLGV[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Nle6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2196
DCLGL[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2197
DCLGI[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Nle6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2198
DCLGGFRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Phe6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2199
DCLGAFRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Phe6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2200
DCLG[2-Abu]FRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5;Phe6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2201
DCLG[Nva]FRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Phe6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2202
DCLG[Nle]FRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Phe6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2203
DCLGVFRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Phe6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2204
DCLGLFRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2205
DCLGIFRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Phe6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2206

DCLGGLRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Leu6,26;Asp10,28;Pra13]GpTx-1(1-34)	2207
DCLGALRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Leu6,26;Asp10,28;Pra13]GpTx-1(1-34)	2208
DCLG[2-Abu]LRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5;Leu6,26;Asp10,28;Pra13]GpTx-1(1-34)	2209
DCLG[Nva]LRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Leu6,26;Asp10,28;Pra13]GpTx-1(1-34)	2210
DCLG[Nle]LRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5;Leu6,26;Asp10,28;Pra13]GpTx-1(1-34)	2211
DCLGVLRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Leu6,26;Asp10,28;Pra13]GpTx-1(1-34)	2212
DCLGLLRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,6,26;Asp10,28;Pra13]GpTx-1(1-34)	2213
DCLGILRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Leu6,26;Asp10,28;Pra13]GpTx-1(1-34)	2214
DCLGG[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Gly5;Nle6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2215
DCLGA[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ala5;Nle6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2216
DCLG[2-Abu][Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[2-Abu5;Nle6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2217
DCLG[Nva][Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nva5;Nle6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2218
DCLG[Nle][Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Nle5,6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2219
DCLGV[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Val5;Nle6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2220
DCLGL[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Leu5,26;Nle6;Asp10,28;Pra13]GpTx-1(1-34)	2221
DCLGI[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{Amide}	[Ile5;Nle6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2222
DCLGFMRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu13;Gln28]GpTx-1(1-34)	2223
DCLGFMRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Pra13;Gln28]GpTx-1(1-34)	2224
DCLGFMRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2225
DCLGFMRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Pra13;Leu26;Gln28]GpTx-1(1-34)	2226

DCLGFMRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2227
DCLGFMRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2228
DCLGFMRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2229
DCLGFFRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2230
DCLGFLRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu6;2-Abu13;Gln28]GpTx-1(1-34)	2231
DCLGF[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle6;2-Abu13;Gln28]GpTx-1(1-34)	2232
DCLGGMRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;2-Abu13;Gln28]GpTx-1(1-34)	2233
DCLGAMRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;2-Abu13;Gln28]GpTx-1(1-34)	2234
DCLG[2-Abu]MRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5,13;Gln28]GpTx-1(1-34)	2235
DCLG[Nva]MRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;2-Abu13;Gln28]GpTx-1(1-34)	2236
DCLG[Nle]MRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;2-Abu13;Gln28]GpTx-1(1-34)	2237
DCLGVMRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;2-Abu13;Gln28]GpTx-1(1-34)	2238
DCLGLMRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;2-Abu13;Gln28]GpTx-1(1-34)	2239
DCLGIMRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;2-Abu13;Gln28]GpTx-1(1-34)	2240
DCLGFMRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Glu11;Pra13;Gln28]GpTx-1(1-34)	2241
DCLGFMRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Glu10;Pra13;Gln28]GpTx-1(1-34)	2242
DCLGFMRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Asp10;Pra13;Gln28]GpTx-1(1-34)	2243
DCLGFFRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Phe6;Pra13;Gln28]GpTx-1(1-34)	2244
DCLGFLRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu6;Pra13;Gln28]GpTx-1(1-34)	2245
DCLGF[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle6;Pra13;Gln28]GpTx-1(1-34)	2246

DCLGGMRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Pra13;Gln28]GpTx-1(1-34)	2247
DCLGAMRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Pra13;Gln28]GpTx-1(1-34)	2248
DCLG[2-Abu]MRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5;Pra13;Gln28]GpTx-1(1-34)	2249
DCLG[Nva]MRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Pra13;Gln28]GpTx-1(1-34)	2250
DCLG[Nle]MRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Pra13;Gln28]GpTx-1(1-34)	2251
DCLGVMRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Pra13;Gln28]GpTx-1(1-34)	2252
DCLGLMRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Pra13;Gln28]GpTx-1(1-34)	2253
DCLGIMRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Pra13;Gln28]GpTx-1(1-34)	2254
DCLGFMRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2255
DCLGFMRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2256
DCLGFMRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2257
DCLGFFRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Phe6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2258
DCLGFLRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu6,26;2-Abu13;Gln28]GpTx-1(1-34)	2259
DCLGF[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2260
DCLGGMRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2261
DCLGAMRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2262
DCLG[2-Abu]MRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5,13;Leu26;Gln28]GpTx-1(1-34)	2263
DCLG[Nva]MRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2264
DCLG[Nle]MRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2265
DCLGVMRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2266

DCLGLMRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;2-Abu13;Gln28]GpTx-1(1-34)	2267
DCLGIMRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2268
DCLGFMRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2269
DCLGFMRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2270
DCLGFMRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2271
DCLGFFRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Phe6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2272
DCLGFLRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu6,26;Pra13;Gln28]GpTx-1(1-34)	2273
DCLGF[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2274
DCLGGMRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Pra13;Leu26;Gln28]GpTx-1(1-34)	2275
DCLGAMRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Pra13;Leu26;Gln28]GpTx-1(1-34)	2276
DCLG[2-Abu]MRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5;Pra13;Leu26;Gln28]GpTx-1(1-34)	2277
DCLG[Nva]MRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Pra13;Leu26;Gln28]GpTx-1(1-34)	2278
DCLG[Nle]MRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Pra13;Leu26;Gln28]GpTx-1(1-34)	2279
DCLGVMRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Pra13;Leu26;Gln28]GpTx-1(1-34)	2280
DCLGLMRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Pra13;Gln28]GpTx-1(1-34)	2281
DCLGIMRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Pra13;Leu26;Gln28]GpTx-1(1-34)	2282
DCLGFFRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2283
DCLGFLRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2284
DCLGF[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2285
DCLGGMRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2286

DCLGAMRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2287
DCLG[2-Abu]MRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5,13;Glu11;Gln28]GpTx-1(1-34)	2288
DCLG[Nva]MRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2289
DCLG[Nle]MRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2290
DCLGVMRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2291
DCLGLMRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2292
DCLGIMRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2293
DCLGFFRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2294
DCLGFLRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2295
DCLGF[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2296
DCLGGMRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2297
DCLGAMRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2298
DCLG[2-Abu]MRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5,13;Glu10;Gln28]GpTx-1(1-34)	2299
DCLG[Nva]MRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2300
DCLG[Nle]MRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2301
DCLGVMRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2302
DCLGLMRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2303
DCLGIMRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2304
DCLGFFRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2305
DCLGFLRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2306

DCLGF[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2307
DCLGGMRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2308
DCLGAMRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2309
DCLG[2-Abu]MRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5,13;Asp10;Gln28]GpTx-1(1-34)	2310
DCLG[Nva]MRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2311
DCLG[Nle]MRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2312
DCLGVMRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2313
DCLGLMRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2314
DCLGIMRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2315
DCLGGFRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2316
DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2317
DCLG[2-Abu]FRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5,13;Phe6;Gln28]GpTx-1(1-34)	2318
DCLG[Nva]FRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2319
DCLG[Nle]FRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2320
DCLGVFRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2321
DCLGLFRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2322
DCLGIFRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2323
DCLGGLRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Leu6;2-Abu13;Gln28]GpTx-1(1-34)	2324
DCLGALRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Leu6;2-Abu13;Gln28]GpTx-1(1-34)	2325
DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5,13;Leu6;Gln28]GpTx-1(1-34)	2326

DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Leu6;2-Abu13;Gln28]GpTx-1(1-34)	2327
DCLG[Nle]LRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Leu6;2-Abu13;Gln28]GpTx-1(1-34)	2328
DCLGVLRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Leu6;2-Abu13;Gln28]GpTx-1(1-34)	2329
DCLGLLRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5,6;2-Abu13;Gln28]GpTx-1(1-34)	2330
DCLGILRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Leu6;2-Abu13;Gln28]GpTx-1(1-34)	2331
DCLGG[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Nle6;2-Abu13;Gln28]GpTx-1(1-34)	2332
DCLGA[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Nle6;2-Abu13;Gln28]GpTx-1(1-34)	2333
DCLG[2-Abu][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5,13;Nle6;Gln28]GpTx-1(1-34)	2334
DCLG[Nva][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Nle6;2-Abu13;Gln28]GpTx-1(1-34)	2335
DCLG[Nle][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5,6;2-Abu13;Gln28]GpTx-1(1-34)	2336
DCLGV[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Nle6;2-Abu13;Gln28]GpTx-1(1-34)	2337
DCLGL[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Nle6;2-Abu13;Gln28]GpTx-1(1-34)	2338
DCLGI[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Nle6;2-Abu13;Gln28]GpTx-1(1-34)	2339
DCLGFFRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2340
DCLGFLRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2341
DCLGF[Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2342
DCLGGMRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Glu11;Pra13;Gln28]GpTx-1(1-34)	2343
DCLGAMRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Glu11;Pra13;Gln28]GpTx-1(1-34)	2344
DCLG[2-Abu]MRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5;Glu11;Pra13;Gln28]GpTx-1(1-34)	2345
DCLG[Nva]MRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Glu11;Pra13;Gln28]GpTx-1(1-34)	2346

DCLG[Nle]MRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Glu11;Pra13;Gln28]GpTx-1(1-34)	2347
DCLGVMRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Glu11;Pra13;Gln28]GpTx-1(1-34)	2348
DCLGLMRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Glu11;Pra13;Gln28]GpTx-1(1-34)	2349
DCLGIMRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Glu11;Pra13;Gln28]GpTx-1(1-34)	2350
DCLGFFRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2351
DCLGFLRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2352
DCLGF[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2353
DCLGGMRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Glu10;Pra13;Gln28]GpTx-1(1-34)	2354
DCLGAMRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Glu10;Pra13;Gln28]GpTx-1(1-34)	2355
DCLG[2-Abu]MRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5;Glu10;Pra13;Gln28]GpTx-1(1-34)	2356
DCLG[Nva]MRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Glu10;Pra13;Gln28]GpTx-1(1-34)	2357
DCLG[Nle]MRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Glu10;Pra13;Gln28]GpTx-1(1-34)	2358
DCLGVMRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Glu10;Pra13;Gln28]GpTx-1(1-34)	2359
DCLGLMRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Glu10;Pra13;Gln28]GpTx-1(1-34)	2360
DCLGIMRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Glu10;Pra13;Gln28]GpTx-1(1-34)	2361
DCLGFFRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2362
DCLGFLRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2363
DCLGF[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2364
DCLGGMRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Asp10;Pra13;Gln28]GpTx-1(1-34)	2365
DCLGAMRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Asp10;Pra13;Gln28]GpTx-1(1-34)	2366

DCLG[2-Abu]MRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5;Asp10;Pra13;Gln28]GpTx-1(1-34)	2367
DCLG[Nva]MRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Asp10;Pra13;Gln28]GpTx-1(1-34)	2368
DCLG[Nle]MRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Asp10;Pra13;Gln28]GpTx-1(1-34)	2369
DCLGVMRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Asp10;Pra13;Gln28]GpTx-1(1-34)	2370
DCLGLMRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Asp10;Pra13;Gln28]GpTx-1(1-34)	2371
DCLGIMRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Asp10;Pra13;Gln28]GpTx-1(1-34)	2372
DCLGGFRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Phe6;Pra13;Gln28]GpTx-1(1-34)	2373
DCLGAFRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Phe6;Pra13;Gln28]GpTx-1(1-34)	2374
DCLG[2-Abu]FRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5;Phe6;Pra13;Gln28]GpTx-1(1-34)	2375
DCLG[Nva]FRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Phe6;Pra13;Gln28]GpTx-1(1-34)	2376
DCLG[Nle]FRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Phe6;Pra13;Gln28]GpTx-1(1-34)	2377
DCLGVFRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Phe6;Pra13;Gln28]GpTx-1(1-34)	2378
DCLGLFRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Phe6;Pra13;Gln28]GpTx-1(1-34)	2379
DCLGIFRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Phe6;Pra13;Gln28]GpTx-1(1-34)	2380
DCLGGLRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Leu6;Pra13;Gln28]GpTx-1(1-34)	2381
DCLGALRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Leu6;Pra13;Gln28]GpTx-1(1-34)	2382
DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5;Leu6;Pra13;Gln28]GpTx-1(1-34)	2383
DCLG[Nva]LRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Leu6;Pra13;Gln28]GpTx-1(1-34)	2384
DCLG[Nle]LRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Leu6;Pra13;Gln28]GpTx-1(1-34)	2385
DCLGVLRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Leu6;Pra13;Gln28]GpTx-1(1-34)	2386

DCLGLLRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5,6;Pra13;Gln28]GpTx-1(1-34)	2387
DCLGILRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Leu6;Pra13;Gln28]GpTx-1(1-34)	2388
DCLGG[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Nle6;Pra13;Gln28]GpTx-1(1-34)	2389
DCLGA[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Nle6;Pra13;Gln28]GpTx-1(1-34)	2390
DCLG[2-Abu][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5;Nle6;Pra13;Gln28]GpTx-1(1-34)	2391
DCLG[Nva][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Nle6;Pra13;Gln28]GpTx-1(1-34)	2392
DCLG[Nle][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5,6;Pra13;Gln28]GpTx-1(1-34)	2393
DCLGV[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Nle6;Pra13;Gln28]GpTx-1(1-34)	2394
DCLGL[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Nle6;Pra13;Gln28]GpTx-1(1-34)	2395
DCLGI[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Nle6;Pra13;Gln28]GpTx-1(1-34)	2396
DCLGFFRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Phe6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2397
DCLGFLRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu6,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2398
DCLGF[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2399
DCLGGMRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2400
DCLGAMRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2401
DCLG[2-Abu]MRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5,13;Glu11;Leu26;Gln28]GpTx-1(1-34)	2402
DCLG[Nva]MRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2403
DCLG[Nle]MRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2404
DCLGVMRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2405
DCLGLMRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2406

DCLGIMRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2407
DCLGFFRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Phe6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2408
DCLGFLRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu6,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2409
DCLGF[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2410
DCLGGMRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2411
DCLGAMRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2412
DCLG[2-Abu]MRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5,13;Glu10;Leu26;Gln28]GpTx-1(1-34)	2413
DCLG[Nva]MRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2414
DCLG[Nle]MRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2415
DCLGVMRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2416
DCLGLMRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2417
DCLGIMRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2418
DCLGFFRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Phe6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2419
DCLGFLRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu6,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2420
DCLGF[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2421
DCLGGMRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2422
DCLGAMRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2423
DCLG[2-Abu]MRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5,13;Asp10;Leu26;Gln28]GpTx-1(1-34)	2424
DCLG[Nva]MRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2425
DCLG[Nle]MRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2426

DCLGVMRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2427
DCLGLMRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2428
DCLGIMRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2429
DCLGGFRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Phe6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2430
DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Phe6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2431
DCLG[2-Abu]FRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5,13;Phe6;Leu26;Gln28]GpTx-1(1-34)	2432
DCLG[Nva]FRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Phe6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2433
DCLG[Nle]FRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Phe6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2434
DCLGVFRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Phe6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2435
DCLGLFRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2436
DCLGIFRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Phe6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2437
DCLGGLRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Leu6,26;2-Abu13;Gln28]GpTx-1(1-34)	2438
DCLGALRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Leu6,26;2-Abu13;Gln28]GpTx-1(1-34)	2439
DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5,13;Leu6,26;Gln28]GpTx-1(1-34)	2440
DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Leu6,26;2-Abu13;Gln28]GpTx-1(1-34)	2441
DCLG[Nle]LRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Leu6,26;2-Abu13;Gln28]GpTx-1(1-34)	2442
DCLGVLRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Leu6,26;2-Abu13;Gln28]GpTx-1(1-34)	2443
DCLGLLRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,6,26;2-Abu13;Gln28]GpTx-1(1-34)	2444
DCLGILRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Leu6,26;2-Abu13;Gln28]GpTx-1(1-34)	2445
DCLGG[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Nle6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2446

DCLGA[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Nle6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2447
DCLG[2-Abu][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5,13;Nle6;Leu26;Gln28]GpTx-1(1-34)	2448
DCLG[Nva][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Nle6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2449
DCLG[Nle][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5,6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2450
DCLGV[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Nle6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2451
DCLGL[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Nle6;2-Abu13;Gln28]GpTx-1(1-34)	2452
DCLGI[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Nle6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2453
DCLGFFRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Phe6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2454
DCLGFLRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2455
DCLGF[Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2456
DCLGGMRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2457
DCLGAMRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2458
DCLG[2-Abu][Nle]MRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2459
DCLG[Nva]MRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2460
DCLG[Nle]MRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2461
DCLGVMRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2462
DCLGLMRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2463
DCLGIMRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2464
DCLGFFRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Phe6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2465
DCLGFLRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2466

DCLGF[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2467
DCLGGMRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2468
DCLGAMRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2469
DCLG[2-Abu]MRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2470
DCLG[Nva]MRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2471
DCLG[Nle]MRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2472
DCLGVMRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2473
DCLGLMRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2474
DCLGIMRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2475
DCLGFFRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Phe6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2476
DCLGFLRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2477
DCLGF[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2478
DCLGGMRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2479
DCLGAMRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2480
DCLG[2-Abu]MRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2481
DCLG[Nva]MRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2482
DCLG[Nle]MRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2483
DCLGVMRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2484
DCLGLMRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2485
DCLGIMRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2486

DCLGGFRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Phe6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2487
DCLGAFRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Phe6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2488
DCLG[2-Abu]FRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5;Phe6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2489
DCLG[Nva]FRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Phe6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2490
DCLG[Nle]FRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Phe6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2491
DCLGVFRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Phe6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2492
DCLGLFRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Phe6;Pra13;Gln28]GpTx-1(1-34)	2493
DCLGIFRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Phe6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2494
DCLGGLRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Leu6,26;Pra13;Gln28]GpTx-1(1-34)	2495
DCLGALRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Leu6,26;Pra13;Gln28]GpTx-1(1-34)	2496
DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5;Leu6,26;Pra13;Gln28]GpTx-1(1-34)	2497
DCLG[Nva]LRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Leu6,26;Pra13;Gln28]GpTx-1(1-34)	2498
DCLG[Nle]LRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Leu6,26;Pra13;Gln28]GpTx-1(1-34)	2499
DCLGVLRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Leu6,26;Pra13;Gln28]GpTx-1(1-34)	2500
DCLGLLRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,6,26;Pra13;Gln28]GpTx-1(1-34)	2501
DCLGILRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Leu6,26;Pra13;Gln28]GpTx-1(1-34)	2502
DCLGG[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Nle6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2503
DCLGA[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Nle6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2504
DCLG[2-Abu][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5;Nle6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2505
DCLG[Nva][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Nle6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2506

DCLG[Nle][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5,6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2507
DCLGV[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Nle6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2508
DCLGL[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Nle6;Pra13;Gln28]GpTx-1(1-34)	2509
DCLGI[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Nle6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2510
DCLGGFRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2511
DCLGAFRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2512
DCLG[2-Abu]FRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5,13;Phe6;Glu11;Gln28]GpTx-1(1-34)	2513
DCLG[Nva]FRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2514
DCLG[Nle]FRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2515
DCLGVFRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2516
DCLGLFRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2517
DCLGIFRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2518
DCLGGLRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Leu6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2519
DCLGALRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Leu6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2520
DCLG[2-Abu]LRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5,13;Leu6;Glu11;Gln28]GpTx-1(1-34)	2521
DCLG[Nva]LRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Leu6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2522
DCLG[Nle]LRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Leu6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2523
DCLGVLRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Leu6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2524
DCLGLLRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5,6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2525
DCLGILRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Leu6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2526

DCLGG[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Nle6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2527
DCLGA[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Nle6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2528
DCLG[2-Abu][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5,13;Nle6;Glu11;Gln28]GpTx-1(1-34)	2529
DCLG[Nva][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Nle6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2530
DCLG[Nle][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5,6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2531
DCLGV[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Nle6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2532
DCLGL[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Nle6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2533
DCLGI[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Nle6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2534
DCLGGFRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2535
DCLGAFRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2536
DCLG[2-Abu]FRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5,13;Phe6;Glu10;Gln28]GpTx-1(1-34)	2537
DCLG[Nva]FRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2538
DCLG[Nle]FRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2539
DCLGVFRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2540
DCLGLFRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2541
DCLGIFRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2542
DCLGGLRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Leu6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2543
DCLGALRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Leu6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2544
DCLG[2-Abu]LRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5,13;Leu6;Glu10;Gln28]GpTx-1(1-34)	2545
DCLG[Nva]LRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Leu6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2546

DCLG[Nle]LRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Leu6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2547
DCLGVLRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Leu6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2548
DCLGLLRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5,6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2549
DCLGILRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Leu6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2550
DCLGG[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Nle6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2551
DCLGA[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Nle6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2552
DCLG[2-Abu][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5,13;Nle6;Glu10;Gln28]GpTx-1(1-34)	2553
DCLG[Nva][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Nle6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2554
DCLG[Nle][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5,6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2555
DCLGV[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Nle6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2556
DCLGL[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Nle6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2557
DCLGI[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Nle6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2558
DCLGGFRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2559
DCLGAFRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2560
DCLG[2-Abu]FRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5,13;Phe6;Asp10;Gln28]GpTx-1(1-34)	2561
DCLG[Nva]FRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2562
DCLG[Nle]FRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2563
DCLGVFRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2564
DCLGLFRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2565
DCLGIFRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2566

DCLGGLRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Leu6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2567
DCLGALRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Leu6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2568
DCLG[2-Abu]LRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5,13;Leu6;Asp10;Gln28]GpTx-1(1-34)	2569
DCLG[Nva]LRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Leu6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2570
DCLG[Nle]LRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Leu6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2571
DCLGVLRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Leu6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2572
DCLGLLRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5,6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2573
DCLGILRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Leu6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2574
DCLGG[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Nle6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2575
DCLGA[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Nle6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2576
DCLG[2-Abu][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5,13;Nle6;Asp10;Gln28]GpTx-1(1-34)	2577
DCLG[Nva][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Nle6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2578
DCLG[Nle][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5,6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2579
DCLGV[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Nle6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2580
DCLGL[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Nle6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2581
DCLGI[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Nle6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2582
DCLGGFRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2583
DCLGAFRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2584
DCLG[2-Abu]FRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2585
DCLG[Nva]FRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2586

DCLG[Nle]FRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2587
DCLGVFRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2588
DCLGLFRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2589
DCLGIFRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2590
DCLGGLRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Leu6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2591
DCLGALRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Leu6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2592
DCLG[2-Abu]LRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5;Leu6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2593
DCLG[Nva]LRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Leu6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2594
DCLG[Nle]LRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Leu6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2595
DCLGVLRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Leu6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2596
DCLGLLRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5,6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2597
DCLGILRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Leu6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2598
DCLGG[Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2599
DCLGA[Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2600
DCLG[2-Abu][Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5;Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2601
DCLG[Nva][Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2602
DCLG[Nle][Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5,6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2603
DCLGV[Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2604
DCLGL[Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2605
DCLGI[Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2606

DCLGGFRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2607
DCLGAFRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2608
DCLG[2-Abu]FRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2609
DCLG[Nva]FRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2610
DCLG[Nle]FRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2611
DCLGVFRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2612
DCLGLFRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2613
DCLGIFRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2614
DCLGGLRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Leu6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2615
DCLGALRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Leu6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2616
DCLG[2-Abu]LRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5;Leu6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2617
DCLG[Nva]LRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Leu6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2618
DCLG[Nle]LRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Leu6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2619
DCLGVLRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Leu6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2620
DCLGLLRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5,6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2621
DCLGILRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Leu6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2622
DCLGG[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2623
DCLGA[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2624
DCLG[2-Abu][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5;Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2625
DCLG[Nva][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2626

DCLG[Nle][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5,6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2627
DCLGV[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2628
DCLGL[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2629
DCLGI[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2630
DCLGGFRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2631
DCLGAFRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2632
DCLG[2-Abu]FRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2633
DCLG[Nva]FRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2634
DCLG[Nle]FRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2635
DCLGVFRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2636
DCLGLFRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2637
DCLGIFRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2638
DCLGGLRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Leu6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2639
DCLGALRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Leu6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2640
DCLG[2-Abu]LRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5;Leu6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2641
DCLG[Nva]LRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Leu6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2642
DCLG[Nle]LRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5;Leu6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2643
DCLGVLRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Leu6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2644
DCLGLLRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5,6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2645
DCLGILRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Leu6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2646

DCLGG[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gly5;Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2647
DCLGA[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ala5;Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2648
DCLG[2-Abu][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[2-Abu5;Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2649
DCLG[Nva][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nva5;Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2650
DCLG[Nle][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Nle5,6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2651
DCLGV[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Val5;Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2652
DCLGL[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Leu5;Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2653
DCLGI[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{Amide}	[Ile5;Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2654
DCLGGFRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Phe6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2655
DCLGAFRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Phe6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2656
DCLG[2-Abu]FRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5,13;Phe6;Glu11,Leu26;Gln28]GpTx-1(1-34)	2657
DCLG[Nva]FRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Phe6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2658
DCLG[Nle]FRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Phe6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2659
DCLGVFRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Phe6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2660
DCLGLFRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2661
DCLGIFRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Phe6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2662
DCLGGLRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Leu6,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2663
DCLGALRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Leu6,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2664
DCLG[2-Abu]LRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5,13;Leu6,26;Glu11;Gln28]GpTx-1(1-34)	2665
DCLG[Nva]LRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Leu6,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2666

DCLG[Nle]LRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Leu6,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2667
DCLGVLRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Leu6,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2668
DCLGLLRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,6,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2669
DCLGILRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Leu6,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2670
DCLGG[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Nle6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2671
DCLGA[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Nle6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2672
DCLG[2-Abu][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5,13;Nle6;Glu11;Leu26;Gln28]GpTx-1(1-34)	2673
DCLG[Nva][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Nle6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2674
DCLG[Nle][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5,6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2675
DCLGV[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Nle6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2676
DCLGL[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Nle6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2677
DCLGI[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Nle6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2678
DCLGGFRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Phe6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2679
DCLGAFRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Phe6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2680
DCLG[2-Abu]FRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5,13;Phe6;Glu10;Leu26;Gln28]GpTx-1(1-34)	2681
DCLG[Nva]FRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Phe6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2682
DCLG[Nle]FRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Phe6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2683
DCLGVFRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Phe6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2684
DCLGLFRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2685
DCLGIFRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Phe6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2686

DCLGGLRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Leu6,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2687
DCLGALRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Leu6,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2688
DCLG[2-Abu]LRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5,13;Leu6,26;Glu10;Gln28]GpTx-1(1-34)	2689
DCLG[Nva]LRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Leu6,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2690
DCLG[Nle]LRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Leu6,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2691
DCLGVLRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Leu6,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2692
DCLGLLRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,6,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2693
DCLGILRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Leu6,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2694
DCLGG[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Nle6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2695
DCLGA[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Nle6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2696
DCLG[2-Abu][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5,13;Nle6;Glu10;Leu26;Gln28]GpTx-1(1-34)	2697
DCLG[Nva][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Nle6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2698
DCLG[Nle][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5,6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2699
DCLGV[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Nle6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2700
DCLGL[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Nle6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2701
DCLGI[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Nle6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2702
DCLGGFRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Phe6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2703
DCLGAFRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Phe6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2704
DCLG[2-Abu]FRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5,13;Phe6;Asp10;Leu26;Gln28]GpTx-1(1-34)	2705
DCLG[Nva]FRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Phe6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2706

DCLG[Nle]FRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Phe6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2707
DCLGVFRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Phe6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2708
DCLGLFRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2709
DCLGIFRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Phe6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2710
DCLGGLRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Leu6,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2711
DCLGALRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Leu6,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2712
DCLG[2-Abu]LRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5,13;Leu6,26;Asp10;Gln28]GpTx-1(1-34)	2713
DCLG[Nva]LRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Leu6,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2714
DCLG[Nle]LRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Leu6,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2715
DCLGVLRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Leu6,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2716
DCLGLLRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,6,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2717
DCLGILRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Leu6,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2718
DCLGG[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Nle6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2719
DCLGA[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Nle6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2720
DCLG[2-Abu][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5,13;Nle6;Asp10;Leu26;Gln28]GpTx-1(1-34)	2721
DCLG[Nva][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Nle6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2722
DCLG[Nle][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5,6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2723
DCLGV[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Nle6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2724
DCLGL[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Nle6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2725
DCLGI[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Nle6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2726

DCLGGFRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Phe6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2727
DCLGAFRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Phe6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2728
DCLG[2-Abu]FRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5;Phe6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2729
DCLG[Nva]FRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Phe6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2730
DCLG[Nle]FRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Phe6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2731
DCLGVFRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Phe6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2732
DCLGLFRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2733
DCLGIFRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Phe6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2734
DCLGGLRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Leu6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2735
DCLGALRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Leu6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2736
DCLG[2-Abu]LRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5;Leu6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2737
DCLG[Nva]LRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Leu6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2738
DCLG[Nle]LRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Leu6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2739
DCLGVLRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Leu6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2740
DCLGLLRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2741
DCLGILRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Leu6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2742
DCLGG[Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Nle6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2743
DCLGA[Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Nle6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2744
DCLG[2-Abu][Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5;Nle6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2745
DCLG[Nva][Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Nle6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2746

DCLG[Nle][Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5,6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2747
DCLGV[Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Nle6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2748
DCLGL[Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2749
DCLGI[Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Nle6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2750
DCLGGFRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Phe6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2751
DCLGAFRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Phe6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2752
DCLG[2-Abu]FRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5;Phe6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2753
DCLG[Nva]FRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Phe6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2754
DCLG[Nle]FRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Phe6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2755
DCLGVFRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Phe6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2756
DCLGLFRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2757
DCLGIFRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Phe6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2758
DCLGGLRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Leu6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2759
DCLGALRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Leu6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2760
DCLG[2-Abu]LRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5;Leu6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2761
DCLG[Nva]LRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Leu6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2762
DCLG[Nle]LRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Leu6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2763
DCLGVLRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Leu6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2764
DCLGLLRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2765
DCLGILRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Leu6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2766

DCLGG[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Nle6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2767
DCLGA[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Nle6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2768
DCLG[2-Abu][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5;Nle6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2769
DCLG[Nva][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Nle6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2770
DCLG[Nle][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5,6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2771
DCLGV[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Nle6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2772
DCLGL[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2773
DCLGI[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Nle6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2774
DCLGGFRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Phe6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2775
DCLGAFRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Phe6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2776
DCLG[2-Abu]FRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5;Phe6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2777
DCLG[Nva]FRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Phe6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2778
DCLG[Nle]FRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Phe6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2779
DCLGVFRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Phe6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2780
DCLGLFRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2781
DCLGIFRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Phe6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2782
DCLGGLRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Leu6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2783
DCLGALRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Leu6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2784
DCLG[2-Abu]LRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5;Leu6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2785
DCLG[Nva]LRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Leu6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2786

DCLG[Nle]LRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5;Leu6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2787
DCLGVLRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Leu6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2788
DCLGLLRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2789
DCLGILRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Leu6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2790
DCLGG[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Gly5;Nle6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2791
DCLGA[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ala5;Nle6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2792
DCLG[2-Abu]-[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[2-Abu5;Nle6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2793
DCLG[Nva]-[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nva5;Nle6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2794
DCLG[Nle]-[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Nle5,6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2795
DCLGV[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Val5;Nle6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2796
DCLGL[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Leu5,26;Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2797
DCLGI[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{Amide}	[Ile5;Nle6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2798
DCLGFMRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu13;Glu26]GpTx-1(1-34)	2799
DCLGFMRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Pra13;Glu26]GpTx-1(1-34)	2800
DCLGFMRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Glu11,26;2-Abu13]GpTx-1(1-34)	2801
DCLGFMRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Glu10,26;2-Abu13]GpTx-1(1-34)	2802
DCLGFMRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2803
DCLGFFRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Phe6;2-Abu13;Glu26]GpTx-1(1-34)	2804
DCLGFLRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu6;2-Abu13;Glu26]GpTx-1(1-34)	2805
DCLGF[Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle6;2-Abu13;Glu26]GpTx-1(1-34)	2806

DCLGGMRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;2-Abu13;Glu26]GpTx-1(1-34)	2807
DCLGAMRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;2-Abu13;Glu26]GpTx-1(1-34)	2808
DCLG[2-Abu]MRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5,13;Glu26]GpTx-1(1-34)	2809
DCLG[Nva]MRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;2-Abu13;Glu26]GpTx-1(1-34)	2810
DCLG[Nle]MRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;2-Abu13;Glu26]GpTx-1(1-34)	2811
DCLGVMRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;2-Abu13;Glu26]GpTx-1(1-34)	2812
DCLGLMRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;2-Abu13;Glu26]GpTx-1(1-34)	2813
DCLGIMRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;2-Abu13;Glu26]GpTx-1(1-34)	2814
DCLGFMRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Glu11,26;Pra13]GpTx-1(1-34)	2815
DCLGFMRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Glu10,26;Pra13]GpTx-1(1-34)	2816
DCLGFMRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Asp10;Pra13;Glu26]GpTx-1(1-34)	2817
DCLGFFRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Phe6;Pra13;Glu26]GpTx-1(1-34)	2818
DCLGFLRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu6;Pra13;Glu26]GpTx-1(1-34)	2819
DCLGF[Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle6;Pra13;Glu26]GpTx-1(1-34)	2820
DCLGGMRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Pra13;Glu26]GpTx-1(1-34)	2821
DCLGAMRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Pra13;Glu26]GpTx-1(1-34)	2822
DCLG[2-Abu]MRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5;Pra13;Glu26]GpTx-1(1-34)	2823
DCLG[Nva]MRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Pra13;Glu26]GpTx-1(1-34)	2824
DCLG[Nle]MRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Pra13;Glu26]GpTx-1(1-34)	2825
DCLGVMRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Pra13;Glu26]GpTx-1(1-34)	2826

DCLGLMRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Pra13;Glu26]GpTx-1(1-34)	2827
DCLGIMRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Pra13;Glu26]GpTx-1(1-34)	2828
DCLGFFRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Phe6;Glu11,26;2-Abu13]GpTx-1(1-34)	2829
DCLGFLRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu6;Glu11,26;2-Abu13]GpTx-1(1-34)	2830
DCLGF[Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle6;Glu11,26;2-Abu13]GpTx-1(1-34)	2831
DCLGGMRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Glu11,26;2-Abu13]GpTx-1(1-34)	2832
DCLGAMRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Glu11,26;2-Abu13]GpTx-1(1-34)	2833
DCLG[2-Abu]MRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5,13;Glu11,26]GpTx-1(1-34)	2834
DCLG[Nva]MRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Glu11,26;2-Abu13]GpTx-1(1-34)	2835
DCLG[Nle]MRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Glu11,26;2-Abu13]GpTx-1(1-34)	2836
DCLGVMRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Glu11,26;2-Abu13]GpTx-1(1-34)	2837
DCLGLMRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Glu11,26;2-Abu13]GpTx-1(1-34)	2838
DCLGIMRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Glu11,26;2-Abu13]GpTx-1(1-34)	2839
DCLGFFRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Phe6;Glu10,26;2-Abu13]GpTx-1(1-34)	2840
DCLGFLRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu6;Glu10,26;2-Abu13]GpTx-1(1-34)	2841
DCLGF[Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle6;Glu10,26;2-Abu13]GpTx-1(1-34)	2842
DCLGGMRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Glu10,26;2-Abu13]GpTx-1(1-34)	2843
DCLGAMRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Glu10,26;2-Abu13]GpTx-1(1-34)	2844
DCLG[2-Abu]MRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5,13;Glu10,26]GpTx-1(1-34)	2845
DCLG[Nva]MRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Glu10,26;2-Abu13]GpTx-1(1-34)	2846

DCLG[Nle]MRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Glu10,26;2-Abu13]GpTx-1(1-34)	2847
DCLGVMRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Glu10,26;2-Abu13]GpTx-1(1-34)	2848
DCLGLMRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Glu10,26;2-Abu13]GpTx-1(1-34)	2849
DCLGIMRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Glu10,26;2-Abu13]GpTx-1(1-34)	2850
DCLGFFRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Phe6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2851
DCLGFLRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2852
DCLGF[Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2853
DCLGGMRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2854
DCLGAMRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2855
DCLG[2-Abu]MRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5,13;Asp10;Glu26]GpTx-1(1-34)	2856
DCLG[Nva]MRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2857
DCLG[Nle]MRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2858
DCLGVMRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2859
DCLGLMRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2860
DCLGIMRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2861
DCLGGFRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Phe6;2-Abu13;Glu26]GpTx-1(1-34)	2862
DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Phe6;2-Abu13;Glu26]GpTx-1(1-34)	2863
DCLG[2-Abu]FRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5,13;Phe6;Glu26]GpTx-1(1-34)	2864
DCLG[Nva]FRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Phe6;2-Abu13;Glu26]GpTx-1(1-34)	2865
DCLG[Nle]FRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Phe6;2-Abu13;Glu26]GpTx-1(1-34)	2866

DCLGVFRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Phe6;2-Abu13;Glu26]GpTx-1(1-34)	2867
DCLGLFRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Phe6;2-Abu13;Glu26]GpTx-1(1-34)	2868
DCLGIFRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Phe6;2-Abu13;Glu26]GpTx-1(1-34)	2869
DCLGGLRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Leu6;2-Abu13;Glu26]GpTx-1(1-34)	2870
DCLGALRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Leu6;2-Abu13;Glu26]GpTx-1(1-34)	2871
DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5,13;Leu6;Glu26]GpTx-1(1-34)	2872
DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Leu6;2-Abu13;Glu26]GpTx-1(1-34)	2873
DCLG[Nle]LRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Leu6;2-Abu13;Glu26]GpTx-1(1-34)	2874
DCLGVLRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Leu6;2-Abu13;Glu26]GpTx-1(1-34)	2875
DCLGLLRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5,6;2-Abu13;Glu26]GpTx-1(1-34)	2876
DCLGILRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Leu6;2-Abu13;Glu26]GpTx-1(1-34)	2877
DCLGG[Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Nle6;2-Abu13;Glu26]GpTx-1(1-34)	2878
DCLGA[Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Nle6;2-Abu13;Glu26]GpTx-1(1-34)	2879
DCLG[2-Abu][Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5,13;Nle6;Glu26]GpTx-1(1-34)	2880
DCLG[Nva][Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Nle6;2-Abu13;Glu26]GpTx-1(1-34)	2881
DCLG[Nle][Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5,6;2-Abu13;Glu26]GpTx-1(1-34)	2882
DCLGV[Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Nle6;2-Abu13;Glu26]GpTx-1(1-34)	2883
DCLGL[Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Nle6;2-Abu13;Glu26]GpTx-1(1-34)	2884
DCLGI[Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Nle6;2-Abu13;Glu26]GpTx-1(1-34)	2885
DCLGFFRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Phe6;Glu11,26;Pra13]GpTx-1(1-34)	2886

DCLGFLRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu6;Glu11,26;Pra13]GpTx-1(1-34)	2887
DCLGF[Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle6;Glu11,26;Pra13]GpTx-1(1-34)	2888
DCLGGMRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Glu11,26;Pra13]GpTx-1(1-34)	2889
DCLGAMRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Glu11,26;Pra13]GpTx-1(1-34)	2890
DCLG[2-Abu]MRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5;Glu11,26;Pra13]GpTx-1(1-34)	2891
DCLG[Nva]MRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Glu11,26;Pra13]GpTx-1(1-34)	2892
DCLG[Nle]MRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Glu11,26;Pra13]GpTx-1(1-34)	2893
DCLGVMRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Glu11,26;Pra13]GpTx-1(1-34)	2894
DCLGLMRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Glu11,26;Pra13]GpTx-1(1-34)	2895
DCLGIMRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Glu11,26;Pra13]GpTx-1(1-34)	2896
DCLGFFRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Phe6;Glu10,26;Pra13]GpTx-1(1-34)	2897
DCLGFLRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu6;Glu10,26;Pra13]GpTx-1(1-34)	2898
DCLGF[Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle6;Glu10,26;Pra13]GpTx-1(1-34)	2899
DCLGGMRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Glu10,26;Pra13]GpTx-1(1-34)	2900
DCLGAMRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Glu10,26;Pra13]GpTx-1(1-34)	2901
DCLG[2-Abu]MRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5;Glu10,26;Pra13]GpTx-1(1-34)	2902
DCLG[Nva]MRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Glu10,26;Pra13]GpTx-1(1-34)	2903
DCLG[Nle]MRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Glu10,26;Pra13]GpTx-1(1-34)	2904
DCLGVMRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Glu10,26;Pra13]GpTx-1(1-34)	2905
DCLGLMRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Glu10,26;Pra13]GpTx-1(1-34)	2906

DCLGIMRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Glu10,26;Pra13]GpTx-1(1-34)	2907
DCLGFFRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	2908
DCLGFLRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu6;Asp10;Pra13;Glu26]GpTx-1(1-34)	2909
DCLGF[Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle6;Asp10;Pra13;Glu26]GpTx-1(1-34)	2910
DCLGGMRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Asp10;Pra13;Glu26]GpTx-1(1-34)	2911
DCLGAMRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Asp10;Pra13;Glu26]GpTx-1(1-34)	2912
DCLG[2-Abu]MRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5;Asp10;Pra13;Glu26]GpTx-1(1-34)	2913
DCLG[Nva]MRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Asp10;Pra13;Glu26]GpTx-1(1-34)	2914
DCLG[Nle]MRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Asp10;Pra13;Glu26]GpTx-1(1-34)	2915
DCLGVMRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Asp10;Pra13;Glu26]GpTx-1(1-34)	2916
DCLGLMRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Asp10;Pra13;Glu26]GpTx-1(1-34)	2917
DCLGIMRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Asp10;Pra13;Glu26]GpTx-1(1-34)	2918
DCLGGFRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Phe6;Pra13;Glu26]GpTx-1(1-34)	2919
DCLGAFRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Phe6;Pra13;Glu26]GpTx-1(1-34)	2920
DCLG[2-Abu]FRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5;Phe6;Pra13;Glu26]GpTx-1(1-34)	2921
DCLG[Nva]FRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Phe6;Pra13;Glu26]GpTx-1(1-34)	2922
DCLG[Nle]FRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Phe6;Pra13;Glu26]GpTx-1(1-34)	2923
DCLGVFRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Phe6;Pra13;Glu26]GpTx-1(1-34)	2924
DCLGLFRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Phe6;Pra13;Glu26]GpTx-1(1-34)	2925
DCLGIFRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Phe6;Pra13;Glu26]GpTx-1(1-34)	2926

DCLGGLRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Leu6;Pra13;Glu26]GpTx-1(1-34)	2927
DCLGALRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Leu6;Pra13;Glu26]GpTx-1(1-34)	2928
DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5;Leu6;Pra13;Glu26]GpTx-1(1-34)	2929
DCLG[Nva]LRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Leu6;Pra13;Glu26]GpTx-1(1-34)	2930
DCLG[Nle]LRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Leu6;Pra13;Glu26]GpTx-1(1-34)	2931
DCLGVLRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Leu6;Pra13;Glu26]GpTx-1(1-34)	2932
DCLGLLRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5,6;Pra13;Glu26]GpTx-1(1-34)	2933
DCLGILRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Leu6;Pra13;Glu26]GpTx-1(1-34)	2934
DCLGG[Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Nle6;Pra13;Glu26]GpTx-1(1-34)	2935
DCLGA[Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Nle6;Pra13;Glu26]GpTx-1(1-34)	2936
DCLG[2-Abu][Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5;Nle6;Pra13;Glu26]GpTx-1(1-34)	2937
DCLG[Nva][Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Nle6;Pra13;Glu26]GpTx-1(1-34)	2938
DCLG[Nle][Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5,6;Pra13;Glu26]GpTx-1(1-34)	2939
DCLGV[Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Nle6;Pra13;Glu26]GpTx-1(1-34)	2940
DCLGL[Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Nle6;Pra13;Glu26]GpTx-1(1-34)	2941
DCLGI[Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Nle6;Pra13;Glu26]GpTx-1(1-34)	2942
DCLGGFRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Phe6;Glu11,26;2-Abu13]GpTx-1(1-34)	2943
DCLGAFRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Phe6;Glu11,26;2-Abu13]GpTx-1(1-34)	2944
DCLG[2-Abu]FRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5,13;Phe6;Glu11,26]GpTx-1(1-34)	2945
DCLG[Nva]FRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Phe6;Glu11,26;2-Abu13]GpTx-1(1-34)	2946

DCLG[Nle]FRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Phe6;Glu11,26;2-Abu13]GpTx-1(1-34)	2947
DCLGVFRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Phe6;Glu11,26;2-Abu13]GpTx-1(1-34)	2948
DCLGLFRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Phe6;Glu11,26;2-Abu13]GpTx-1(1-34)	2949
DCLGIFRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Phe6;Glu11,26;2-Abu13]GpTx-1(1-34)	2950
DCLGGLRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Leu6;Glu11,26;2-Abu13]GpTx-1(1-34)	2951
DCLGALRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Leu6;Glu11,26;2-Abu13]GpTx-1(1-34)	2952
DCLG[2-Abu]LRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5,13;Leu6;Glu11,26]GpTx-1(1-34)	2953
DCLG[Nva]LRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Leu6;Glu11,26;2-Abu13]GpTx-1(1-34)	2954
DCLG[Nle]LRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Leu6;Glu11,26;2-Abu13]GpTx-1(1-34)	2955
DCLGVLRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Leu6;Glu11,26;2-Abu13]GpTx-1(1-34)	2956
DCLGLLRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5,6;Glu11,26;2-Abu13]GpTx-1(1-34)	2957
DCLGILRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Leu6;Glu11,26;2-Abu13]GpTx-1(1-34)	2958
DCLGG[Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Nle6;Glu11,26;2-Abu13]GpTx-1(1-34)	2959
DCLGA[Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Nle6;Glu11,26;2-Abu13]GpTx-1(1-34)	2960
DCLG[2-Abu][Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5,13;Nle6;Glu11,26]GpTx-1(1-34)	2961
DCLG[Nva][Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Nle6;Glu11,26;2-Abu13]GpTx-1(1-34)	2962
DCLG[Nle][Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5,6;Glu11,26;2-Abu13]GpTx-1(1-34)	2963
DCLGV[Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Nle6;Glu11,26;2-Abu13]GpTx-1(1-34)	2964
DCLGL[Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Nle6;Glu11,26;2-Abu13]GpTx-1(1-34)	2965
DCLGI[Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Nle6;Glu11,26;2-Abu13]GpTx-1(1-34)	2966

DCLGGFRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Phe6;Glu10,26;2-Abu13]GpTx-1(1-34)	2967
DCLGAFRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Phe6;Glu10,26;2-Abu13]GpTx-1(1-34)	2968
DCLG[2-Abu]FRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5,13;Phe6;Glu10,26]GpTx-1(1-34)	2969
DCLG[Nva]FRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Phe6;Glu10,26;2-Abu13]GpTx-1(1-34)	2970
DCLG[Nle]FRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Phe6;Glu10,26;2-Abu13]GpTx-1(1-34)	2971
DCLGVFRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Phe6;Glu10,26;2-Abu13]GpTx-1(1-34)	2972
DCLGLFRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Phe6;Glu10,26;2-Abu13]GpTx-1(1-34)	2973
DCLGIFRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Phe6;Glu10,26;2-Abu13]GpTx-1(1-34)	2974
DCLGGLRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Leu6;Glu10,26;2-Abu13]GpTx-1(1-34)	2975
DCLGALRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Leu6;Glu10,26;2-Abu13]GpTx-1(1-34)	2976
DCLG[2-Abu]LRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5,13;Leu6;Glu10,26]GpTx-1(1-34)	2977
DCLG[Nva]LRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Leu6;Glu10,26;2-Abu13]GpTx-1(1-34)	2978
DCLG[Nle]LRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Leu6;Glu10,26;2-Abu13]GpTx-1(1-34)	2979
DCLGVLRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Leu6;Glu10,26;2-Abu13]GpTx-1(1-34)	2980
DCLGLLRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5,6;Glu10,26;2-Abu13]GpTx-1(1-34)	2981
DCLGILRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Leu6;Glu10,26;2-Abu13]GpTx-1(1-34)	2982
DCLGG[Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Nle6;Glu10,26;2-Abu13]GpTx-1(1-34)	2983
DCLGA[Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Nle6;Glu10,26;2-Abu13]GpTx-1(1-34)	2984
DCLG[2-Abu][Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5,13;Nle6;Glu10,26]GpTx-1(1-34)	2985
DCLG[Nva][Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Nle6;Glu10,26;2-Abu13]GpTx-1(1-34)	2986

DCLG[Nle][Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5,6;Glu10,26;2-Abu13]GpTx-1(1-34)	2987
DCLGV[Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Nle6;Glu10,26;2-Abu13]GpTx-1(1-34)	2988
DCLGL[Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Nle6;Glu10,26;2-Abu13]GpTx-1(1-34)	2989
DCLGI[Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Nle6;Glu10,26;2-Abu13]GpTx-1(1-34)	2990
DCLGGFRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Phe6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2991
DCLGAFRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Phe6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2992
DCLG[2-Abu]FRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5,13;Phe6;Asp10;Glu26]GpTx-1(1-34)	2993
DCLG[Nva]FRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Phe6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2994
DCLG[Nle]FRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Phe6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2995
DCLGVFRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Phe6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2996
DCLGLFRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Phe6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2997
DCLGIFRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Phe6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2998
DCLGGLRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Leu6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2999
DCLGALRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Leu6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3000
DCLG[2-Abu]LRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5,13;Leu6;Asp10;Glu26]GpTx-1(1-34)	3001
DCLG[Nva]LRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Leu6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3002
DCLG[Nle]LRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Leu6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3003
DCLGVLRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Leu6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3004
DCLGLLRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5,6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3005
DCLGILRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Leu6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3006

DCLGG[Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Nle6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3007
DCLGA[Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Nle6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3008
DCLG[2-Abu][Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5,13;Nle6;Asp10;Glu26]GpTx-1(1-34)	3009
DCLG[Nva][Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Nle6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3010
DCLG[Nle][Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5,6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3011
DCLGV[Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Nle6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3012
DCLGL[Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Nle6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3013
DCLGI[Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Nle6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3014
DCLGGFRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Phe6;Glu11,26;Pra13]GpTx-1(1-34)	3015
DCLGAFRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Phe6;Glu11,26;Pra13]GpTx-1(1-34)	3016
DCLG[2-Abu]FRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5;Phe6;Glu11,26;Pra13]GpTx-1(1-34)	3017
DCLG[Nva]FRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Phe6;Glu11,26;Pra13]GpTx-1(1-34)	3018
DCLG[Nle]FRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Phe6;Glu11,26;Pra13]GpTx-1(1-34)	3019
DCLGVFRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Phe6;Glu11,26;Pra13]GpTx-1(1-34)	3020
DCLGLFRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Phe6;Glu11,26;Pra13]GpTx-1(1-34)	3021
DCLGIFRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Phe6;Glu11,26;Pra13]GpTx-1(1-34)	3022
DCLGGLRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Leu6;Glu11,26;Pra13]GpTx-1(1-34)	3023
DCLGALRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Leu6;Glu11,26;Pra13]GpTx-1(1-34)	3024
DCLG[2-Abu]LRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5;Leu6;Glu11,26;Pra13]GpTx-1(1-34)	3025
DCLG[Nva]LRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Leu6;Glu11,26;Pra13]GpTx-1(1-34)	3026

DCLG[Nle]LRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Leu6;Glu11,26;Pra13]GpTx-1(1-34)	3027
DCLGVLRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Leu6;Glu11,26;Pra13]GpTx-1(1-34)	3028
DCLGLLRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5,6;Glu11,26;Pra13]GpTx-1(1-34)	3029
DCLGILRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Leu6;Glu11,26;Pra13]GpTx-1(1-34)	3030
DCLGG[Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Nle6;Glu11,26;Pra13]GpTx-1(1-34)	3031
DCLGA[Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Nle6;Glu11,26;Pra13]GpTx-1(1-34)	3032
DCLG[2-Abu][Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5;Nle6;Glu11,26;Pra13]GpTx-1(1-34)	3033
DCLG[Nva][Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Nle6;Glu11,26;Pra13]GpTx-1(1-34)	3034
DCLG[Nle][Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5,6;Glu11,26;Pra13]GpTx-1(1-34)	3035
DCLGV[Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Nle6;Glu11,26;Pra13]GpTx-1(1-34)	3036
DCLGL[Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Nle6;Glu11,26;Pra13]GpTx-1(1-34)	3037
DCLGI[Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Nle6;Glu11,26;Pra13]GpTx-1(1-34)	3038
DCLGGFRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Phe6;Glu10,26;Pra13]GpTx-1(1-34)	3039
DCLGAFRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Phe6;Glu10,26;Pra13]GpTx-1(1-34)	3040
DCLG[2-Abu]FRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5;Phe6;Glu10,26;Pra13]GpTx-1(1-34)	3041
DCLG[Nva]FRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Phe6;Glu10,26;Pra13]GpTx-1(1-34)	3042
DCLG[Nle]FRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Phe6;Glu10,26;Pra13]GpTx-1(1-34)	3043
DCLGVFRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Phe6;Glu10,26;Pra13]GpTx-1(1-34)	3044
DCLGLFRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Phe6;Glu10,26;Pra13]GpTx-1(1-34)	3045
DCLGIFRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Phe6;Glu10,26;Pra13]GpTx-1(1-34)	3046

DCLGGLRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Leu6;Glu10,26;Pra13]GpTx-1(1-34)	3047
DCLGALRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Leu6;Glu10,26;Pra13]GpTx-1(1-34)	3048
DCLG[2-Abu]LRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5;Leu6;Glu10,26;Pra13]GpTx-1(1-34)	3049
DCLG[Nva]LRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Leu6;Glu10,26;Pra13]GpTx-1(1-34)	3050
DCLG[Nle]LRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Leu6;Glu10,26;Pra13]GpTx-1(1-34)	3051
DCLGVLRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Leu6;Glu10,26;Pra13]GpTx-1(1-34)	3052
DCLGLLRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5,6;Glu10,26;Pra13]GpTx-1(1-34)	3053
DCLGILRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Leu6;Glu10,26;Pra13]GpTx-1(1-34)	3054
DCLGG[Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Nle6;Glu10,26;Pra13]GpTx-1(1-34)	3055
DCLGA[Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Nle6;Glu10,26;Pra13]GpTx-1(1-34)	3056
DCLG[2-Abu][Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5;Nle6;Glu10,26;Pra13]GpTx-1(1-34)	3057
DCLG[Nva][Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Nle6;Glu10,26;Pra13]GpTx-1(1-34)	3058
DCLG[Nle][Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5,6;Glu10,26;Pra13]GpTx-1(1-34)	3059
DCLGV[Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Nle6;Glu10,26;Pra13]GpTx-1(1-34)	3060
DCLGL[Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Nle6;Glu10,26;Pra13]GpTx-1(1-34)	3061
DCLGI[Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Nle6;Glu10,26;Pra13]GpTx-1(1-34)	3062
DCLGGFRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3063
DCLGAFRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3064
DCLG[2-Abu]FRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5;Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3065
DCLG[Nva]FRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3066

DCLG[Nle]FRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3067
DCLGVFRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3068
DCLGLFRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3069
DCLGIFRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3070
DCLGGLRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Leu6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3071
DCLGALRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Leu6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3072
DCLG[2-Abu]LRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5;Leu6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3073
DCLG[Nva]LRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Leu6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3074
DCLG[Nle]LRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5;Leu6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3075
DCLGVLRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Leu6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3076
DCLGLLRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5,6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3077
DCLGILRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Leu6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3078
DCLGG[Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Gly5;Nle6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3079
DCLGA[Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Nle6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3080
DCLG[2-Abu][Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[2-Abu5;Nle6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3081
DCLG[Nva][Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nva5;Nle6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3082
DCLG[Nle][Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Nle5,6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3083
DCLGV[Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Val5;Nle6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3084
DCLGL[Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Leu5;Nle6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3085
DCLGI[Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{Amide}	[Ile5;Nle6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3086

[00229] As stated herein above, in accordance with the present invention, the peptide portions of the inventive composition of matter can also be chemically derivatized at one or more amino acid residues by known organic chemistry techniques. "Chemical derivative" or "chemically derivatized" refers to a subject peptide having one or more residues chemically derivatized by reaction of a functional side group. Such derivatized molecules include, for example, those molecules in which free amino groups have been derivatized to form amine hydrochlorides, p-toluene sulfonyl groups, carbobenzoxy groups, t-butyloxycarbonyl groups, chloroacetyl groups or formyl groups. Free carboxyl groups may be derivatized to form salts, methyl and ethyl esters or other types of esters or hydrazides. Free hydroxyl groups may be derivatized to form O-acyl or O-alkyl derivatives. The imidazole nitrogen of histidine may be derivatized to form N-im-benzylhistidine. Also included as chemical derivatives are those peptides which contain one or more naturally occurring amino acid derivatives of the twenty canonical amino acids, whether in L- or D- form. For example, 4-hydroxyproline may be substituted for proline; 5-hydroxylysine maybe substituted for lysine; 3-methylhistidine may be substituted for histidine; homoserine may be substituted for serine; and ornithine may be substituted for lysine.

[00230] Useful derivatizations include, in some embodiments, those in which the amino terminal of the peptide is chemically blocked so that conjugation with the vehicle will be prevented from taking place at an N-terminal free amino group. There may also be other beneficial effects of such a modification, for example a reduction in the toxin peptide analog's susceptibility to enzymatic proteolysis. The N-terminus can be acylated or modified to a substituted amine, or derivatized with another functional group, such as an aromatic moiety (e.g., an indole acid, benzyl (Bzl or Bn), dibenzyl (DiBzl or Bn_2), or benzyloxycarbonyl (Cbz or Z)), *N,N*-dimethylglycine or creatine. For example, in some embodiments, an acyl moiety, such as, but not limited to, a formyl, acetyl (Ac), propanoyl, butanyl, heptanyl, hexanoyl, octanoyl, or nonanoyl, can be covalently linked to the N-terminal end of the peptide, which can prevent undesired side reactions during conjugation of the vehicle to the peptide. Other exemplary N-terminal derivative groups include $-NRR^1$ (other than $-NH_2$), $-NRC(O)R^1$, $-NRC(O)OR^1$, $-NRS(O)_2R^1$, $-NHC(O)NHR^1$, succinimide, or benzyloxycarbonyl-NH-

(Cbz-NH-), wherein R and R^1 are each independently hydrogen or lower alkyl and wherein the phenyl ring may be substituted with 1 to 3 substituents selected from C_1-C_4 alkyl, C_1-C_4 alkoxy, chloro, and bromo.

[00231] In some embodiments, one or more peptidyl [-C(O)NR-] linkages (bonds) between amino acid residues can be replaced by a non-peptidyl linkage. Exemplary non-peptidyl linkages are -CH_2-carbamate [-CH_2-OC(O)NR-], phosphonate , -CH_2-sulfonamide [-CH_2-$S(O)_2$NR-], urea [-NHC(O)NH-], -CH_2-secondary amine, and alkylated peptide [-C(O)NR^6- wherein R^6 is lower alkyl].

[00232] In some embodiments, one or more individual amino acid residues can be derivatized. Various derivatizing agents are known to react specifically with selected sidechains or terminal residues, as described in detail below by way of example.

[00233] Lysinyl residues and amino terminal residues may be reacted with succinic or other carboxylic acid anhydrides, which reverse the charge of the lysinyl residues. Other suitable reagents for derivatizing alpha-amino-containing residues include imidoesters such as methyl picolinimidate; pyridoxal phosphate; pyridoxal; chloroborohydride; trinitrobenzenesulfonic acid; O-methylisourea; 2,4 pentanedione; and transaminase-catalyzed reaction with glyoxylate.

[00234] Arginyl residues may be modified by reaction with any one or combination of several conventional reagents, including phenylglyoxal, 2,3-butanedione, 1,2-cyclohexanedione, and ninhydrin. Derivatization of arginyl residues requires that the reaction be performed in alkaline conditions because of the high pKa of the guanidine functional group. Furthermore, these reagents may react with the groups of lysine as well as the arginine epsilon-amino group.

[00235] Specific modification of tyrosyl residues has been studied extensively, with particular interest in introducing spectral labels into tyrosyl residues by reaction with aromatic diazonium compounds or tetranitromethane. Most commonly, N-acetylimidizole and tetranitromethane are used to form O-acetyl tyrosyl species and 3-nitro derivatives, respectively.

[00236] Carboxyl sidechain groups (aspartyl or glutamyl) may be selectively modified by reaction with carbodiimides (R'-N=C=N-R') such as 1-cyclohexyl-3-(2-morpholinyl-(4-ethyl) carbodiimide or 1-ethyl-3-(4-azonia-4,4-dimethylpentyl)

carbodiimide. Furthermore, aspartyl and glutamyl residues may be converted to asparaginyl and glutaminyl residues by reaction with ammonium ions.

[00237] Glutaminyl and asparaginyl residues may be deamidated to the corresponding glutamyl and aspartyl residues. Alternatively, these residues are deamidated under mildly acidic conditions. Either form of these residues falls within the scope of this invention.

[00238] Cysteinyl residues can be replaced by amino acid residues or other moieties either to eliminate disulfide bonding or, conversely, to stabilize cross-linking. (See, e.g., Bhatnagar et al., J. Med. Chem., 39:3814-3819 (1996)).

[00239] Derivatization with bifunctional agents is useful for cross-linking the peptides or their functional derivatives to a water-insoluble support matrix, if desired, or to other macromolecular vehicles. Commonly used cross-linking agents include, e.g., 1,1-bis(diazoacetyl)-2-phenylethane, glutaraldehyde, N-hydroxysuccinimide esters, for example, esters with 4-azidosalicylic acid, homobifunctional imidoesters, including disuccinimidyl esters such as 3,3'-dithiobis(succinimidylpropionate), and bifunctional maleimides such as bis-N-maleimido-1,8-octane. Derivatizing agents such as methyl-3-[(p-azidophenyl)dithio]propioimidate yield photoactivatable intermediates that are capable of forming crosslinks in the presence of light. Alternatively, reactive water-insoluble matrices such as cyanogen bromide-activated carbohydrates and the reactive substrates, e.g., as described in U.S. Pat. Nos. 3,969,287; 3,691,016; 4,195,128; 4,247,642; 4,229,537; and 4,330,440, are employed for protein immobilization.

[00240] Other possible modifications include hydroxylation of proline and lysine, phosphorylation of hydroxyl groups of seryl or threonyl residues, oxidation of the sulfur atom in Cys, methylation of the alpha-amino groups of lysine, arginine, and histidine side chains. Creighton, Proteins: Structure and Molecule Properties (W. H. Freeman & Co., San Francisco), 79-86 (1983).

[00241] The above examples of derivatizations are not intended to be an exhaustive treatment, but merely illustrative.

[00242] The production of the composition of matter can also involve suitable protein purification techniques, when applicable. In some embodiments of the composition of matter of the invention, the molecule can be prepared to include a

suitable isotopic label (e.g., ^{125}I, ^{14}C, ^{13}C, ^{35}S, ^{3}H, ^{2}H, ^{13}N, ^{15}N, ^{18}O, ^{17}O, *etc.*), for ease of quantification or detection.

[00243] Half-life extending moieties. Optionally, for modulation of the pharmacokinetic profile of the molecule to fit the therapeutic need, the composition of the present invention can include one or more half-life extending moieties of various masses and configurations, which half-life extending moiety, or moieties, can be covalently fused, attached, linked or conjugated to the toxin peptide analog. A "half-life extending moiety" refers to a molecule that prevents or mitigates in vivo degradation by proteolysis or other activity-diminishing chemical modification, increases in vivo half-life or other pharmacokinetic properties such as but not limited to increasing the rate of absorption, reduces toxicity, reduces immunogenicity, improves solubility, increases biological activity and/or target selectivity of the toxin peptide analog with respect to a target of interest, and/or increases manufacturability, compared to an unconjugated form of the toxin peptide analog. In accordance with the invention, the half-life extending moiety is one that is pharmaceutically acceptable.

[00244] The half-life extending moiety can be selected such that the inventive composition achieves a sufficient hydrodynamic size to prevent clearance by renal filtration in vivo. For example, a half-life extending moiety can be selected that is a polymeric macromolecule, which is substantially straight chain, branched-chain (br), or dendritic in form. Alternatively, a half-life extending moiety can be selected such that, in vivo, the inventive composition of matter will bind to a serum protein to form a complex, such that the complex thus formed avoids substantial renal clearance. The half-life extending moiety can be, for example, a lipid; a cholesterol group (such as a steroid); a carbohydrate or oligosaccharide; or any natural or synthetic protein, polypeptide or peptide that binds to a salvage receptor.

[00245] Exemplary half-life extending moieties that can be used, in accordance with the present invention, include an immunoglobulin Fc domain, or a portion thereof, or a biologically suitable polymer or copolymer, for example, a polyalkylene glycol compound, such as a polyethylene glycol (PEG) or a polypropylene glycol. Other appropriate polyalkylene glycol compounds include, but are not limited to, charged or neutral polymers of the following types: dextran, polylysine, colominic acids or other carbohydrate based polymers, polymers of amino acids, and biotin derivatives. In some

monomeric fusion or conjugate protein embodiments an immunoglobulin (including light and heavy chains) or a portion thereof, can be used as a half-life-extending moiety, preferably an immunoglobulin of human origin, and including any of the immunoglobulins, such as, but not limited to, IgG1, IgG2, IgG3 or IgG4.

[00246] Other examples of the half-life extending moiety, in accordance with the invention, include a copolymer of ethylene glycol, a copolymer of propylene glycol, a carboxymethylcellulose, a polyvinyl pyrrolidone, a poly-1,3-dioxolane, a poly-1,3,6-trioxane, an ethylene maleic anhydride copolymer, a polyaminoacid (e.g., polylysine or polyornithine), a dextran n-vinyl pyrrolidone, a poly n-vinyl pyrrolidone, a propylene glycol homopolymer, a propylene oxide polymer, an ethylene oxide polymer, a polyoxyethylated polyol, a polyvinyl alcohol, a linear or branched glycosylated chain, a polyacetal, a long chain fatty acid, a long chain hydrophobic aliphatic group, or a polysialic acid (e.g., PolyXen^{TM} technology; Gregoriadis et al., Improving the therapeutic efficacy of peptides and proteins: a role for polysialic acids, Intl. J. Pharmaceutics, 300:125-30 (2005), incorporated herein by reference in its entirety).

[00247] In other embodiments of the composition of matter, the half-life extending moiety is an anionically charged chemical entity, covalently linked to the N-terminus of the toxin peptide analog, which anionically charged chemical entities include, but are not limited to, phosphotyrosine, phosphoserine, p-phosphono(difluoro-methyl)-phenylalanine (Pfp), p-phosphono-methyl-phenylalanine (Pmp), p-phosphatidyl-phenylalanine (Ppa), or p-phosphono-methylketo-phenylalanine (Pkp), which can be covalently linked to the N-terminal of the toxin peptide analog, optionally indirectly, via an AEEA linker or other linker as described herein. (See, Chandy et al., Analogs of ShK toxin and their uses in selective inhibition of Kv1.3 potassium channels, WO 2006/042151 A2; Beeton et al., Targeting effector memory T cells with a selective peptide inhibitor of Kv1.3 channels for therapy of autoimmune diseases, Molec. Pharmacol. 67(4):1369-81 (2005); Pennington et al., Engineering a stable and selective peptide blocker of the Kv1.3 channel in T lymphocytes, Molecular Pharmacology Fast Forward, published January 2, 2009 as doi:10.1124/mol.108.052704 (2009), all of which references are incorporated herein by reference in their entireties). AEEA is 2-(2-(2-aminoethoxy)ethoxy)acetic acid (also known as 8-Amino-3,6-Dioxaoctanoic Acid). (See, e.g., Beeton et al., Targeting effector memory T cells with a

selective peptide inhibitor of Kv1.3 channels for therapy of autoimmune diseases, Molec. Pharmacol. 67(4):1369-81 (2005)).

[00248] Other embodiments of the half-life extending moiety, in accordance with the invention, include peptide ligands or small (organic) molecule ligands that have binding affinity for a long half-life serum protein under physiological conditions of temperature, pH, and ionic strength. Examples include an albumin-binding peptide or small molecule ligand, a transthyretin-binding peptide or small molecule ligand, a thyroxine-binding globulin-binding peptide or small molecule ligand, an antibody-binding peptide or small molecule ligand, or another peptide or small molecule that has an affinity for a long half-life serum protein. (See, e.g., Blaney et al., Method and compositions for increasing the serum half-life of pharmacologically active agents by binding to transthyretin-selective ligands, US Patent. No. 5,714,142; Sato et al., Serum albumin binding moieties, US 2003/0069395 A1; Jones et al., Pharmaceutical active conjugates, US Patent No. 6,342,225). A "long half-life serum protein" is one of the hundreds of different proteins dissolved in mammalian blood plasma, including so-called "carrier proteins" (such as albumin, transferrin and haptoglobin), fibrinogen and other blood coagulation factors, complement components, immunoglobulins, enzyme inhibitors, precursors of substances such as angiotensin and bradykinin and many other types of proteins. The invention encompasses the use of any single species of pharmaceutically acceptable half-life extending moiety, such as, but not limited to, those described herein, or the use of a combination of two or more different half-life extending moieties, such as PEG and immunoglobulin Fc domain or a portion thereof (see, e.g., Feige et al., Modified peptides as therapeutic agents, US Patent No. 6,660,843), such as a CH2 domain of Fc, albumin (e.g., human serum albumin (HSA); see, e.g., Rosen et al., Albumin fusion proteins, US Patent No. 6,926,898 and US 2005/0054051; Bridon et al., Protection of endogenous therapeutic peptides from peptidase activity through conjugation to blood components, US 6,887,470), a transthyretin (TTR; see, e.g., Walker et al., Use of transthyretin peptide/protein fusions to increase the serum half-life of pharmacologically active peptides/proteins, US 2003/0195154 A1; 2003/0191056 A1), or a thyroxine-binding globulin (TBG), or a combination such as immunoglobulin(light chain+heavy chain) and Fc domain (the heterotrimeric combination a so-called "hemibody"), for example as described in

Sullivan et al., Toxin Peptide Therapeutic Agents, PCT/US2007/022831, published as WO 2008/088422, which is incorporated herein by reference in its entirety.

[00249] Conjugation of the toxin peptide analogs(s) to the half-life extending moiety, or moieties, can be via the N-terminal and/or C-terminal of the toxin peptide, or can be intercalary as to its primary amino acid sequence, F1 being linked closer to the toxin peptide analog's N-terminus.

[00250] Particularly useful half-life extending moieties include immunoglobulins (e.g., human immunoglobulin, including IgG1, IgG2, IgG3 or IgG4). The term "immunoglobulin" encompasses full antibodies comprising two dimerized heavy chains (HC), each covalently linked to a light chain (LC); a single undimerized immunoglobulin heavy chain and covalently linked light chain (HC + LC); or a chimeric immunoglobulin (light chain + heavy chain)-Fc heterotrimer (a so-called "hemibody"). Figure 12A-N and Figures 88-91 illustrate several different embodiments of such immunoglobulin-toxin peptide conjugates.

[00251] Recombinant fusion or chemical conjugation of the inventive GpTx-1 peptide analogs to a recombinant immunoglobulin of any of the IgG1, IgG2, IgG3 or IgG4 isotypes can be useful to extend pharmacokinetic half life. (See, e.g., Doellgast et al., WO 2010/108153 A2). Any of the carrier immunoglobulins disclosed in Doellgast et al., WO 2010/108153 A2 or Walker et al., PCT/US2011/052841, or isotype conversions of any of them comprising different isotype constant domains, or other carrier immunoglobulins known in the art, can be used as half life extending moieties within the scope of the invention.

[00252] One example of a human IgG2 heavy chain (HC) constant domain has the amino acid sequence:

ASTKGPSVFPLAPCSRSTSESTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFP
AVLQSSGLYSLSSVVTVPSSNFGTQTYTCNVDHKPSNTKVDKTVERKCCVECPP
CPAPPVAGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVQFNWYVDGVE
VHNAKTKPREEQFNSTFRVVSVLTVVHQDWLNGKEYKCKVSNKGLPAPIEKTI
SKTKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENN
YKTTPPMLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSL
SPGK// SEQ. ID NO:3090.

[00253] Constant region sequences of other IgG isotypes are known in the art for an IgG1, IgG2, IgG3, or IgG4 immunoglobulin isotype, if desired. In general, human IgG2 can be used for targets where effector functions are not desired, and human IgG1 in situations where such effector functions (e.g., antibody-dependent cytotoxicity (ADCC)) are desired. Human IgG3 has a relatively short half life and human IgG4 forms antibody "half-molecules." There are four known allotypes of human IgG1. The preferred allotype is referred to as "hIgG1z", also known as the "KEEM" allotype. Human IgG1 allotypes "hIgG1za" (KDEL), "hIgG1f" (REEM), and "hIgG1fa" are also useful; all appear to have ADCC effector function.

[00254] Human hIgG1z heavy chain (HC) constant domain has the amino acid sequence:

ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFP
AVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHT
CPPCPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAP
IEKTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNG
QPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYT
QKSLSLSPGK// SEQ ID NO:3091.

[00232] Human hIgG1za heavy chain (HC) constant domain has the amino acid sequence:

ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFP
AVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHT
CPPCPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAP
IEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQ
PENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQ
KSLSLSPGK// SEQ ID NO:3092.

[00233] Human hIgG1f heavy chain (HC) constant domain has the amino acid sequence:

ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFP
AVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHT
CPPCPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAP
IEKTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNG
QPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYT
QKSLSLSPGK// SEQ ID NO:3093.

[00234] Human hIgG1fa heavy chain (HC) constant domain has the amino acid sequence:

ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFP
AVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHT
CPPCPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAP
IEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQ
PENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQ
KSLSLSPGK// SEQ ID NO:3094.

[00235] One example of a human immunoglobulin light chain (LC) constant region sequence is the following (designated "CL-1"):

GQPKANPTVTLFPPSSEELQANKATLVCLISDFYPGAVTVAWKADGSPVKAGV
ETTKPSKQSNNKYAASSYLSLTPEQWKSHRSYSCQVTHEGSTVEKTVAPTECS//
SEQ ID NO:3095.

[00236] CL-1 is useful to increase the pI of antibodies and is convenient. There are three other human immunoglobulin light chain constant regions, designated "CL-2", "CL-3" and "CL-7", which can also be used within the scope of the present invention. CL-2 and CL-3 are more common in the human population.

[00237] CL-2 human light chain (LC) constant domain has the amino acid sequence:

GQPKAAPSVTLFPPSSEELQANKATLVCLISDFYPGAVTVAWKADSSPVKAGVE
TTTPSKQSNNKYAASSYLSLTPEQWKSHRSYSCQVTHEGSTVEKTVAPTECS//
SEQ ID NO:3096.

[00238] CL-3 human LC constant domain has the amino acid sequence:

GQPKAAPSVTLFPPSSEELQANKATLVCLISDFYPGAVTVAWKADSSPVKAGVE
TTTPSKQSNNKYAASSYLSLTPEQWKSHKSYSCQVTHEGSTVEKTVAPTECS//
SEQ ID NO:3097.

[00239] CL-7 human LC constant domain has the amino acid sequence:

GQPKAAPSVTLFPPSSEELQANKATLVCLVSDFYPGAVTVAWKADGSPVKVGV
ETTKPSKQSNNKYAASSYLSLTPEQWKSHRSYSCRVTHEGSTVEKTVAPAECS//
SEQ ID NO:3098.

[00240] Variable regions of immunoglobulin chains generally exhibit the same overall structure, comprising relatively conserved framework regions (FR) joined by three hypervariable regions, more often called "complementarity determining regions" or CDRs. The CDRs from the two chains of each heavy chain/light chain pair mentioned above typically are aligned by the framework regions to form a structure that binds specifically with a specific epitope or domain on the target protein, if any. From N-terminal to C-terminal, naturally-occurring light and heavy chain variable regions both typically conform with the following order of these elements: FR1, CDR1, FR2, CDR2, FR3, CDR3 and FR4. A numbering system has been devised for assigning numbers to amino acids that occupy positions in each of these domains. This numbering system is defined in Kabat Sequences of Proteins of Immunological Interest (1987 and 1991, NIH, Bethesda, MD), or Chothia & Lesk, 1987, *J. Mol. Biol.* 196:901-917; Chothia *et al.*, 1989, *Nature* 342:878-883.

[00241] An "antibody", or interchangeably "Ab", is a tetrameric glycoprotein. In a naturally-occurring antibody, each tetramer is composed of two identical pairs of polypeptide chains, each pair having one "light" chain of about 220 amino acids (about

25 kDa) and one "heavy" chain of about 440 amino acids (about 50-70 kDa). The amino-terminal portion of each chain includes a “variable” (“V”) region of about 100 to 110 or more amino acids primarily responsible for antigen recognition. The carboxy-terminal portion of each chain defines a constant region primarily responsible for effector function. The variable region differs among different antibodies. The constant region is the same among different antibodies. Within the variable region of each heavy or light chain, there are three hypervariable subregions that help determine the antibody’s specificity for antigen. The variable domain residues between the hypervariable regions are called the framework residues and generally are somewhat homologous among different antibodies. Immunoglobulins can be assigned to different classes depending on the amino acid sequence of the constant domain of their heavy chains. Human light chains are classified as kappa (κ) and lambda (λ) light chains. Within light and heavy chains, the variable and constant regions are joined by a "J" region of about 12 or more amino acids, with the heavy chain also including a "D" region of about 10 more amino acids. See generally, Fundamental Immunology, Ch. 7 (Paul, W., ed., 2nd ed. Raven Press, N.Y. (1989)). Within the scope of the invention, an “antibody” also encompasses a recombinantly made antibody, and antibodies that are lacking glycosylation.

[00242] The term “light chain” or “immunoglobulin light chain” includes a full-length light chain and fragments thereof having sufficient variable region sequence to confer binding specificity. A full-length light chain includes a variable region domain, VL, and a constant region domain, CL. The variable region domain of the light chain is at the amino-terminus of the polypeptide. Light chains include kappa chains and lambda chains. The term “heavy chain” or “immunoglobulin heavy chain” includes a full-length heavy chain and fragments thereof having sufficient variable region sequence to confer binding specificity. A full-length heavy chain includes a variable region domain, V_H, and three constant region domains, C_H1, C_H2, and C_H3. The V_H domain is at the amino-terminus of the polypeptide, and the C_H domains are at the carboxyl-terminus, with the C_H3 being closest to the carboxy-terminus of the polypeptide. Heavy chains are classified as mu (μ), delta (Δ), gamma (γ), alpha (α), and epsilon (ε), and define the antibody's isotype as IgM, IgD, IgG, IgA, and IgE,

respectively. In separate embodiments of the invention, heavy chains may be of any isotype, including IgG (including IgG1, IgG2, IgG3 and IgG4 subtypes), IgA (including IgA1 and IgA2 subtypes), IgM and IgE. Several of these may be further divided into subclasses or isotypes, e.g. IgG1, IgG2, IgG3, IgG4, IgA1 and IgA2. The variable regions of each light/heavy chain pair typically form the antigen binding site of an antibody, but a useful carrier antibody need not have a known antigen binding site to be useful. (See, e.g., Doellgast et al., WO 2010/108153 A2; Walker et al., PCT/US2011/052841). Different IgG isotypes may have different effector functions (mediated by the Fc region), such as antibody-dependent cellular cytotoxicity (ADCC) and complement-dependent cytotoxicity (CDC). In ADCC, the Fc region of an antibody binds to Fc receptors (FcγRs) on the surface of immune effector cells such as natural killers and macrophages, leading to the phagocytosis or lysis of the targeted cells. In CDC, the antibodies kill the targeted cells by triggering the complement cascade at the cell surface.

[00243] An "Fc region", or used interchangeably herein, "Fc domain" or "immunoglobulin Fc domain", contains two heavy chain fragments, which in a full antibody comprise the C_H1 and C_H2 domains of the antibody. The two heavy chain fragments are held together by two or more disulfide bonds and by hydrophobic interactions of the C_H3 domains.

[00244] The term "salvage receptor binding epitope" refers to an epitope of the Fc region of an IgG molecule (*e.g.*, IgG_1, IgG_2, IgG_3, or IgG_4) that is responsible for increasing the in vivo serum half-life of the IgG molecule.

[00245] "Allotypes" are variations in antibody sequence, often in the constant region, that can be immunogenic and are encoded by specific alleles in humans. Allotypes have been identified for five of the human IGHC genes, the IGHG1, IGHG2, IGHG3, IGHA2 and IGHE genes, and are designated as G1m, G2m, G3m, A2m, and Em allotypes, respectively. At least 18 Gm allotypes are known: nG1m(1), nG1m(2), G1m (1, 2, 3, 17) or G1m (a, x, f, z), G2m (23) or G2m (n), G3m (5, 6, 10, 11, 13, 14, 15, 16, 21, 24, 26, 27, 28) or G3m (b1, c3, b5, b0, b3, b4, s, t, g1, c5, u, v, g5). There are two A2m allotypes A2m(1) and A2m(2).

[00246] For a detailed description of the structure and generation of antibodies, see Roth, D.B., and Craig, N.L., *Cell*, 94:411-414 (1998), herein incorporated by reference in its entirety. Briefly, the process for generating DNA encoding the heavy and light chain immunoglobulin sequences occurs primarily in developing B-cells. Prior to the rearranging and joining of various immunoglobulin gene segments, the V, D, J and constant (C) gene segments are found generally in relatively close proximity on a single chromosome. During B-cell-differentiation, one of each of the appropriate family members of the V, D, J (or only V and J in the case of light chain genes) gene segments are recombined to form functionally rearranged variable regions of the heavy and light immunoglobulin genes. This gene segment rearrangement process appears to be sequential. First, heavy chain D-to-J joints are made, followed by heavy chain V-to-DJ joints and light chain V-to-J joints. In addition to the rearrangement of V, D and J segments, further diversity is generated in the primary repertoire of immunoglobulin heavy and light chains by way of variable recombination at the locations where the V and J segments in the light chain are joined and where the D and J segments of the heavy chain are joined. Such variation in the light chain typically occurs within the last codon of the V gene segment and the first codon of the J segment. Similar imprecision in joining occurs on the heavy chain chromosome between the D and J_H segments and may extend over as many as 10 nucleotides. Furthermore, several nucleotides may be inserted between the D and J_H and between the V_H and D gene segments which are not encoded by genomic DNA. The addition of these nucleotides is known as N-region diversity. The net effect of such rearrangements in the variable region gene segments and the variable recombination which may occur during such joining is the production of a primary antibody repertoire.

[00247] The term "hypervariable" region refers to the amino acid residues of an antibody which are responsible for antigen-binding. The hypervariable region comprises amino acid residues from a complementarity determining region or CDR [i.e., residues 24-34 (L1), 50-56 (L2) and 89-97 (L3) in the light chain variable domain and 31-35 (H1), 50-65 (H2) and 95-102 (H3) in the heavy chain variable domain as described by Kabat et al., Sequences of Proteins of Immunological Interest, 5th Ed. Public Health Service, National Institutes of Health, Bethesda, Md. (1991)]. Even a

single CDR may recognize and bind antigen, although with a lower affinity than the entire antigen binding site containing all of the CDRs.

[00248] An alternative definition of residues from a hypervariable "loop" is described by Chothia et al., *J. Mol.Biol. 196*: 901-917 (1987) as residues 26-32 (L1), 50-52 (L2) and 91-96 (L3) in the light chain variable domain and 26-32 (H1), 53-55 (H2) and 96-101 (H3) in the heavy chain variable domain.

[00249] "Framework" or "FR" residues are those variable region residues other than the hypervariable region residues.

[00250] "Antibody fragments" comprise a portion of an intact full length antibody, preferably the antigen binding or variable region of the intact antibody. Examples of antibody fragments include Fab, Fab', $F(ab')_2$, and Fv fragments; diabodies; linear antibodies (Zapata et al., Protein Eng.,8(10):1057-1062 (1995)); single-chain antibody molecules; and multispecific antibodies formed from antibody fragments.

[00251] Papain digestion of antibodies produces two identical antigen-binding fragments, called "Fab" fragments, each with a single antigen-binding site, and a residual "Fc" fragment which contains the constant region. The Fab fragment contains all of the variable domain, as well as the constant domain of the light chain and the first constant domain (CH1) of the heavy chain. The Fc fragment displays carbohydrates and is responsible for many antibody effector functions (such as binding complement and cell receptors), that distinguish one class of antibody from another.

[00252] Pepsin treatment yields an $F(ab')_2$ fragment that has two "Single-chain Fv" or "scFv" antibody fragments comprising the VH and VL domains of antibody, wherein these domains are present in a single polypeptide chain. Fab fragments differ from Fab' fragments by the inclusion of a few additional residues at the carboxy terminus of the heavy chain CH1 domain including one or more cysteines from the antibody hinge region. Preferably, the Fv polypeptide further comprises a polypeptide linker between the VH and VL domains that enables the Fv to form the desired structure for antigen binding. For a review of scFv see Pluckthun in The Pharmacology of Monoclonal

Antibodies, vol. l 13, Rosenburg and Moore eds., Springer-Verlag, New York, pp. 269-315 (1994).

[00253] A "Fab fragment" is comprised of one light chain and the C_H1 and variable regions of one heavy chain. The heavy chain of a Fab molecule cannot form a disulfide bond with another heavy chain molecule.

[00254] A "Fab' fragment" contains one light chain and a portion of one heavy chain that contains the V_H domain and the C_H1 domain and also the region between the C_H1 and C_H2 domains, such that an interchain disulfide bond can be formed between the two heavy chains of two Fab' fragments to form an $F(ab')_2$ molecule.

[00255] A "$F(ab')_2$ fragment" contains two light chains and two heavy chains containing a portion of the constant region between the C_H1 and C_H2 domains, such that an interchain disulfide bond is formed between the two heavy chains. A $F(ab')_2$ fragment thus is composed of two Fab' fragments that are held together by a disulfide bond between the two heavy chains.

[00256] "Fv" is the minimum antibody fragment that contains a complete antigen recognition and binding site. This region consists of a dimer of one heavy- and one light-chain variable domain in tight, non-covalent association. It is in this configuration that the three CDRs of each variable domain interact to define an antigen binding site on the surface of the VH VL dimer. A single variable domain (or half of an Fv comprising only three CDRs specific for an antigen) has the ability to recognize and bind antigen, although at a lower affinity than the entire binding site.

[00257] "Single-chain antibodies" are Fv molecules in which the heavy and light chain variable regions have been connected by a flexible linker to form a single polypeptide chain, which forms an antigen-binding region. Single chain antibodies are discussed in detail in International Patent Application Publication No. WO 88/01649 and United States Patent No. 4,946,778 and No. 5,260,203, the disclosures of which are incorporated by reference in their entireties.

[00258] "Single-chain Fv" or "scFv" antibody fragments comprise the V_H and V_L domains of antibody, wherein these domains are present in a single polypeptide chain, and optionally comprising a polypeptide linker between the V_H and V_L domains that enables the Fv to form the desired structure for antigen binding (Bird et al., *Science* 242:423-426, 1988, and Huston et al., *Proc. Natl. Acad. Sci. USA* 85:5879-5883, 1988). An "Fd" fragment consists of the V_H and C_H1 domains.

[00259] The term "diabodies" refers to small antibody fragments with two antigen-binding sites, which fragments comprise a heavy-chain variable domain (VH) connected to a light-chain variable domain (VL) in the same polypeptide chain (VH VL). By using a linker that is too short to allow pairing between the two domains on the same chain, the domains are forced to pair with the complementary domains of another chain and create two antigen-binding sites. Diabodies are described more fully in, for example, EP 404,097; WO 93/11161; and Hollinger et al., Proc. Natl. Acad. Sci. USA, 90:6444-6448 (1993).

[00260] A "domain antibody" is an immunologically functional immunoglobulin fragment containing only the variable region of a heavy chain or the variable region of a light chain. In some instances, two or more V_H regions are covalently joined with a peptide linker to create a bivalent domain antibody. The two V_H regions of a bivalent domain antibody may target the same or different antigens.

[00261] The term "epitope" is the portion of a molecule that is bound by an antigen binding protein (for example, an antibody). The term includes any determinant capable of specifically binding to an antigen binding protein, such as an antibody or to a T-cell receptor. An epitope can be contiguous or non-contiguous (e.g., in a single-chain polypeptide, amino acid residues that are not contiguous to one another in the polypeptide sequence but that within the context of the molecule are bound by the antigen binding protein). In certain embodiments, epitopes may be mimetic in that they comprise a three dimensional structure that is similar to an epitope used to generate the antigen binding protein, yet comprise none or only some of the amino acid residues found in that epitope used to generate the antigen binding protein. Most often, epitopes reside on proteins, but in some instances may reside on other kinds of molecules, such

as nucleic acids. Epitope determinants may include chemically active surface groupings of molecules such as amino acids, sugar side chains, phosphoryl or sulfonyl groups, and may have specific three dimensional structural characteristics, and/or specific charge characteristics. Generally, antibodies specific for a particular target antigen will preferentially recognize an epitope on the target antigen in a complex mixture of proteins and/or macromolecules.

[00262] The term "identity" refers to a relationship between the sequences of two or more polypeptide molecules or two or more nucleic acid molecules, as determined by aligning and comparing the sequences. "Percent identity" means the percent of identical residues between the amino acids or nucleotides in the compared molecules and is calculated based on the size of the smallest of the molecules being compared. For these calculations, gaps in alignments (if any) must be addressed by a particular mathematical model or computer program (i.e., an "algorithm"). Methods that can be used to calculate the identity of the aligned nucleic acids or polypeptides include those described in Computational Molecular Biology, (Lesk, A. M., ed.), 1988, New York: Oxford University Press; Biocomputing Informatics and Genome Projects, (Smith, D. W., ed.), 1993, New York: Academic Press; Computer Analysis of Sequence Data, Part I, (Griffin, A. M., and Griffin, H. G., eds.), 1994, New Jersey: Humana Press; von Heinje, G., 1987, Sequence Analysis in Molecular Biology, New York: Academic Press; Sequence Analysis Primer, (Gribskov, M. and Devereux, J., eds.), 1991, New York: M. Stockton Press; and Carillo et al., 1988, SIAM J. Applied Math. 48:1073. For example, sequence identity can be determined by standard methods that are commonly used to compare the similarity in position of the amino acids of two polypeptides. Using a computer program such as BLAST or FASTA, two polypeptide or two polynucleotide sequences are aligned for optimal matching of their respective residues (either along the full length of one or both sequences, or along a pre-determined portion of one or both sequences). The programs provide a default opening penalty and a default gap penalty, and a scoring matrix such as PAM 250 [a standard scoring matrix; see Dayhoff et al., in *Atlas of Protein Sequence and Structure*, vol. 5, supp. 3 (1978)] can be used in conjunction with the computer program. For example, the percent identity can then be calculated as: the total number of identical matches multiplied by

100 and then divided by the sum of the length of the longer sequence within the matched span and the number of gaps introduced into the longer sequences in order to align the two sequences. In calculating percent identity, the sequences being compared are aligned in a way that gives the largest match between the sequences.

[00263] The GCG program package is a computer program that can be used to determine percent identity, which package includes GAP (Devereux et al., 1984, Nucl. Acid Res. 12:387; Genetics Computer Group, University of Wisconsin, Madison, WI). The computer algorithm GAP is used to align the two polypeptides or two polynucleotides for which the percent sequence identity is to be determined. The sequences are aligned for optimal matching of their respective amino acid or nucleotide (the "matched span", as determined by the algorithm). A gap opening penalty (which is calculated as 3x the average diagonal, wherein the "average diagonal" is the average of the diagonal of the comparison matrix being used; the "diagonal" is the score or number assigned to each perfect amino acid match by the particular comparison matrix) and a gap extension penalty (which is usually 1/10 times the gap opening penalty), as well as a comparison matrix such as PAM 250 or BLOSUM 62 are used in conjunction with the algorithm. In certain embodiments, a standard comparison matrix (see, Dayhoff et al., 1978, Atlas of Protein Sequence and Structure 5:345-352 for the PAM 250 comparison matrix; Henikoff et al., 1992, Proc. Natl. Acad. Sci. U.S.A. 89:10915-10919 for the BLOSUM 62 comparison matrix) is also used by the algorithm.

[00264] Recommended parameters for determining percent identity for polypeptides or nucleotide sequences using the GAP program include the following:

Algorithm: Needleman et al., 1970, J. Mol. Biol. 48:443-453;
Comparison matrix: BLOSUM 62 from Henikoff et al., 1992, supra;
Gap Penalty: 12 (but with no penalty for end gaps)
Gap Length Penalty: 4
Threshold of Similarity: 0

[00265] Certain alignment schemes for aligning two amino acid sequences may result in matching of only a short region of the two sequences, and this small aligned region

may have very high sequence identity even though there is no significant relationship between the two full-length sequences. Accordingly, the selected alignment method (GAP program) can be adjusted if so desired to result in an alignment that spans at least 50 contiguous amino acids of the target polypeptide.

[00266] The term "modification" when used in connection withimmmunoglobulins, including antibodies and antibody fragments, of the invention, include, but are not limited to, one or more amino acid changes (including substitutions, insertions or deletions); chemical modifications; covalent modification by conjugation to therapeutic or diagnostic agents; labeling (e.g., with radionuclides or various enzymes); covalent polymer attachment such as PEGylation (derivatization with polyethylene glycol) and insertion or substitution by chemical synthesis of non-natural amino acids.

[00267] The term "derivative" when used in connection with an immunoglobulin (including antibodies and antibody fragments) within the scope of the invention refers to immunoglobulin proteins that are covalently modified by conjugation to therapeutic or diagnostic agents, labeling (e.g., with radionuclides or various enzymes), covalent polymer attachment such as PEGylation (derivatization with polyethylene glycol) and insertion or substitution by chemical synthesis of non-natural amino acids. Derivatives of the invention will retain the binding properties of underivatized molecules of the invention.

[00268] In some embodiments of the invention, the half-life extending moiety is an immunoglobulin Fc domain (e.g., a human immunoglobulin Fc domain, including Fc of allotype IgG1, IgG2, IgG3 or IgG4) or a portion thereof (e.g., CH2 domain of the Fc domain), human serum albumin (HSA), or poly(ethylene glycol) (PEG), in particular PEG of molecular weight of about 1000 Da to about 100000 Da.

[00269] Monovalent dimeric or bivalent dimeric Fc-toxin peptide analog fusions or conjugates are useful embodiments of the inventive composition of matter. A "monovalent dimeric" Fc-toxin peptide analog fusion or conjugate, or interchangeably, "monovalent dimer", or interchangeably, "monovalent heterodimer", is a Fc-toxin peptide analog fusion or conjugate that includes a toxin peptide analog conjugated with only one of the dimerized Fc domains (e.g., as represented schematically in Figure 2B

of Sullivan et al., Toxin Peptide Therapeutic Agents, US2007/0071764 and Sullivan et al., Toxin Peptide Therapeutic Agents, PCT/US2007/022831, published as WO 2008/088422, which are both incorporated herein by reference in their entireties). A "bivalent dimeric" Fc-toxin peptide analog fusion, or interchangeably, "bivalent dimer" or "bivalent homodimer", is a Fc-toxin peptide analog fusion or conjugate having both of the dimerized Fc domains each conjugated separately with a toxin peptide analog (e.g., as represented schematically in Figure 2C of Sullivan et al., Toxin Peptide Therapeutic Agents, US2007/0071764 and Sullivan et al., Toxin Peptide Therapeutic Agents, PCT/US2007/022831, published as WO 2008/088422).

[00270] Immunoglobulin Fc domains include Fc variants, which are suitable half-life extending moieties within the scope of this invention. A native Fc can be extensively modified to form an Fc variant in accordance with this invention, provided binding to the salvage receptor is maintained; see, for example WO 97/34631, WO 96/32478, and WO 04/110 472. In such Fc variants, one can remove one or more sites of a native Fc that provide structural features or functional activity not required by the fusion or conjugate molecules of this invention. One can remove these sites by, for example, substituting or deleting residues, inserting residues into the site, or truncating portions containing the site. The inserted or substituted residues can also be altered amino acids, such as peptidomimetics or D-amino acids. Fc variants can be desirable for a number of reasons, several of which are described below. Exemplary Fc variants include molecules and sequences in which:

[00271] 1. Sites involved in disulfide bond formation are removed. Such removal can avoid reaction with other cysteine-containing proteins present in the host cell used to produce the molecules of the invention. For this purpose, the cysteine-containing segment at the N-terminus can be truncated or cysteine residues can be deleted or substituted with other amino acids (e.g., alanyl, seryl). In particular, one can truncate the N-terminal 20-amino acid segment of SEQ ID NO: 478:

Met Glu Trp Ser Trp Val Phe Leu Phe Phe Leu Ser Val Thr Thr Gly
Val His Ser Asp Lys Thr His Thr Cys Pro Pro Cys Pro Ala Pro Glu
Leu Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys Asp

Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys// SEQ ID NO:478.

or delete or substitute the cysteine residues at positions 7 and 10 of SEQ ID NO: 478. Even when cysteine residues are removed, the single chain Fc domains can still form a dimeric Fc domain that is held together non-covalently.

[00272] 2. A native Fc is modified to make it more compatible with a selected host cell. For example, one can remove the PA dipeptide sequence near the N-terminus of a typical native Fc, which can be recognized by a digestive enzyme in *E. coli* such as proline iminopeptidase. One can also add an N-terminal methionine residue, especially when the molecule is expressed recombinantly in a bacterial cell such as *E. coli*. The Fc domain of SEQ ID NO: 478 is one such Fc variant.

[00273] 3. A portion of the N-terminus of a native Fc is removed to prevent N-terminal heterogeneity when expressed in a selected host cell. For this purpose, one can delete any of the first 20 amino acid residues at the N-terminus, particularly those at positions 1, 2, 3, 4 and 5.

[00274] 4. One or more glycosylation sites are removed. Residues that are typically glycosylated (e.g., asparagine) can confer cytolytic response. Such residues can be deleted or substituted with unglycosylated residues (e.g., alanine).

[00275] 5. Sites involved in interaction with complement, such as the C1q binding site, are removed. For example, one can delete or substitute the EKK tripeptide sequence of human IgG1. Complement recruitment may not be advantageous for the molecules of this invention and so can be avoided with such an Fc variant.

[00276] 5. Sites are removed that affect binding to Fc receptors other than a salvage receptor. A native Fc can have sites for interaction with certain white blood cells that are not required for the fusion or conjugate molecules of the present invention and so can be removed.

[00277] 7. The ADCC site is removed to decrease or eliminate ADCC effector function, or alternatively, modified for enhanced ADCC effector function by non-fucosylation or de-fucosylation. ADCC sites are known in the art; see, for example, Molec. Immunol. 29 (5): 633-9 (1992) with regard to ADCC sites in IgG1. These sites, as well, are not required for the fusion or conjugate molecules of the present invention and so can be removed, or enhanced for ADCC effector function, as may be desired. (See, Iida et al., Two mechanisms of the enhanced antibody-dependent cellular cytotoxicity (ADCC) efficacy of non-fucosylated therapeutic antibodies in human blood, BMC Cancer 9:58 doi:10.1186/1471-2407-9-58 (2009)).

[00278] 8. When the native Fc is derived from a non-human antibody, the native Fc can be humanized. Typically, to humanize a native Fc, one will substitute selected residues in the non-human native Fc with residues that are normally found in human native Fc. Techniques for antibody humanization are well known in the art.

[00279] 9. One or more toxin peptide analog sequences can be inserted into an internal conjugation site, or sites, within a loop region of an immunoglobulin Fc domain, as disclosed in U.S. Patent Nos.7,442,778; 7,645,861; 7,655,764; 7,655,765; 7,662,931; 7,750,127, and 7,750,128. The term "loop" region or "Fc-loop" region refers to a primary sequence of amino acid residues which connects two regions comprising secondary structure, such as an α-helix or a β-sheet, in the immediate N-terminal and C-terminal directions of primary structure from the loop region. Examples include, but are not limited to, CH2 or CH3 loop regions. One of skill in the art understands that a loop region, while not itself comprising secondary structure, may

influence or contribute to secondary or higher order protein structure. The term "internal" conjugation site means that the toxin peptide analog moiety, or moieties, is non-terminal, i.e., not through the α-amino site or the α-carboxy site of the Fc domain, although there optionally can also be additional moieties conjugated terminally at the N-terminal and/or C-terminal of the Fc domain.

[00280] 10. A linker of suitable length and neutral charge, such as "L25" (GGGGSGGGGSGGGGSGGGGSGGGGS; SEQ ID NO:493) or "L20" (GGGGSGGGGSGGGGSGGGGS; SEQ ID NO:477), can be covalently fused between the C-terminal of one monomer of an Fc domain and the N-terminal of a second Fc domain monomer, with a toxin peptide analog fused to the N-terminal of the first Fc domain monomer or the C-terminal of the second Fc domain monomer, or within a loop region of the first and/or second Fc domain monomer. Such a molecule can be recombinantly expressed in bacterial or mammalian cells to produce a variant "monovalent dimeric" Fc-toxin peptide analog fusion or conjugate with the typical disulfide bond formation between the Fc monomers. (See, e.g., Example 13 herein). Other examples of Fc variants include the following: In SEQ ID NO: 478, the leucine at position 15 can be substituted with glutamate; the glutamate at position 99, with alanine; and the lysines at positions 101 and 103, with alanines. In addition, phenyalanine residues can replace one or more tyrosine residues. For purposes of the invention, a variant Fc domain can also be part of a monomeric immunoglobulin heavy chain, an antibody, or a heterotrimeric hemibody (LC+HC+Fc).

[00281] An alternative half-life extending moiety would be a protein, polypeptide, peptide, antibody, antibody fragment, or small molecule (e.g., a peptidomimetic compound) capable of binding to a salvage receptor. For example, one could use as a half-life extending moiety a polypeptide as described in U.S. Pat. No. 5,739,277, issued April 14, 1998 to Presta et al. Peptides could also be selected by phage display for binding to the FcRn salvage receptor. Such salvage receptor-binding compounds are also included within the meaning of "half-life extending moiety" and are within the scope of this invention. Such half-life extending moieties should be selected for increased half-life (e.g., by avoiding sequences recognized by proteases) and decreased

immunogenicity (e.g., by favoring non-immunogenic sequences, as discovered in antibody humanization).

[00282] As noted above, polymer half-life extending moieties can also be used. Various means for attaching chemical moieties useful as half-life extending moieties are currently available, see, e.g., Patent Cooperation Treaty ("PCT") International Publication No. WO 96/11953, entitled "N-Terminally Chemically Modified Protein Compositions and Methods," herein incorporated by reference in its entirety. This PCT publication discloses, among other things, the selective attachment of water-soluble polymers to the N-terminus of proteins.

[00283] In some embodiments of the inventive compositions, the polymer half-life extending moiety is polyethylene glycol (PEG), covalently linked at the N-terminal, C-terminal or at one or more intercalary side chains of toxin peptide analog. Some embodiments of the inventive composition of matter further include one or more PEG moieties conjugated to a non-PEG half-life extending moiety or to the toxin peptide analog, or to any combination of any of these. For example, an Fc domain or portion thereof in the inventive composition can be made mono-PEGylated, di-PEGylated, or otherwise multi-PEGylated, by the process of reductive alkylation.

[00284] Covalent conjugation of proteins and peptides with poly(ethylene glycol) (PEG) has been widely recognized as an approach to significantly extend the in vivo circulating half-lives of therapeutic proteins. PEGylation achieves this effect predominately by retarding renal clearance, since the PEG moiety adds considerable hydrodynamic radius to the protein. (Zalipsky, S., et al., Use of functionalized poly(ethylene glycol)s for modification of polypeptides., in poly(ethylene glycol) chemistry: Biotechnical and biomedical applications., J.M. Harris, Ed., Plenum Press: New York., 347-370 (1992)). Additional benefits often conferred by PEGylation of proteins and peptides include increased solubility, resistance to proteolytic degradation, and reduced immunogenicity of the therapeutic polypeptide. The merits of protein PEGylation are evidenced by the commercialization of several PEGylated proteins including PEG-Adenosine deaminase (Adagen™/Enzon Corp.), PEG-L-asparaginase (Oncaspar™/Enzon Corp.), PEG-Interferon α-2b (PEG-Intron™/Schering/Enzon),

PEG-Interferon α-2a (PEGASYS™/Roche) and PEG-G-CSF (Neulasta™/Amgen) as well as many others in clinical trials.

[00285] By "PEGylated peptide" or "PEGylated protein" is meant a peptide having a polyethylene glycol (PEG) moiety covalently bound to an amino acid residue of the peptide itself or to a peptidyl or non-peptidyl linker that is covalently bound to a residue of the peptide, either directly or indirectly through another linker moiety. A non-limiting example is N-terminal conjugation of the peptide with 3-(1-(1-bromo-2-oxo-6,9,12,15,18,21,24,27,30,33,36-undecaoxa-3-azaoctatriacontan-38-yl)-1H-1,2,3-triazol-4-yl)propanoyl (designated herein by the abbreviation "{bromoacetamide-PEG11-triazole}-").

[00286] By "polyethylene glycol" or "PEG" is meant a polyalkylene glycol compound or a derivative thereof, with or without coupling agents or derivatization with coupling or activating moieties (e.g., with aldehyde, hydroxysuccinimidyl, hydrazide, thiol, triflate, tresylate, azirdine, oxirane, orthopyridyl disulphide, vinylsulfone, iodoacetamide or a maleimide moiety). In accordance with the present invention, useful PEG includes substantially linear, straight chain PEG, branched PEG (brPEG), or dendritic PEG. (See, e.g., Merrill, US Patent No. 5,171,264; Harris et al., Multiarmed, monofunctional, polymer for coupling to molecules and surfaces, US Patent No. 5,932,462; Shen, N-maleimidyl polymer derivatives, US Patent No. 6,602,498).

[00287] Briefly, the PEG groups are generally attached to the peptide portion of the composition of the invention via acylation or reductive alkylation (or reductive amination) through a reactive group on the PEG moiety (e.g., an aldehyde, amino, thiol, or ester group) to a reactive group on the inventive compound (e.g., an aldehyde, amino, or ester group). A useful strategy for the PEGylation of synthetic peptides consists of combining, through forming a conjugate linkage in solution, a peptide and a PEG moiety, each bearing a special functionality that is mutually reactive toward the other. The peptides can be easily prepared with conventional solid phase synthesis (see, for example, Figures 5 and 6 and the accompanying text herein). The peptides are "preactivated" with an appropriate functional group at a specific site. The precursors are

purified and fully characterized prior to reacting with the PEG moiety. Ligation of the peptide with PEG usually takes place in aqueous phase and can be easily monitored by reverse phase analytical HPLC. The PEGylated peptides can be easily purified by preparative HPLC and characterized by analytical HPLC, amino acid analysis and laser desorption mass spectrometry.

[00288] PEG is a well-known, water soluble polymer that is commercially available or can be prepared by ring-opening polymerization of ethylene glycol according to methods well known in the art (Sandler and Karo, Polymer Synthesis, Academic Press, New York, Vol. 3, pages 138-161). In the present application, the term "PEG" is used broadly to encompass any polyethylene glycol molecule, in mono-, bi-, or poly-functional form, without regard to size or to modification at an end of the PEG, and can be represented by the formula:

$$X\text{-}O(CH_2CH_2O)_{n-1}CH_2CH_2OH, \qquad (I)$$

where n is 20 to 2300 and X is H or a terminal modification, e.g., a C_{1-4} alkyl.

[00289] In some useful embodiments, a PEG used in the invention terminates on one end with hydroxy or methoxy, i.e., X is H or CH_3 ("methoxy PEG"). It is noted that the other end of the PEG, which is shown in formula (I) terminating in OH, covalently attaches to an activating moiety via an ether oxygen bond, an amine linkage, or amide linkage. When used in a chemical structure, the term "PEG" includes the formula (I) above without the hydrogen of the hydroxyl group shown, leaving the oxygen available to react with a free carbon atom of a linker to form an ether bond. More specifically, in order to conjugate PEG to a peptide, the peptide must be reacted with PEG in an "activated" form. Activated PEG can be represented by the formula:

$$(PEG)\text{-}(A) \qquad (II)$$

where PEG (defined supra) covalently attaches to a carbon atom of the activation moiety (A) to form an ether bond, an amine linkage, or amide linkage, and (A) contains a reactive group which can react with an amino, azido, alkyne, imino, maleimido, N-succinimidyl, carboxyl, aminooxy, seleno, or thiol group on an amino acid residue of a peptide or a linker moiety covalently attached to the peptide, e.g., the toxin peptide analog.

[00290] Techniques for the preparation of activated PEG and its conjugation to biologically active peptides are well known in the art. (E.g., see U.S. Pat. Nos. 5,643,575, 5,919,455, 5,932,462, and 5,990,237; Kinstler et al., N-terminally chemically modified protein compositions and methods, US Patent Nos. 5,985,265, and 5,824,784; Thompson et al., PEGylation of polypeptides, EP 0575545 B1; Petit, Site specific protein modification, US Patent Nos. 6,451,986, and 6,548,644; S. Herman et al., Poly(ethylene glycol) with reactive endgroups: I. Modification of proteins, J. Bioactive Compatible Polymers, 10:145-187 (1995); Y. Lu et al., PEGylated peptides III: Solid-phase synthesis with PEGylating reagents of varying molecular weight: synthesis of multiply PEGylated peptides, Reactive Polymers, 22:221-229 (1994); A.M. Felix et al., PEGylated Peptides IV: Enhanced biological activity of site-directed PEGylated GRF analogs, Int. J. Peptide Protein Res., 46:253-264 (1995); A.M. Felix, Site-specific poly(ethylene glycol)ylation of peptides, ACS Symposium Series 680(poly(ethylene glycol)): 218-238 (1997); Y. Ikeda et al., Polyethylene glycol derivatives, their modified peptides, methods for producing them and use of the modified peptides, EP 0473084 B1; G.E. Means et al., Selected techniques for the modification of protein side chains, in: Chemical modification of proteins, Holden Day, Inc., 219 (1971)).

[00291] Activated PEG, such as PEG-aldehydes or PEG-aldehyde hydrates, can be chemically synthesized by known means or obtained from commercial sources, e.g., Shearwater Polymers, (Huntsville, Al) or Enzon, Inc. (Piscataway, N.J.).

[00292] An example of a useful activated PEG for purposes of the present invention is a PEG-aldehyde compound (e.g., a methoxy PEG-aldehyde), such as PEG-propionaldehyde, which is commercially available from Shearwater Polymers

(Huntsville, Al). PEG-propionaldehyde is represented by the formula PEG-CH_2CH_2CHO. (See, e.g., U.S. Pat. No. 5,252,714). Also included within the meaning of "PEG aldehyde compound" are PEG aldehyde hydrates, e.g., PEG acetaldehyde hydrate and PEG bis aldehyde hydrate, which latter yields a bifunctionally activated structure. (See., e.g., Bentley et al., Poly(ethylene glycol) aldehyde hydrates and related polymers and applications in modifying amines, US Patent No. 5,990,237) (See., e.g., Bentley et al., Poly(ethylene glycol) aldehyde hydrates and related polymers and applications in modifying amines, US Patent No. 5,990,237). An activated multi-branched PEG-aldehyde compound can be used (PEG derivatives comprising multiple arms to give divalent, trivalent, tetravalent, octavalent constructs). Using a 4-arm PEG derivative four (4) toxin peptide analogs are attached to each PEG molecule. For example, in accordance with the present invention, the toxin peptide analog can be conjugated to a polyethylene glycol (PEG) at 1, 2, 3 or 4 amino functionalized sites of the PEG.

[00293] In being conjugated in accordance with the inventive method, the polyethylene glycol (PEG), as described herein, is covalently bound by reductive amination directly to at least one solvent-exposed free amine moiety of an amino acid residue of the toxin peptide analog itself. In some embodiments of the inventive method, the toxin peptide analog is conjugated to a PEG at one or more primary or secondary amines on the toxin peptide analog, or to two PEG groups at a single primary amine site on the toxin peptide analog (e.g., this can occur when the reductive amination reaction involves the presence of excess PEG-aldehyde compound). We have observed that when PEGylation by reductive amination is at a primary amine on the peptide, it is not uncommon to have amounts (1 to 100% range) of reaction product that have two or more PEGs present per molecule, and if the desired PEGylation product is one with only one PEG per molecule, then this "over-PEGylation" may be undesirable. When PEGylated product with a single PEG per PEGylation product molecule is desired, an embodiment of the inventive method can be employed that involves PEGylation using secondary amines of the pharmacologically active peptide, because only one PEG group per molecule will be transferred in the reductive amination reaction.

[00294] Amino acid residues that can provide a primary amine moiety include residues of lysine, homolysine, ornithine, α, β-diaminopropionic acid (Dap), α, β-diaminopropionoic acid (Dpr), and α, γ-diaminobutyric acid (Dab), aminobutyric acid (Abu), and α-amino-isobutyric acid (Aib). The polypeptide N-terminus also provides a useful α-amino group for PEGylation. Amino acid residues that can provide a secondary amine moiety include ε-N-alkyl lysine, α-N-alkyl lysine, δ-N-alkyl ornithine, α-N-alkyl ornithine, or an N-terminal proline, where the alkyl is C_1 to C_6.

[00295] Another useful activated PEG for generating the PEGylated toxin peptide analogs of the present invention is a PEG-maleimide compound, such as, but not limited to, a methoxy PEG-maleimide, such as maleimido monomethoxy PEG, are particularly useful for generating the PEG-conjugated peptides of the invention. (E.g., Shen, *N*-maleimidyl polymer derivatives, US Patent No. 6,602,498; C. Delgado et al., The uses and properties of PEG-linked proteins., Crit. Rev. Therap. Drug Carrier Systems, 9:249-304 (1992); S. Zalipsky et al., Use of functionalized poly(ethylene glycol)s for modification of polypeptides, in: Poly(ethylene glycol) chemistry: Biotechnical and biomedical applications (J.M. Harris, Editor, Plenum Press: New York, 347-370 (1992); S. Herman et al., Poly(ethylene glycol) with reactive endgroups: I. Modification of proteins, J. Bioactive Compatible Polymers, 10:145-187 (1995); P.J. Shadle et al., Conjugation of polymer to colony stimulating factor-1, U.S. Patent No. 4,847,325; G. Shaw et al., Cysteine added variants IL-3 and chemical modifications thereof, U.S. Patent No. 5,166,322 and EP 0469074 B1; G. Shaw et al., Cysteine added variants of EPO and chemical modifications thereof, EP 0668353 A1; G. Shaw et al., Cysteine added variants G-CSF and chemical modifications thereof, EP 0668354 A1; N.V. Katre et al., Interleukin-2 muteins and polymer conjugation thereof, U.S. Patent No. 5,206,344; R.J. Goodson and N.V. Katre, Site-directed pegylation of recombinant interleukin-2 at its glycosylation site, Biotechnology, 8:343-346 (1990)).

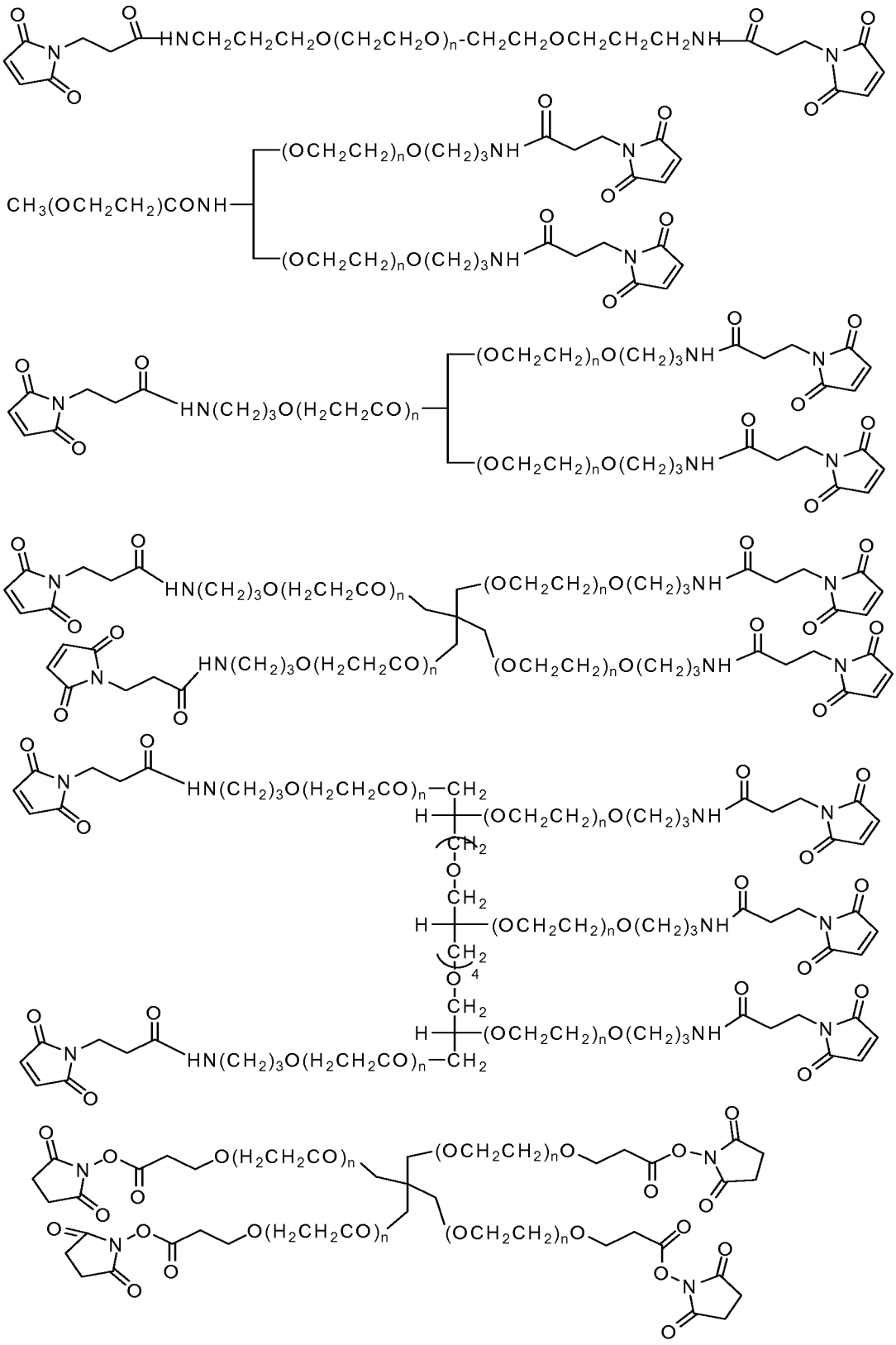
[00296] A poly(ethylene glycol) vinyl sulfone is another useful activated PEG for generating the PEG-conjugated toxin peptide analogs of the present invention by conjugation at thiolated amino acid residues, e.g., at C residues. (E.g., M. Morpurgo et al., Preparation and characterization of poly(ethylene glycol) vinyl sulfone, Bioconj. Chem., 7:363-368 (1996); see also Harris, Functionalization of polyethylene glycol for

formation of active sulfone-terminated PEG derivatives for binding to proteins and biologically compatible materials, U.S. Patent Nos. 5,446,090; 5,739,208; 5,900,461; 6,610,281 and 6,894,025; and Harris, Water soluble active sulfones of poly(ethylene glycol), WO 95/13312 A1). Another activated form of PEG that is useful in accordance with the present invention, is a PEG-N-hydroxysuccinimide ester compound, for example, methoxy PEG-N-hydroxysuccinimidyl (NHS) ester.

[00297] Heterobifunctionally activated forms of PEG are also useful. (See, e.g., Thompson et al., PEGylation reagents and biologically active compounds formed therewith, U.S. Patent No. 6,552,170).

[00298] In still other embodiments of the inventive method of producing a composition of matter, the toxin peptide analog is reacted by known chemical techniques with an activated PEG compound, such as but not limited to, a thiol-activated PEG compound, a diol-activated PEG compound, a PEG-hydrazide compound, a PEG-oxyamine compound, or a PEG-bromoacetyl compound. (See, e.g., S. Herman, Poly(ethylene glycol) with Reactive Endgroups: I. Modification of Proteins, J. Bioactive and Compatible Polymers, 10:145-187 (1995); S. Zalipsky, Chemistry of Polyethylene Glycol Conjugates with Biologically Active Molecules, Advanced Drug Delivery Reviews, 16:157-182 (1995); R. Greenwald et al., Poly(ethylene glycol) conjugated drugs and prodrugs: a comprehensive review, Critical Reviews in Therapeutic Drug Carrier Systems, 17:101-161 (2000)).

[00299] An even more preferred activated PEG for generating the PEG-conjugated toxin peptide analogs of the present invention is a multivalent PEG having more than one activated residues. Preferred multivalent PEG moieties include, but are not limited to, those shown below:



[00300] In still other embodiments of making the composition of matter, the inventive toxin peptide analog is reacted by known chemical techniques with an activated multi-

branched PEG compound (PEG derivatives comprising multiple arms to give divalent, trivalent, tetravalent, octavalent constructs), such as but not limited to, pentaerythritol tetra-polyethyleneglycol ether. Functionalization and activated derivatives , such as, but not limited to, N-succinimidyloxycarbonyl)propyl, p-nitrophenyloxycarbonyl, (—CO_2-p-$C_6H_4NO_2$), 3-(N-maleimido)propanamido, 2-sulfanylethyl, and 3-aminopropyl. Using a 4-arm PEG derivative, four toxin peptide analogs are attached to each PEG molecule. For example, in accordance with the present invention, the toxin peptide analog can be conjugated to a polyethylene glycol (PEG) at:

(a) 1, 2, 3 or 4 amino functionalized sites of the PEG;
(b) 1, 2, 3 or 4 thiol functionalized sites of the PEG;
(c) 1, 2, 3 or 4 maleimido functionalized sites of the PEG;
(d) 1, 2, 3 or 4 N-succinimidyl functionalized sites of the PEG;
(e) 1, 2, 3 or 4 carboxyl functionalized sites of the PEG; or
(f) 1, 2, 3 or 4 *p*-nitrophenyloxycarbonyl functionalized sites of the PEG.

[00301] The smallest practical size of PEG is about 500 Daltons (Da), below which PEG becomes toxic. Above about 500 Da, any molecular mass for a PEG can be used as practically desired, e.g., from about 1,000 Daltons (Da) to 100,000 Da (n is 20 to 2300). The number of PEG monomers (n) is approximated from the average molecular mass using a MW = 44 Da for each monomer. It is preferred that the combined molecular mass of PEG on an activated linker is suitable for pharmaceutical use. Thus, the combined molecular mass of the PEG molecule should not exceed about 100,000 Da. In some embodiments, the combined or total average molecular mass of PEG used in a PEG-conjugated toxin peptide analog of the present invention is from about 3,000 Da to 60,000 Da (total n is from 70 to 1,400), more preferably from about 10,000 Da to 40,000 Da (total n is about 230 to about 910). The most preferred combined mass for PEG is from about 20,000 Da to 30,000 Da (total n is about 450 to about 680).

[00302] It will be appreciated that "multimers" of the composition of matter can be made, since the half-life extending moiety employed for conjugation to the toxin peptide analog (with or without an intervening linker moiety) can be multivalent (e.g., bivalent, trivalent, tetravalent or a higher order valency) as to the number of amino acid

residues at which the half-life extending moiety can be conjugated. In some embodiments the peptide portion of the inventive composition of matter can be multivalent (e.g., bivalent, trivalent, tetravalent or a higher order valency), and, thus, some "multimers" of the inventive composition of matter may have more that one half life extending moiety. Consequently, it is possible by the inventive method of producing a composition of matter to produce a variety of conjugated half-life extending moiety peptide structures. By way of example, a univalent half-life extending moiety and a univalent peptide will produce a 1:1 conjugate; a bivalent peptide and a univalent half-life extending moiety may form conjugates wherein the peptide conjugates bear two half-life extending moiety moieties, whereas a bivalent half-life extending moiety and a univalent peptide may produce species where two peptide entities are linked to a single half-life extending moiety; use of higher-valence half-life extending moiety can lead to the formation of clusters of peptide entities bound to a single half-life extending moiety, whereas higher-valence peptides may become encrusted with a plurality of half-life extending moiety moieties. By way of further example, if the site of conjugation of a multivalent half-life extending moiety to the toxin peptide analog is a cysteine or other aminothiol the methods disclosed by D'Amico et al. may be employed (D'Amico et al., Method of conjugating aminothiol containing molecules to vehicles, published as US 2006/0199812, which application is incorporated herein by reference in its entirety).

[00303] The peptide moieties may have more than one reactive group which will react with the activated half-life extending moiety and the possibility of forming complex structures must always be considered; when it is desired to form simple structures such as 1:1 adducts of half-life extending moiety and peptide, or to use bivalent half-life extending moiety to form peptide:half-life extending moiety:peptide adducts, it will be beneficial to use predetermined ratios of activated half-life extending moiety and peptide material, predetermined concentrations thereof and to conduct the reaction under predetermined conditions (such as duration, temperature, pH, etc.) so as to form a proportion of the described product and then to separate the described product from the other reaction products. The reaction conditions, proportions and concentrations of the reagents can be obtained by relatively simple trial-and-error experiments which are

within the ability of an ordinarily skilled artisan with appropriate scaling-up as necessary. Purification and separation of the products is similarly achieved by conventional techniques well known to those skilled in the art.

[00304] Additionally, physiologically acceptable salts of the half-life extending moiety-fused or conjugated to the toxin peptide analogs of this invention are also encompassed within the composition of matter of the present invention.

[00305] The above-described half-life extending moieties and other half-life extending moieties described herein are useful, either individually or in combination, and as further described in the art, for example, in Sullivan et al., Toxin Peptide Therapeutic Agents, US2007/0071764 and Sullivan et al., Toxin Peptide Therapeutic Agents, PCT/US2007/022831, published as WO 2008/088422, which are both incorporated herein by reference in their entireties. The invention encompasses the use of any single species of pharmaceutically acceptable half-life extending moiety, such as, but not limited to, those described herein, in conjugation with the toxin peptide analog, or the use of a combination of two or more like or different half-life extending moieties.

[00306] Linkers. A "linker moiety" as used herein refers to a biologically acceptable peptidyl or non-peptidyl organic group that is covalently bound to an amino acid residue of a toxin peptide analog or other polypeptide chain (e.g., an immunoglobulin HC or LC or immunoglobulin Fc domain) contained in the inventive composition, which linker moiety covalently joins or conjugates the toxin peptide analog or other polypeptide chain to another peptide or polypeptide chain in the composition, or to a half-life extending moiety. In some embodiments of the composition, a half-life extending moiety, as described herein, is conjugated, i.e., covalently bound directly to an amino acid residue of the toxin peptide analog itself, or optionally, to a peptidyl or non-peptidyl linker moiety (including but not limited to aromatic or aryl linkers) that is covalently bound to an amino acid residue of the toxin peptide analog. The presence of any linker moiety is optional. When present, its chemical structure is not critical, since it serves primarily as a spacer to position, join, connect, or optimize presentation or position of one functional moiety in relation to one or more other functional moieties of a molecule of the inventive composition. The presence of a linker moiety can be useful

in optimizing pharamcologial activity of some embodiments of the inventive composition. The linker is preferably made up of amino acids linked together by peptide bonds. The linker moiety, if present, can be independently the same or different from any other linker, or linkers, that may be present in the inventive composition. As stated above, the linker moiety, if present (whether within the primary amino acid sequence of the toxin peptide analog, or as a linker for attaching a half-life extending moiety to the toxin peptide analog), can be "peptidyl" in nature (i.e., made up of amino acids linked together by peptide bonds) and made up in length, preferably, of from 1 up to about 40 amino acid residues, more preferably, of from 1 up to about 20 amino acid residues, and most preferably of from 1 to about 10 amino acid residues. Preferably, but not necessarily, the amino acid residues in the linker are from among the twenty canonical amino acids, more preferably, cysteine, glycine, alanine, proline, asparagine, glutamine, and /or serine. Even more preferably, a peptidyl linker is made up of a majority of amino acids that are sterically unhindered, such as glycine, serine, and alanine linked by a peptide bond. It is also desirable that, if present, a peptidyl linker be selected that avoids rapid proteolytic turnover in circulation *in vivo*. Some of these amino acids may be glycosylated, as is well understood by those in the art. For example, a useful linker sequence constituting a sialylation site is $X_1X_2NX_4X_5G$ (SEQ ID NO:479), wherein X_1, X_2,X_4 and X_5 are each independently any amino acid residue.

[00307] In other embodiments, the 1 to 40 amino acids of the peptidyl linker moiety are selected from glycine, alanine, proline, asparagine, glutamine, and lysine. Preferably, a linker is made up of a majority of amino acids that are sterically unhindered, such as glycine and alanine. Thus, preferred linkers include polyglycines, polyserines, and polyalanines, or combinations of any of these. Some exemplary peptidyl linkers are poly$(Gly)_{1-8}$, particularly $(Gly)_3$, $(Gly)_4$ (SEQ ID NO:480), $(Gly)_5$ (SEQ ID NO:481) and $(Gly)_7$ (SEQ ID NO:482), as well as, GlySer and poly$(Gly)_4$Ser, such as "L15" (GGGGSGGGGSGGGGS; SEQ ID NO:483), poly$(Gly\text{-}Ala)_{2-4}$ and poly$(Ala)_{1-8}$. Other specific examples of peptidyl linkers include $(Gly)_5$Lys (SEQ ID NO:484), and $(Gly)_5$LysArg (SEQ ID NO:485). Other examples of useful peptidyl linkers are: Other examples of useful peptidyl linkers are:

$(Gly)_3Lys(Gly)_4$ (SEQ ID NO:486);

$(Gly)_3AsnGlySer(Gly)_2$ (SEQ ID NO:487);
$(Gly)_3Cys(Gly)_4$ (SEQ ID NO:488); and
GlyProAsnGlyGly (SEQ ID NO:489).

To explain the above nomenclature, for example, $(Gly)_3Lys(Gly)_4$ means Gly-Gly-Gly-Lys-Gly-Gly-Gly-Gly (SEQ ID NO:490). Other combinations of Gly and Ala are also useful.

[00308] Other preferred linkers are those identified herein as "L5" (GGGGS; or "G_4S"; SEQ ID NO:491), "L10" (GGGGSGGGGS; SEQ ID NO:492); "L20" (GGGGSGGGGSGGGGSGGGGS; SEQ ID NO:477) ; "L25" (GGGGSGGGGSGGGGSGGGGSGGGGS; SEQ ID NO:493) and any linkers used in the working examples hereinafter.

[00309] In some embodiments of the compositions of this invention, which comprise a peptide linker moiety, acidic residues, for example, glutamate or aspartate residues, are placed in the amino acid sequence of the linker moiety. Examples include the following peptide linker sequences:

GGEGGG (SEQ ID NO:494);
GGEEEGGG (SEQ ID NO:495);
GEEEG (SEQ ID NO:496);
GEEE (SEQ ID NO:497);
GGDGGG (SEQ ID NO:498);
GGDDDGG (SEQ ID NO:499);
GDDDG (SEQ ID NO:500);
GDDD (SEQ ID NO:501);
GGGGSDDSDEGSDGEDGGGGS (SEQ ID NO:502);
WEWEW (SEQ ID NO:503);
FEFEF (SEQ ID NO:504);
EEEWWW (SEQ ID NO:505);
EEEFFF (SEQ ID NO:506);
WWEEEWW (SEQ ID NO:507); or

FFEEEFF (SEQ ID NO:508).

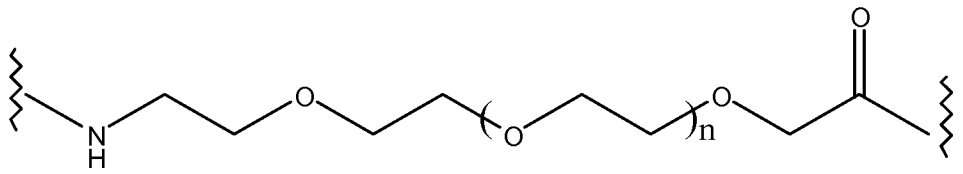
[00310] In other embodiments, the linker constitutes a phosphorylation site, e.g., $X_1X_2YX_4X_5G$ (SEQ ID NO:509), wherein X_1, X_2, X_4, and X_5 are each independently any amino acid residue; $X_1X_2SX_4X_5G$ (SEQ ID NO:510), wherein X_1, X_2,X_4 and X_5 are each independently any amino acid residue; or $X_1X_2TX_4X_5G$ (SEQ ID NO:511), wherein X_1, X_2, X_4 and X_5 are each independently any amino acid residue.

[00311] The linkers shown here are exemplary; peptidyl linkers within the scope of this invention may be much longer and may include other residues. A peptidyl linker can contain, e.g., a cysteine, another thiol, or nucleophile for conjugation with a half-life extending moiety. In another embodiment, the linker contains a cysteine or homocysteine residue, or other 2-amino-ethanethiol or 3-amino-propanethiol moiety for conjugation to maleimide, iodoacetaamide or thioester, functionalized half-life extending moiety.

[00312] Another useful peptidyl linker is a large, flexible linker comprising a random Gly/Ser/Thr sequence, for example: GSGSATGGSGSTASSGSGSATH (SEQ ID NO:512) or HGSGSATGGSGSTASSGSGSAT (SEQ ID NO:513), that is estimated to be about the size of a 1 kDa PEG molecule. Alternatively, a useful peptidyl linker may be comprised of amino acid sequences known in the art to form rigid helical structures (e.g., Rigid linker: -AEAAAKEAAAKEAAAKAGG-// SEQ ID NO:514). Additionally, a peptidyl linker can also comprise a non-peptidyl segment such as a 6 carbon aliphatic molecule of the formula $-CH_2-CH_2-CH_2-CH_2-CH_2-CH_2-$. The peptidyl linkers can be altered to form derivatives as described herein.

[00313] Optionally, a non-peptidyl linker moiety is also useful for conjugating the half-life extending moiety to the peptide portion of the half-life extending moiety-conjugated toxin peptide analog. For example, alkyl linkers such as $-NH-(CH_2)_s-C(O)-$, wherein s = 2-20 can be used. These alkyl linkers may further be substituted by any non-sterically hindering group such as lower alkyl (e.g., C_1-C_6) lower acyl, halogen (e.g., Cl, Br), CN, NH_2, phenyl, *etc*. Exemplary non-peptidyl linkers are PEG linkers (e.g., shown below):

(III)



wherein n is such that the linker has a molecular weight of about 100 to about 5000 Daltons (Da), preferably about 100 to about 500 Da.

[00314] In one embodiment, the non-peptidyl linker is aryl. The linkers may be altered to form derivatives in the same manner as described herein. In addition, PEG moieties may be attached to the N-terminal amine or selected side chain amines by either reductive alkylation using PEG aldehydes or acylation using hydroxysuccinimido or carbonate esters of PEG, or by thiol conjugation.

[00315] "Aryl" is phenyl or phenyl vicinally-fused with a saturated, partially-saturated, or unsaturated 3-, 4-, or 5 membered carbon bridge, the phenyl or bridge being substituted by 0, 1, 2 or 3 substituents selected from C_{1-8} alkyl, C_{1-4} haloalkyl or halo. "Heteroaryl" is an unsaturated 5 , 6 or 7 membered monocyclic or partially-saturated or unsaturated 6-, 7-, 8-, 9-, 10- or 11 membered bicyclic ring, wherein at least one ring is unsaturated, the monocyclic and the bicyclic rings containing 1, 2, 3 or 4 atoms selected from N, O and S, wherein the ring is substituted by 0, 1, 2 or 3 substituents selected from C_{1-8} alkyl, C_{1-4} haloalkyl and halo.

[00316] Non-peptide portions of the inventive composition of matter, such as non-peptidyl linkers or non-peptide half-life extending moieties can be synthesized by conventional organic chemistry reactions.

[00317] The above is merely illustrative and not an exhaustive treatment of the kinds of linkers that can optionally be employed in accordance with the present invention.

[00318] Compositions of this invention incorporating the isolated polypeptide antagonists of the voltage-gated sodium channel $Na_V1.3$ and/or $Na_V1.7$, in particular GpTx-1 and GpTx-1 toxin peptide analogs of the present invention, whether or not conjugated to a half-life extending moiety, are useful as therapeutic agents in the treatment of pain, for example in humans. Clinical genetic information, replicated independently by several groups, shows unambiguously that the product of the Nav1.7 (*SCN9A*) gene is a key control point for the perception of pain. In humans, loss-of-function truncation mutations of the gene lead to complete insensitivity to all forms of pain measured, whereas the human chronic pain syndromes primary erythromelalgia and paroxysmal extreme pain disorder are caused by gain-of-function mutations in $Na_V1.7$ that lead to easier or more prolonged Nav1.7 channel opening. Remarkably, no other major neurological abnormalities are present in patients carrying either truncation or gain-of-function mutations in $Na_V1.7$ (Goldberg et al., Clin Genet 71:311-319 (2007); Cox et al., Nature 444:894-898 (2006); Ahmad et al., Hum Mol Genet 16:2114-2121 (2007); Fertleman et al., Neurology 69:586-595 (2007)). Accordingly, a therapeutic that blocks $Na_V1.7$ can be expected to be of great utility for the treatment of pain in humans.

[00319] Specific clinical chronic pain syndromes include, but are not limited to, pain associated with, or due to, cancer, chemotherapy, osteoarthritis, fibromyalgia, primary erythromelalgia, post-herpetic neuralgia, painful diabetic neuropathy, idiopathic painful neuropathy, neuromas, paroxysmal extreme pain disorder, migraine, trigeminal neuralgia, orofacial pain, cluster or other headaches, complex regional pain syndrome (CRPS), failed back surgery syndrome, sciatica (including lower back pain), interstitial cystitis and pelvic pain, inflammation-induced pain including cellulitis, and rheumatic or joint pain. A $Na_V1.7$ inhibitor can also have great utility for treatment of acute or persistent pain, including but not limited to pain following trauma, burns, or surgery. Notably, inhibition of $Na_V1.7$ is not expected to result in the adverse effects on cognition and on the gastrointestinal system that limit the use of opioid drugs. Again unlike opioids, $Na_V1.7$ inhibitors should not produce respiratory depression, patient tolerance, or addiction. Moreover, $Na_V1.7$ expression in humans and in non-human primates is overwhelmingly in the peripheral nervous system, with little or no message

or protein in the brain or spinal cord (Ahmad et al., Hum Mol Genet 16:2114-2121, 2007). Consistent with these studies, our data show that among CNS areas from post-mortem humans examined with in situ hybridization, message RNA for $Na_V1.7$ was found only in light amounts in hypothalamic nuclei and in ventral motor areas of the spinal cord and spinal ependyma, areas with no known involvement in the pain response. By contrast, no $Na_V1.7$ was found in cerebral cortex, cerebellum, adrenal medulla, pituitary, or dorsal or deep regions of lumbar spinal cord. Strong $Na_V1.7$ expression was found in peripheral nerves including dorsal root ganglia, trigeminal ganglia, and myenteric plexes of the stomach and intestine. (See, Figure 13A-E). This suggests that an inhibitor of $Na_V1.7$ would exert analgesic efficacy via the peripheral nervous system without a need for CNS penetrance. As peptides generally do not cross the blood-brain barrier, a peptide inhibitor thus has an advantage over small molecules with some CNS-penetrance in that a peptide should not produce common off-target side effects mediated by the brain such as dizziness, confusion, or sedation.

[00320] The clinical genetic data for $Na_V1.7$ do not address whether $Na_V1.7$ maintains its key role in pain perception in patients with damage to and subsequent remodeling of the nervous system. Such remodeling is likely a feature of many chronic pain syndromes (Woolf and Ma, Neuron 55:353-364 (2007)). For such cases, antagonism of the $Na_V1.3$ sodium channel may prove of great therapeutic benefit. Published results show up-regulation of mRNA encoding $Na_V1.3$ in sensory neurons of rats subjected to spinal nerve ligation surgery, a standard model for neuropathic pain in humans (Hains et al., J Neurosci 24:4832-4839, 2004). This implies that for some chronic pain syndromes, especially neuropathic pain, inhibition of $Na_V1.3$ in addition to $Na_V1.7$ may produce the best analgesic efficacy. Electrophysiological studies of the cell bodies of rat sensory neurons show that spinal nerve ligation causes a dramatic shift in sodium channel expression to the fast, tetrodotoxin-sensitive subtype most likely encoded by *SCN9A* ($Na_V1.7$) and *SCN3A* ($Na_V1.3$) (see, Figure 14A-E). Again this implies that for some pain syndromes, simultaneous dual inhibition of Nav1.7 and Nav1.3 can produce the most effective suppression of pain.

[00321] Accordingly, the present invention also relates to the use of one or more of the inventive compositions of matter in the manufacture of a medicament for the

treatment or prevention of a disease, disorder, or other medical condition described herein, for example, but not limited to, chronic pain, acute pain, or persistent pain, or any of the pain syndromes described herein.

[00322] Such pharmaceutical compositions can be configured for administration to a patient by a wide variety of delivery routes, e.g., an intravascular delivery route such as by injection or infusion, subcutaneous ("s.c."), intravenous ("i.v."), intramuscular, intraperitoneal ("i.p."), epidural, or intrathecal delivery routes, or for oral, enteral, pulmonary (e.g., inhalant), intranasal, transmucosal (e.g., sublingual administration), transdermal or other delivery routes and/or forms of administration known in the art. Delivery of a drug or pharmaceutical composition containing GpTx-1, or other compositions of matter of the invention, may take place via standard injectable modalities, whether self-administered or in hospital setting, or also via an implantable delivery pump to achieve the most accurate dosing and the most stable plasma exposure levels. The inventive pharmaceutical compositions may be prepared in liquid form, or may be in dried powder form, such as lyophilized form, or crystalline form. For oral or enteral use, the pharmaceutical compositions can be configured, for example, as tablets, troches, lozenges, aqueous or oily suspensions, dispersible powders or granules, emulsions, hard or soft capsules, syrups, elixirs or enteral formulas.

[00323] Pharmaceutical Compositions

[00324] In General. The present invention also provides pharmaceutical compositions comprising the inventive composition of matter and a pharmaceutically acceptable carrier. Such pharmaceutical compositions can be configured for administration to a patient by a wide variety of delivery routes, e.g., an intravascular delivery route such as by injection or infusion, subcutaneous, intramuscular, intraperitoneal, epidural, or intrathecal delivery routes, or for oral, enteral, pulmonary (e.g., inhalant), intranasal, transmucosal (e.g., sublingual administration), transdermal or other delivery routes and/or forms of administration known in the art. The inventive pharmaceutical compositions may be prepared in liquid form, or may be in dried powder form, such as lyophilized form. For oral or enteral use, the pharmaceutical compositions can be configured, for example, as tablets, troches, lozenges, aqueous or oily suspensions,

dispersible powders or granules, emulsions, hard or soft capsules, syrups, elixirs or enteral formulas.

[00325] In the practice of this invention the "pharmaceutically acceptable carrier" is any physiologically tolerated substance known to those of ordinary skill in the art useful in formulating pharmaceutical compositions, including, any pharmaceutically acceptable diluents, excipients, dispersants, binders, fillers, glidants, anti-frictional agents, compression aids, tablet-disintegrating agents (disintegrants), suspending agents, lubricants, flavorants, odorants, sweeteners, permeation or penetration enhancers, preservatives, surfactants, solubilizers, emulsifiers, thickeners, adjuvants, dyes, coatings, encapsulating material(s), and/or other additives singly or in combination. Such pharmaceutical compositions can include diluents of various buffer content (*e.g.*, Tris-HCl, acetate, phosphate), pH and ionic strength; additives such as detergents and solubilizing agents (*e.g.*, Tween® 80, Polysorbate 80), anti-oxidants (*e.g.*, ascorbic acid, sodium metabisulfite), preservatives (*e.g.*, Thimersol®, benzyl alcohol) and bulking substances (*e.g.*, lactose, mannitol); incorporation of the material into particulate preparations of polymeric compounds such as polylactic acid, polyglycolic acid, etc. or into liposomes. Hyaluronic acid can also be used, and this can have the effect of promoting sustained duration in the circulation. Such compositions can influence the physical state, stability, rate of in vivo release, and rate of in vivo clearance of the present proteins and derivatives. See, e.g., Remington's Pharmaceutical Sciences, 18th Ed. (1990, Mack Publishing Co., Easton, PA 18042) pages 1435-1712, which are herein incorporated by reference in their entirety. The compositions can be prepared in liquid form, or can be in dried powder, such as lyophilized form. Implantable sustained release formulations are also useful, as are transdermal or transmucosal formulations. Additionally (or alternatively), the present invention provides compositions for use in any of the various slow or sustained release formulations or microparticle formulations known to the skilled artisan, for example, sustained release microparticle formulations, which can be administered via pulmonary, intranasal, or subcutaneous delivery routes. (See, e.g., Murthy et al., Injectable compositions for the controlled delivery of pharmacologically active compound, U.S. Patent No.6,887,487; Manning et al., Solubilization of pharmaceutical substances in an

organic solvent and preparation of pharmaceutical powders using the same, U.S. Patent Nos. 5,770,559 and 5,981,474; Lieberman et al., Lipophilic complexes of pharmacologically active inorganic mineral acid esters of organic compounds, U.S. Patent No. 5,002,936; Gen, Formative agent of protein complex, US 2002/0119946 A1; Goldenberg et al., Sustained release formulations, WO 2005/105057 A1).

[00326] One can dilute the inventive compositions or increase the volume of the pharmaceutical compositions of the invention with an inert material. Such diluents can include carbohydrates, especially, mannitol, α-lactose, anhydrous lactose, cellulose, sucrose, modified dextrans and starch. Certain inorganic salts may also be used as fillers, including calcium triphosphate, magnesium carbonate and sodium chloride. Some commercially available diluents are Fast-Flo, Emdex, STA-Rx 1500, Emcompress and Avicell.

[00327] A variety of conventional thickeners are useful in creams, ointments, suppository and gel configurations of the pharmaceutical composition, such as, but not limited to, alginate, xanthan gum, or petrolatum, may also be employed in such configurations of the pharmaceutical composition of the present invention. A permeation or penetration enhancer, such as polyethylene glycol monolaurate, dimethyl sulfoxide, N-vinyl-2-pyrrolidone, N-(2-hydroxyethyl)-pyrrolidone, or 3-hydroxy-N-methyl-2-pyrrolidone can also be employed. Useful techniques for producing hydrogel matrices are known. (E.g., Feijen, Biodegradable hydrogel matrices for the controlled release of pharmacologically active agents, U.S. Patent No. 4,925,677; Shah et al., Biodegradable pH/thermosensitive hydrogels for sustained delivery of biologically active agents, WO 00/38651 A1). Such biodegradable gel matrices can be formed, for example, by crosslinking a proteinaceous component and a polysaccharide or mucopolysaccharide component, then loading with the inventive composition of matter to be delivered.

[00328] Liquid pharmaceutical compositions of the present invention that are sterile solutions or suspensions can be administered to a patient by injection, for example, intramuscularly, intrathecally, epidurally, intravascularly (e.g., intravenously or intraarterially), intraperitoneally or subcutaneously. (See, e.g., Goldenberg et al.,

Suspensions for the sustained release of proteins, U.S. Patent No. 6,245,740 and WO 00/38652 A1). Sterile solutions can also be administered by intravenous infusion. The inventive composition can be included in a sterile solid pharmaceutical composition, such as a lyophilized powder, which can be dissolved or suspended at a convenient time before administration to a patient using sterile water, saline, buffered saline or other appropriate sterile injectable medium.

[00329] Implantable sustained release formulations are also useful embodiments of the inventive pharmaceutical compositions. For example, the pharmaceutically acceptable carrier, being a biodegradable matrix implanted within the body or under the skin of a human or non-human vertebrate, can be a hydrogel similar to those described above. Alternatively, it may be formed from a poly-alpha-amino acid component. (Sidman, Biodegradable, implantable drug delivery device, and process for preparing and using same, U.S. Patent No. 4,351,337). Other techniques for making implants for delivery of drugs are also known and useful in accordance with the present invention.

[00330] In powder forms, the pharmaceutically acceptable carrier is a finely divided solid, which is in admixture with finely divided active ingredient(s), including the inventive composition. For example, in some embodiments, a powder form is useful when the pharmaceutical composition is configured as an inhalant. (See, e.g., Zeng et al., Method of preparing dry powder inhalation compositions, WO 2004/017918; Trunk et al., Salts of the CGRP antagonist BIBN4096 and inhalable powdered medicaments containing them, U.S. Patent No. 6,900,317).

[00331] One can dilute or increase the volume of the compound of the invention with an inert material. These diluents could include carbohydrates, especially mannitol, α-lactose, anhydrous lactose, cellulose, sucrose, modified dextrans and starch. Certain inorganic salts can also be used as fillers including calcium triphosphate, magnesium carbonate and sodium chloride. Some commercially available diluents are Fast-Flo™, Emdex™, STA-Rx™ 1500, Emcompress™ and Avicell™.

[00332] Disintegrants can be included in the formulation of the pharmaceutical composition into a solid dosage form. Materials used as disintegrants include but are not limited to starch including the commercial disintegrant based on starch, Explotab™.

Sodium starch glycolate, Amberlite™, sodium carboxymethylcellulose, ultramylopectin, sodium alginate, gelatin, orange peel, acid carboxymethyl cellulose, natural sponge and bentonite can all be used. Insoluble cationic exchange resin is another form of disintegrant. Powdered gums can be used as disintegrants and as binders and these can include powdered gums such as agar, Karaya or tragacanth. Alginic acid and its sodium salt are also useful as disintegrants.

[00333] Binders can be used to hold the therapeutic agent together to form a hard tablet and include materials from natural products such as acacia, tragacanth, starch and gelatin. Others include methyl cellulose (MC), ethyl cellulose (EC) and carboxymethyl cellulose (CMC). Polyvinyl pyrrolidone (PVP) and hydroxypropylmethyl cellulose (HPMC) could both be used in alcoholic solutions to granulate the therapeutic. An antifrictional agent can be included in the formulation of the therapeutic to prevent sticking during the formulation process. Lubricants can be used as a layer between the therapeutic and the die wall, and these can include but are not limited to; stearic acid including its magnesium and calcium salts, polytetrafluoroethylene (PTFE), liquid paraffin, vegetable oils and waxes. Soluble lubricants can also be used such as sodium lauryl sulfate, magnesium lauryl sulfate, polyethylene glycol of various molecular weights, Carbowax 4000 and 6000.

[00334] Glidants that might improve the flow properties of the drug during formulation and to aid rearrangement during compression might be added. The glidants can include starch, talc, pyrogenic silica and hydrated silicoaluminate.

[00335] To aid dissolution of the compound of this invention into the aqueous environment a surfactant might be added as a wetting agent. Surfactants can include anionic detergents such as sodium lauryl sulfate, dioctyl sodium sulfosuccinate and dioctyl sodium sulfonate. Cationic detergents might be used and could include benzalkonium chloride or benzethonium chloride. The list of potential nonionic detergents that could be included in the formulation as surfactants are lauromacrogol 400, polyoxyl 40 stearate, polyoxyethylene hydrogenated castor oil 10, 50 and 60, glycerol monostearate, polysorbate 40, 60, 65 and 80, sucrose fatty acid ester, methyl

cellulose and carboxymethyl cellulose. These surfactants could be present in the formulation of the protein or derivative either alone or as a mixture in different ratios.

[00336] Oral dosage forms. Also useful are oral dosage forms of the inventive compositionss. If necessary, the composition can be chemically modified so that oral delivery is efficacious. Generally, the chemical modification contemplated is the attachment of at least one moiety to the molecule itself, where said moiety permits (a) inhibition of proteolysis; and (b) uptake into the blood stream from the stomach or intestine. Also desired is the increase in overall stability of the compound and increase in circulation time in the body. Moieties useful as covalently attached half-life extending moieties in this invention can also be used for this purpose. Examples of such moieties include: PEG, copolymers of ethylene glycol and propylene glycol, carboxymethyl cellulose, dextran, polyvinyl alcohol, polyvinyl pyrrolidone and polyproline. See, for example, Abuchowski and Davis (1981), Soluble Polymer-Enzyme Adducts, Enzymes as Drugs (Hocenberg and Roberts, eds.), Wiley-Interscience, New York, NY, pp 367-83; Newmark, et al. (1982), J. Appl. Biochem. 4:185-9. Other polymers that could be used are poly-1,3-dioxolane and poly-1,3,6-tioxocane. Preferred for pharmaceutical usage, as indicated above, are PEG moieties.

[00337] For oral delivery dosage forms, it is also possible to use a salt of a modified aliphatic amino acid, such as sodium N-(8-[2-hydroxybenzoyl] amino) caprylate (SNAC), as a carrier to enhance absorption of the therapeutic compounds of this invention. The clinical efficacy of a heparin formulation using SNAC has been demonstrated in a Phase II trial conducted by Emisphere Technologies. See US Patent No. 5,792,451, "Oral drug delivery composition and methods."

[00338] In one embodiment, the pharmaceutically acceptable carrier can be a liquid and the pharmaceutical composition is prepared in the form of a solution, suspension, emulsion, syrup, elixir or pressurized composition. The active ingredient(s) (e.g., the inventive composition of matter) can be dissolved, diluted or suspended in a pharmaceutically acceptable liquid carrier such as water, an organic solvent, a mixture of both, or pharmaceutically acceptable oils or fats. The liquid carrier can contain other suitable pharmaceutical additives such as detergents and/or solubilizers (e.g., Tween 80,

Polysorbate 80), emulsifiers, buffers at appropriate pH (e.g., Tris-HCl, acetate, phosphate), adjuvants, anti-oxidants (e.g., ascorbic acid, sodium metabisulfite), preservatives (e.g., Thimersol, benzyl alcohol), sweeteners, flavoring agents, suspending agents, thickening agents, bulking substances (e.g., lactose, mannitol), colors, viscosity regulators, stabilizers, electrolytes, osmolutes or osmo-regulators. Additives can also be included in the formulation to enhance uptake of the inventive composition. Additives potentially having this property are for instance the fatty acids oleic acid, linoleic acid and linolenic acid.

[00339] Useful are oral solid dosage forms, which are described generally in Remington's Pharmaceutical Sciences (1990), supra, in Chapter 89, which is hereby incorporated by reference in its entirety. Solid dosage forms include tablets, capsules, pills, troches or lozenges, cachets or pellets. Also, liposomal or proteinoid encapsulation can be used to formulate the present compositions (as, for example, proteinoid microspheres reported in U.S. Patent No. 4,925,673). Liposomal encapsulation can be used and the liposomes can be derivatized with various polymers (e.g., U.S. Patent No. 5,013,556). A description of possible solid dosage forms for the therapeutic is given in Marshall, K., Modern Pharmaceutics (1979), edited by G. S. Banker and C. T. Rhodes, in Chapter 10, which is hereby incorporated by reference in its entirety. In general, the formulation will include the inventive compound, and inert ingredients that allow for protection against the stomach environment, and release of the biologically active material in the intestine.

[00340] The composition of this invention can be included in the formulation as fine multiparticulates in the form of granules or pellets of particle size about 1 mm. The formulation of the material for capsule administration could also be as a powder, lightly compressed plugs or even as tablets. The therapeutic could be prepared by compression.

[00341] Colorants and flavoring agents can all be included. For example, the protein (or derivative) can be formulated (such as by liposome or microsphere encapsulation) and then further contained within an edible product, such as a refrigerated beverage containing colorants and flavoring agents.

[00342] In tablet form, the active ingredient(s) are mixed with a pharmaceutically acceptable carrier having the necessary compression properties in suitable proportions and compacted in the shape and size desired.

[00343] The powders and tablets preferably contain up to 99% of the active ingredient(s). Suitable solid carriers include, for example, calcium phosphate, magnesium stearate, talc, sugars, lactose, dextrin, starch, gelatin, cellulose, polyvinylpyrrolidine, low melting waxes and ion exchange resins.

[00344] Controlled release formulation can be desirable. The composition of this invention can be incorporated into an inert matrix that permits release by either diffusion or leaching mechanisms e.g., gums. Slowly degenerating matrices can also be incorporated into the formulation, e.g., alginates, polysaccharides. Another form of a controlled release of the compositions of this invention is by a method based on the Oros™ therapeutic system (Alza Corp.), i.e., the drug is enclosed in a semipermeable membrane which allows water to enter and push drug out through a single small opening due to osmotic effects. Some enteric coatings also have a delayed release effect.

[00345] Other coatings can be used for the formulation. These include a variety of sugars that could be applied in a coating pan. The therapeutic agent could also be given in a film-coated tablet and the materials used in this instance are divided into 2 groups. The first are the nonenteric materials and include methylcellulose, ethyl cellulose, hydroxyethyl cellulose, methylhydroxy-ethyl cellulose, hydroxypropyl cellulose, hydroxypropyl-methyl cellulose, sodium carboxymethyl cellulose, providone and the polyethylene glycols. The second group consists of the enteric materials that are commonly esters of phthalic acid.

[00346] A mix of materials might be used to provide the optimum film coating. Film coating can be carried out in a pan coater or in a fluidized bed or by compression coating.

[00347] Pulmonary delivery forms. Pulmonary delivery of the inventive compositions is also useful. The protein (or derivative) is delivered to the lungs of a

mammal while inhaling and traverses across the lung epithelial lining to the blood stream. (Other reports of this include Adjei et al., Pharma. Res. (1990) 7: 565-9; Adjei et al. (1990), Internatl. J. Pharmaceutics 63: 135-44 (leuprolide acetate); Braquet et al. (1989), J. Cardiovasc. Pharmacol. 13 (suppl.5): s.143-146 (endothelin-1); Hubbard et al. (1989), Annals Int. Med. 3: 206-12 (α1-antitrypsin); Smith et al. (1989), J. Clin. Invest. 84: 1145-6 (α1-proteinase); Oswein et al. (March 1990), "Aerosolization of Proteins," Proc. Symp. Resp. Drug Delivery II, Keystone, Colorado (recombinant human growth hormone); Debs et al. (1988), J. Immunol. 140: 3482-8 (interferon-γ and tumor necrosis factor α) and Platz et al., U.S. Patent No. 5,284,656 (granulocyte colony stimulating factor).

[00348] Useful in the practice of this invention are a wide range of mechanical devices designed for pulmonary delivery of therapeutic products, including but not limited to nebulizers, metered dose inhalers, and powder inhalers, all of which are familiar to those skilled in the art. Some specific examples of commercially available devices suitable for the practice of this invention are the Ultravent nebulizer, manufactured by Mallinckrodt, Inc., St. Louis, Missouri; the Acorn II nebulizer, manufactured by Marquest Medical Products, Englewood, Colorado; the Ventolin metered dose inhaler, manufactured by Glaxo Inc., Research Triangle Park, North Carolina; and the Spinhaler powder inhaler, manufactured by Fisons Corp., Bedford, Massachusetts. (See, e.g., Helgesson et al., Inhalation device, U.S. Patent No. 6,892,728; McDerment et al., Dry powder inhaler, WO 02/11801 A1; Ohki et al., Inhalant medicator, U.S. Patent No. 6,273,086). All such devices require the use of formulations suitable for the dispensing of the inventive compound. Typically, each formulation is specific to the type of device employed and can involve the use of an appropriate propellant material, in addition to diluents, adjuvants and/or carriers useful in therapy.

[00349] The inventive compound should most advantageously be prepared in particulate form with an average particle size of less than 10 μm (or microns), most preferably 0.5 to 5 μm, for most effective delivery to the distal lung.

[00350] Pharmaceutically acceptable excipients include carbohydrates such as trehalose, mannitol, xylitol, sucrose, lactose, and sorbitol. Other ingredients for use in formulations can include DPPC, DOPE, DSPC and DOPC. Natural or synthetic surfactants can be used. PEG can be used (even apart from its use in derivatizing the protein or analog). Dextrans, such as cyclodextran, can be used. Bile salts and other related enhancers can be used. Cellulose and cellulose derivatives can be used. Amino acids can be used, such as use in a buffer formulation.

[00351] Also, the use of liposomes, microcapsules or microspheres, inclusion complexes, or other types of carriers is contemplated.

[00352] Formulations suitable for use with a nebulizer, either jet or ultrasonic, will typically comprise the inventive compound dissolved in water at a concentration of about 0.1 to 25 mg of biologically active protein per mL of solution. The formulation can also include a buffer and a simple sugar (e.g., for protein stabilization and regulation of osmotic pressure). The nebulizer formulation can also contain a surfactant, to reduce or prevent surface induced aggregation of the protein caused by atomization of the solution in forming the aerosol.

[00353] Formulations for use with a metered-dose inhaler device will generally comprise a finely divided powder containing the inventive compound suspended in a propellant with the aid of a surfactant. The propellant can be any conventional material employed for this purpose, such as a chlorofluorocarbon, a hydrochlorofluorocarbon, a hydrofluorocarbon, or a hydrocarbon, including trichlorofluoromethane, dichlorodifluoromethane, dichlorotetrafluoroethanol, and 1,1,1,2-tetrafluoroethane, or combinations thereof. Suitable surfactants include sorbitan trioleate and soya lecithin. Oleic acid can also be useful as a surfactant. (See, e.g., Bäckström et al., Aerosol drug formulations containing hydrofluoroalkanes and alkyl saccharides, U.S. Patent No. 6,932,962).

[00354] Formulations for dispensing from a powder inhaler device will comprise a finely divided dry powder containing the inventive compound and can also include a bulking agent, such as lactose, sorbitol, sucrose, mannitol, trehalose, or xylitol in

amounts which facilitate dispersal of the powder from the device, e.g., 50 to 90% by weight of the formulation.

[00355] Nasal delivery forms. In accordance with the present invention, intranasal delivery of the inventive composition of matter and/or pharmaceutical compositions is also useful, which allows passage thereof to the blood stream directly after administration to the inside of the nose, without the necessity for deposition of the product in the lung. Formulations suitable for intransal administration include those with dextran or cyclodextran, and intranasal delivery devices are known. (See, e.g, Freezer, Inhaler, U.S. Patent No. 4,083,368).

[00356] Transdermal and transmucosal (e.g., buccal) delivery forms). In some embodiments, the inventive composition is configured as a part of a pharmaceutically acceptable transdermal or transmucosal patch or a troche. Transdermal patch drug delivery systems, for example, matrix type transdermal patches, are known and useful for practicing some embodiments of the present pharmaceutical compositions. (E.g., Chien et al., Transdermal estrogen/progestin dosage unit, system and process, U.S. Patent Nos. 4,906,169 and 5,023,084; Cleary et al., Diffusion matrix for transdermal drug administration and transdermal drug delivery devices including same, U.S. Patent No. 4,911,916; Teillaud et al., EVA-based transdermal matrix system for the administration of an estrogen and/or a progestogen, U.S. Patent No. 5.605,702; Venkateshwaran et al., Transdermal drug delivery matrix for coadministering estradiol and another steroid, U.S. Patent No. 5,783,208; Ebert et al., Methods for providing testosterone and optionally estrogen replacement therapy to women, U.S. Patent No. 5,460,820). A variety of pharmaceutically acceptable systems for transmucosal delivery of therapeutic agents are also known in the art and are compatible with the practice of the present invention. (E.g., Heiber et al., Transmucosal delivery of macromolecular drugs, U.S. Patent Nos. 5,346,701 and 5,516,523; Longenecker et al., Transmembrane formulations for drug administration, U.S. Patent No. 4,994,439).

[00357] Buccal delivery of the inventive compositions is also useful. Buccal delivery formulations are known in the art for use with peptides. For example, known tablet or patch systems configured for drug delivery through the oral mucosa (e.g., sublingual

mucosa), include some embodiments that comprise an inner layer containing the drug, a permeation enhancer, such as a bile salt or fusidate, and a hydrophilic polymer, such as hydroxypropyl cellulose, hydroxypropyl methylcellulose, hydroxyethyl cellulose, dextran, pectin, polyvinyl pyrrolidone, starch, gelatin, or any number of other polymers known to be useful for this purpose. This inner layer can have one surface adapted to contact and adhere to the moist mucosal tissue of the oral cavity and can have an opposing surface adhering to an overlying non-adhesive inert layer. Optionally, such a transmucosal delivery system can be in the form of a bilayer tablet, in which the inner layer also contains additional binding agents, flavoring agents, or fillers. Some useful systems employ a non-ionic detergent along with a permeation enhancer. Transmucosal delivery devices may be in free form, such as a cream, gel, or ointment, or may comprise a determinate form such as a tablet, patch or troche. For example, delivery of the inventive composition can be via a transmucosal delivery system comprising a laminated composite of, for example, an adhesive layer, a backing layer, a permeable membrane defining a reservoir containing the inventive composition, a peel seal disc underlying the membrane, one or more heat seals, and a removable release liner. (E.g., Ebert et al., Transdermal delivery system with adhesive overlay and peel seal disc, U.S. Patent No. 5,662,925; Chang et al., Device for administering an active agent to the skin or mucosa, U.S. Patent Nos. 4,849,224 and 4,983,395). These examples are merely illustrative of available transmucosal drug delivery technology and are not limiting of the present invention.

[00358] Dosages. The dosage regimen involved in a method for treating the above-described conditions will be determined by the attending physician, considering various factors which modify the action of drugs, e.g. the age, condition, body weight, sex and diet of the patient, the severity of any infection, time of administration and other clinical factors. Generally, the daily regimen should be in the range of 0.1-1000 micrograms of the inventive compound per kilogram of body weight, preferably 0.1-150 micrograms per kilogram.

[00359] By way of further illustration, the following numbered embodiments are encompassed by the present invention:

[00360] 1. A composition of matter comprising an isolated polypeptide comprising the amino acid sequence of the formula:

$X_{aa}^{1}X_{aa}^{2}\ X_{aa}^{3}X_{aa}^{4}X_{aa}^{5}X_{aa}^{6}X_{aa}^{7}X_{aa}^{8}X_{aa}^{9}X_{aa}^{10}X_{aa}^{11}X_{aa}^{12}X_{aa}^{13}X_{aa}^{14}Asp^{15}$
$X_{aa}^{16}\ X_{aa}^{17}$
$X_{aa}^{18}X_{aa}^{19}\ X_{aa}^{20}\ X_{aa}^{21}X_{aa}^{22}X_{aa}^{23}\ X_{aa}^{24}X_{aa}^{25}\ X_{aa}^{26}X_{aa}^{27}X_{aa}^{28}X_{aa}^{29}X_{aa}^{30}$
$X_{aa}^{31}Lys^{32}X_{aa}^{33}X_{aa}^{34}X_{aa}^{35}\ X_{aa}^{36}X_{aa}^{37}X_{aa}^{38}$//SEQ ID NO:475

or a pharmaceutically acceptable salt thereof,

wherein:

$X_{aa}^{1}X_{aa}^{2}$ is absent; or X_{aa}^{1} is any amino acid residue and X_{aa}^{2} is any amino acid residue; or X_{aa}^{1} is absent and X_{aa}^{2} is any amino acid residue;

X_{aa}^{3} is Cys, if X_{aa}^{18} is Cys; or X_{aa}^{3} is SeCys, if X_{aa}^{18} is SeCys; or X_{aa}^{3} is an alkyl amino acid residue, if X_{aa}^{18} is an alkyl amino acid residue;

X_{aa}^{4} is an acidic, hydrophobic, basic, or neutral hydrophilic amino acid residue;

X_{aa}^{5} is a Gly, Ala, hydrophobic, or basic amino acid residue;

X_{aa}^{6} is a Gly, Ala, 2-Abu, Nle, Nva, or hydrophobic amino acid residue;

X_{aa}^{7} is a Gly, Ala, aromatic, or hydrophobic amino acid residue;

X_{aa}^{8} is a basic, acidic, or neutral hydrophilic amino acid residue, or an Ala residue;

X_{aa}^{9} is a basic or neutral hydrophilic amino acid residue;

X_{aa}^{10} is Cys if X_{aa}^{24} is Cys; or X_{aa}^{10} is SeCys if X_{aa}^{24} is SeCys;

X_{aa}^{11} is any amino acid residue;

X_{aa}^{12} is a Pro, acidic, neutral, or hydrophobic amino acid residue;

X_{aa}^{13} is any amino acid residue;

X_{aa}^{14} is any amino acid residue;

X_{aa}^{16} is a basic, neutral hydrophilic, or acidic amino acid residue, or an Ala residue;

X_{aa}^{17} is a Cys if X_{aa}^{31} is Cys; or X_{aa}^{17} is a SeCys if X_{aa}^{31} is SeCys;

X_{aa}^{18} is a Cys, SeCys, or an alkyl amino acid residue;

X_{aa}^{19} is any amino acid residue;

X_{aa}^{20} is a Pro, Gly, basic, or neutral hydrophilic residue;

X_{aa}^{21} is a basic, hydrophobic, or neutral hydrophilic amino acid residue;

X_{aa}^{22} is a hydrophobic or basic amino acid residue;

X_{aa}^{23} is a hydrophobic, basic, or neutral hydrophilic amino acid residue;

X_{aa}^{24} is a Cys or SeCys residue;

X_{aa}^{25} is a Ser, Ala, or a neutral hydrophilic amino acid residue;

X_{aa}^{26} is an Ala, acidic, basic, or neutral hydrophilic amino acid residue;

X_{aa}^{27} is an acidic, basic, neutral hydrophilic or hydrophobic residue;

X_{aa}^{28} is an aromatic or basic amino acid residue;

X_{aa}^{29} is an acidic, basic, or neutral hydrophilic amino acid residue;

X_{aa}^{30} is a Trp, 5-bromoTrp, 6-bromoTrp, 5-chloroTrp, 6-chloroTrp, 1-Nal, 2-Nal, or thioTrp residue;

X_{aa}^{31} is a Cys or SeCys;

X_{aa}^{33} is a hydrophobic or aromatic amino acid residue;

X_{aa}^{34} is any amino acid residue;

X_{aa}^{35} is a hydrophobic amino acid residue;

each of X_{aa}^{36} , X_{aa}^{37} , and X_{aa}^{38} is independently absent or is independently a neutral, basic, or hydrophobic amino acid residue;

and wherein:

if X_{aa}^{3} and X_{aa}^{18} are both Cys residues, there is a disulfide bond between residue X_{aa}^{3} and residue X_{aa}^{18}; or if X_{aa}^{3} and X_{aa}^{18} are both SeCys residues, there is a diselenide bond between residue X_{aa}^{3} and residue X_{aa}^{18};

if X_{aa}^{10} and X_{aa}^{24} are both Cys residues, there is a disulfide bond between residue X_{aa}^{10} and residue X_{aa}^{24}; or if X_{aa}^{10} and X_{aa}^{24} are both SeCys residues, there is a diselenide bond between residue X_{aa}^{10} and residue X_{aa}^{24};

if X_{aa}^{17} and X_{aa}^{31} are both Cys residues, there is a disulfide bond between residue X_{aa}^{17} and residue X_{aa}^{31}; or if X_{aa}^{17} and X_{aa}^{31} are both SeCys residues, there is a diselenide bond between residue X_{aa}^{17} and residue X_{aa}^{31};

the amino-terminal residue is optionally acetylated, biotinylated, or 4-pentynoylated, or PEGylated; and

the carboxy-terminal residue is optionally amidated.

[00361] 2. The composition of matter of Embodiment 1 wherein X_{aa}^{4} is selected from Ala, Glu, Asp, Phe, Pro, Ile, Leu, Met, Val, Trp, Tyr, Arg, Lys, His,

homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, cyclohexylglycine (Chg), cyclohexylalanine (Cha), glycine, norleucine, norvaline, 1-Nal, 2-Nal, 4-phenyl-phenylalanine (Bip), Gln, Asn, Ser, Thr, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, and Cit residues.

[00362] 3. The composition of matter of Embodiments 1-2, wherein X_{aa}^5 is selected from Ala, Phe, Ile, Leu, Met, Val, Trp, Tyr, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, glycine, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues.

[00363] 4. The composition of matter of Embodiments 1-3, wherein X_{aa}^6 is selected from Ala, Gly, 2-Abu, Phe, Ile, Leu, Met, Val, Trp, Tyr, proline, thiaproline, methionine, glycine, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclopentylglycine (Cpg), phenylglycine, N-methylleucine, N-methylphenylalanine, N-methylvaline, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 2-chloro-phenylalanine, 4-chloro-phenylalanine, 3,4-dichlorophenylalanine, 4-trifluoromethyl-phenylalanine, and 4-phenyl-phenylalanine (Bip) residues.

[00364] 5. The composition of matter of Embodiments 1-4, wherein X_{aa}^7 is selected from Gly, Ala, Phe, Ile, Leu, Met, Val, Trp, Tyr, norleucine, norvaline, Pro, 2-pyridinylalanine, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 2-chloro-phenylalanine, 4-chloro-phenylalanine, 3,4-dichlorophenylalanine, 4-trifluoromethyl-phenylalanine, and 4-phenyl-phenylalanine (Bip) residues.

[00365] 6. The composition of matter of Embodiments 1-5, wherein X_{aa}^8 is selected from Ala, Arg, Lys, His, homolysine, ornithine, N-methyl-arginine, ω-

aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, Ser, Thr, Asn, Gln, Cit, Asp, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, and Glu residues.

[00366] 7. The composition of matter of Embodiments 1-6, wherein X_{aa}^{9} is selected from Ala, Pro, Met, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, Gln, Asn, Ser, Thr, and Cit residues.

[00367] 8. The composition of matter of Embodiments 1-7, wherein X_{aa}^{11} is selected from Ala, Asp, Glu, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, Pra, Atz, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues.

[00368] 9. The composition of matter of Embodiments 1-8, wherein X_{aa}^{12} is selected from alanine, valine, leucine, isoleucine, proline, serine, threonine, aspartic acid, glutamatic acid, glycine, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, Cha, and 4-phenyl-phenylalanine (Bip), cyclohexylglycine (Chg), cyclohexylalanine (Cha), asparagine, glutamine, methionine, hydroxyproline, phenylalanine, tryptophan, and tyrosine.

[00369] 10. The composition of matter of Embodiments 1-9, wherein X_{aa}^{13} is selected from Ala, Asp, Glu, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, Pra, Atz, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine,

homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues.

[00370] 11. The composition of matter of Embodiments 1-10, wherein X_{aa}^{14} is selected from Ala, Asp, Glu, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, Pra, Atz, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues.

[00371] 12. The composition of matter of Embodiments 1-11, wherein X_{aa}^{16} is selected from Ala, Pro, Met, Arg, Lys, His, Pra, Atz, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, Gln, Asn, Ser, Thr, Cit, Asp, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, and Glu residues.

[00372] 13. The composition of matter of Embodiments 1-12, wherein X_{aa}^{19} is selected from Ala, Asp, Glu, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues.

[00373] 14. The composition of matter of Embodiments 1-13, wherein X_{aa}^{20} is selected from Ala, Gly, Pro, Met, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-

histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, Gln, Asn, Ser, Thr, and Cit residues.

[00374] 15. The composition of matter of Embodiments 1-14, wherein X_{aa}^{21} is selected from Ala, Phe, Pro, Ile, Leu, Met, Val, Trp, Tyr, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, cyclohexylglycine (Chg), cyclohexylalanine (Cha), glycine, norleucine, norvaline, 1-Nal, 2-Nal, 4-phenyl-phenylalanine (Bip), Gln, Asn, Ser, Thr, and Cit residues.

[00375] 16. The composition of matter of Embodiments 1-15, wherein X_{aa}^{22} is selected from Ala, Phe, Ile, Leu, Met, Val, Trp, Tyr, Arg, Lys, His, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, glycine, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues.

[00376] 17. The composition of matter of Embodiments 1-16, wherein X_{aa}^{23} is selected from Ala, Phe, Pro, Ile, Leu, Met, Val, Trp, Tyr, Arg, Lys, His, Pra, Atz, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, cyclohexylglycine (Chg), cyclohexylalanine (Cha), glycine, norleucine, norvaline, 1-Nal, 2-Nal, 4-phenyl-phenylalanine (Bip), Gln, Asn, Ser, Thr, and Cit residues.

[00377] 18. The composition of matter of Embodiments 1-17, wherein X_{aa}^{25} is selected from Ala, Gly Pro, Met, Gln, Asn, Ser, Thr, and Cit residues.

[00378] 19. The composition of matter of Embodiments 1-18, wherein X_{aa}^{26} is selected from Ala, Pro, Met, Arg, Lys, His, homolysine, ornithine, N-methyl-

arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, glycine, Glu, Asp, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, Gln, Asn, Ser, Thr, and Cit residues.

[00379] 20. The composition of matter of Embodiments 1-19, wherein X_{aa}^{27} is selected from Thr, Leu, Ile, Val, Ser, Met, Gln, Asn, Phe, Tyr, Trp, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 4-phenyl-phenylalanine (Bip), Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, Asp, Glu, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, and Gly residues.

[00380] 21. The composition of matter of Embodiments 1-20, wherein X_{aa}^{28} is selected from Phe, Trp, Tyr, Arg, Lys, His, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, 1-Nal, 2-Nal, 2-pyridyl-alanine, 3-pyridyl-alanine, 4-pyridyl-alanine, 4-piperidinyl-alanine, and 4-phenyl-phenylalanine (Bip) residues.

[00381] 22. The composition of matter of Embodiments 1-21, wherein X_{aa}^{29} is selected from Ala, Asp, Glu, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, Phe, Gly, His, Lys, Asn, Pro, Gln, Arg, Ser, Thr, Tyr, Pra, Atz, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, and Dab residues.

[00382] 23. The composition of matter of Embodiments 1-22, wherein X_{aa}^{33} is selected from Phe, Ile, Leu, Met, Val, Trp, Tyr, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 2-chloro-

phenylalanine, 4-chloro-phenylalanine, 3,4-dichlorophenylalanine, 4-trifluoromethyl-phenylalanine, 2-pyridyl-alanine, 3-pyridyl-alanine, 4-pyridyl-alanine, 4-piperidinyl-alanine, and 4-phenyl-phenylalanine (Bip) residues.

[00383] 24. The composition of matter of Embodiments 1-23, wherein X_{aa}^{34} is selected from Ala, Asp, Glu, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, Pra, Atz, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 2-chloro-phenylalanine, 4-chloro-phenylalanine, 3,4-dichlorophenylalanine, 4-trifluoromethyl-phenylalanine, 2-pyridyl-alanine, 3-pyridyl-alanine, 4-carboxy-phenylalanine, and 4-phenyl-phenylalanine (Bip) residues.

[00384] 25. The composition of matter of Embodiments 1-24, wherein X_{aa}^{35} is selected from Phe, Ile, Leu, Met, Val, Trp, Tyr, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 2-chloro-phenylalanine, 4-chloro-phenylalanine, 3,4-dichlorophenylalanine, 4-trifluoromethyl-phenylalanine, and 4-phenyl-phenylalanine (Bip) residues.

[00385] 26. The composition of matter of Embodiments 1-25, wherein each of X_{aa}^{36}, X_{aa}^{37}, and X_{aa}^{38} is independently absent or is independently selected from Ala, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues.

[00386] 27. The composition of matter of Embodiments 1-26, wherein $X_{aa}^{3}$and X_{aa}^{18} are alkyl residues.

[00387] 28. The composition of matter of Embodiment 27, wherein $X_{aa}^{3}$and X_{aa}^{18} are, independently, Ala or 2-Abu residues.

[00388] 29. The composition of matter of Embodiments 1-28, wherein the carboxy-terminal residue is amidated.

[00389] 30. The composition of matter of Embodiments 1-29, wherein the isolated polypeptide comprises the amino acid sequence of the formula:

$X_{aa}^{1}X_{aa}^{2}$ $Cys^{3}X_{aa}^{4}$ $X_{aa}^{5}Ala^{6}$ $X_{aa}^{7}X_{aa}^{8}X_{aa}^{9}Cys^{10}X_{aa}^{11}X_{aa}^{12}X_{aa}^{13}X_{aa}^{14}Asp^{15}$
X_{aa}^{16} $Cys^{17}Cys^{18}X_{aa}^{19}$ X_{aa}^{20} $X_{aa}^{21}X_{aa}^{22}X_{aa}^{23}$ $Cys^{24}X_{aa}^{25}$
$X_{aa}^{26}X_{aa}^{27}X_{aa}^{28}X_{aa}^{29}X_{aa}^{30}$
$Cys^{31}Lys^{32}X_{aa}^{33}X_{aa}^{34}X_{aa}^{35}$ $X_{aa}^{36}X_{aa}^{37}X_{aa}^{38}$// SEQ ID NO:476.

[00390] 31. The composition of matter of Embodiments 1-29, wherein X_{aa}^{6} is Ala.

[00391] 32. The composition of matter of Embodiment 31, wherein X_{aa}^{27} is Glu.

[00392] 33. The composition of matter of Embodiments 31-32, wherein X_{aa}^{29} is Asp, Glu, or Gln.

[00393] 34. The composition of matter of Embodiment 31, comprising an amino acid sequence selected from SEQ ID NOS: 22, 252-263, 419-439, 518-521, 524, 525, 562-580, 602, 691, 692, 696-703, 715, 721-735, 737-749, 756, 757, 761, 762, 764-

771, 787-796, 798, 800, 802, 803, 809-812, 1028, 1030-1040, 1043-1047, 1062-1065, and 1068-1070.

[00394] 35. The composition of matter of Embodiment 31, comprising an amino acid sequence selected from SEQ ID NOS: 1082, 1096, 1110, 1124, 1135, 1146, 1157, 1165, 1173, 1181, 1192, 1203, 1214, 1222, 1230, 1238, 1249, 1260, 1271, 1279, 1287, 1295, 1306, 1317, 1328, 1336, 1344, 1352, 1360, 1368, 1376, 1384, 1392, 1400, 1408, 1416, 1424, 1432, 1440, 1448, 1456, 1464, 1472, 1480, 1488, 1496, 1504, 1512, 1520, 1528, 1536, 1544, 1552, 1560, 1568, 1576, 1584, 1592, 1600, 1608, 1616, 1624, 1632, 1640, 1658, 1672, 1686, 1700, 1711, 1722, 1733, 1741, 1749, 1757, 1768, 1779, 1790, 1798, 1806, 1814, 1825, 1836, 1847, 1855, 1863, 1871, 1882, 1893, 1904, 1912, 1920, 1928, 1936, 1944, 1952, 1960, 1968, 1976, 1984, 1992, 2000, 2008, 2016, 2024, 2032, 2040, 2048, 2056, 2064, 2072, 2080, 2088, 2096, 2104, 2112, 2120, 2128, 2136, 2144, 2152, 2160, 2168, 2176, 2184, 2192, 2200, 2208, 2216, 2234, 2248, 2262, 2276, 2287, 2298, 2309, 2317, 2325, 2333, 2344, 2355, 2366, 2374, 2382, 2390, 2401, 2412, 2423, 2431, 2439, 2447, 2458, 2469, 2480, 2488, 2496, 2504, 2512, 2520, 2528, 2536, 2544, 2552, 2560, 2568, 2576, 2584, 2592, 2600, 2608, 2616, 2624, 2632, 2640, 2648, 2656, 2664, 2672, 2680, 2688, 2696, 2704, 2712, 2720, 2728, 2736, 2744, 2752, 2760, 2768, 2776, 2784, 2792, 2808, 2822, 2833, 2844, 2855, 2863, 2871, 2879, 2890, 2901, 2912, 2920, 2928, 2936, 2944, 2952, 2960, 2968, 2976, 2984, 2992, 3000, 3008, 3016, 3024, 3032, 3040, 3048, 3056, 3064, 3072, and 3080.

[00395] 36. The composition of matter of Embodiment 31, comprising an amino acid sequence selected from SEQ ID NOS: 597-601 and 813-1027.

[00396] 37. The composition of matter of Embodiments 1-29, wherein X_{aa}^{6} is Gly.

[00397] 38. The composition of matter of Embodiment 37, wherein X_{aa}^{27} is Glu.

[00398] 39. The composition of matter of Embodiments 37-38, wherein X_{aa}^{29} is Asp, Glu, or Gln.

[00399] 40. The composition of matter of Embodiment 37, comprising an amino acid sequence selected from SEQ ID NOS: 265, 751, 752, 754, 755, 1081, 1095, 1109, 1123, 1134, 1145, 1156, 1164, 1172, 1180, 1191, 1202, 1213, 1221, 1229, 1237, 1248, 1259, 1270, 1278, 1286, 1294, 1305, 1316, 1327, 1335, 1343, 1351, 1359, 1367, 1375, 1383, 1391, 1399, 1407, 1415, 1423, 1431, 1439, 1447, 1455, 1463, 1471, 1479, 1487, 1495, 1503, 1511, 1519, 1527, 1535, 1543, 1551, 1559, 1567, 1575, 1583, 1591, 1599, 1607, 1615, 1623, 1631, 1639, 1657, 1671, 1685, 1699, 1710, 1721, 1732, 1740, 1748, 1756, 1767, 1778, 1789, 1797, 1805, 1813, 1824, 1835, 1846, 1854, 1862, 1870, 1881, 1892, 1903, 1911, 1919, 1927, 1935, 1943, 1951, 1959, 1967, 1975, 1983, 1991, 1999, 2007, 2015, 2023, 2031, 2039, 2047, 2055, 2063, 2071, 2079, 2087, 2095, 2103, 2111, 2119, 2127, 2135, 2143, 2151, 2159, 2167, 2175, 2183, 2191, 2199, 2207, 2215, 2233, 2247, 2261, 2275, 2286, 2297, 2308, 2316, 2324, 2332, 2343, 2354, 2365, 2373, 2381, 2389, 2400, 2411, 2422, 2430, 2438, 2446, 2457, 2468, 2479, 2487, 2495, 2503, 2511, 2519, 2527, 2535, 2543, 2551, 2559, 2567, 2575, 2583, 2591, 2599, 2607, 2615, 2623, 2631, 2639, 2647, 2655, 2663, 2671, 2679, 2687, 2695, 2703, 2711, 2719, 2727, 2735, 2743, 2751, 2759, 2767, 2775, 2783, 2791, 2807, 2821, 2832, 2843, 2854, 2862, 2870, 2878, 2889, 2900, 2911, 2919, 2927, 2935, 2943, 2951, 2959, 2967, 2975, 2983, 2991, 2999, 3007, 3015, 3023, 3031, 3039, 3047, 3055, 3063, 3071, and 3079.

[00400] 41. The composition of matter of Embodiments 1-29, wherein X_{aa}^{6} is 2-Abu.

[00401] 42. The composition of matter of Embodiment 41, wherein X_{aa}^{27} is Glu.

[00402] 43. The composition of matter of Embodiments 41-42, wherein X_{aa}^{29} is Asp, Glu, or Gln.

[00403] 44. The composition of matter of Embodiment 41, comprising an amino acid sequence selected from SEQ ID NOS: 605, 636, 649, 706, 707, 718, 753, 758, 797, 799, 801, 804, 807, 808, 1029, 1041, 1042, 1048, 1066, 1067, 1083, 1097, 1111, 1125, 1136, 1147, 1158, 1166, 1174, 1182, 1193, 1204, 1215, 1223, 1231, 1239, 1250, 1261, 1272, 1280, 1288, 1296, 1307, 1318, 1329, 1337, 1345, 1353, 1361, 1369, 1377, 1385, 1393, 1401, 1409, 1417, 1425, 1433, 1441, 1449, 1457, 1465, 1473, 1481, 1489, 1497, 1505, 1513, 1521, 1529, 1537, 1545, 1553, 1561, 1569, 1577, 1585, 1593, 1601, 1609, 1617, 1625, 1633, 1641, 1659, 1673, 1687, 1701, 1712, 1723, 1734, 1742, 1750, 1758, 1769, 1780, 1791, 1799, 1807, 1815, 1826, 1837, 1848, 1856, 1864, 1872, 1883, 1894, 1905, 1913, 1921, 1929, 1937, 1945, 1953, 1961, 1969, 1977, 1985, 1993, 2001, 2009, 2017, 2025, 2033, 2041, 2049, 2057, 2065, 2073, 2081, 2089, 2097, 2105, 2113, 2121, 2129, 2137, 2145, 2153, 2161, 2169, 2177, 2185, 2193, 2201, 2209, 2217, 2235, 2249, 2263, 2277, 2288, 2299, 2310, 2318, 2326, 2334, 2345, 2356, 2367, 2375, 2383, 2391, 2402, 2413, 2424, 2432, 2440, 2448, 2459, 2470, 2481, 2489, 2497, 2505, 2513, 2521, 2529, 2537, 2545, 2553, 2561, 2569, 2577, 2585, 2593, 2601, 2609, 2617, 2625, 2633, 2641, 2649, 2657, 2665, 2673, 2681, 2689, 2697, 2705, 2713, 2721, 2729, 2737, 2745, 2753, 2761, 2769, 2777, 2785, 2793, 2809, 2823, 2834, 2845, 2856, 2864, 2872, 2880, 2891, 2902, 2913, 2921, 2929, 2937, 2945, 2953, 2961, 2969, 2977, 2985, 2993, 3001, 3009, 3017, 3025, 3033, 3041, 3049, 3057, 3065, 3073, and 3081.

[00404] 45. The composition of matter of Embodiments 1-29, wherein X_{aa}^{6} is Nle.

[00405] 46. The composition of matter of Embodiment 45, wherein X_{aa}^{27} is Glu.

[00406] 47. The composition of matter of Embodiments 45-46, wherein X_{aa}^{29} is Asp, Glu, or Gln.

[00407] 48. The composition of matter of Embodiment 45, comprising an amino acid sequence selected from SEQ ID NOS: 607, 638, 651, 1085, 1099, 1113, 1127, 1138, 1149, 1160, 1168, 1176, 1184, 1195, 1206, 1217, 1225, 1233, 1241, 1252, 1263, 1274, 1282, 1290, 1298, 1309, 1320, 1331, 1339, 1347, 1355, 1363, 1371, 1379, 1387, 1395, 1403, 1411, 1419, 1427, 1435, 1443, 1451, 1459, 1467, 1475, 1483, 1491, 1499, 1507, 1515, 1523, 1531, 1539, 1547, 1555, 1563, 1571, 1579, 1587, 1595, 1603, 1611, 1619, 1627, 1635, 1643, 1661, 1675, 1689, 1703, 1714, 1725, 1736, 1744, 1752, 1760, 1771, 1782, 1793, 1801, 1809, 1817, 1828, 1839, 1850, 1858, 1866, 1874, 1885, 1896, 1907, 1915, 1923, 1931, 1939, 1947, 1955, 1963, 1971, 1979, 1987, 1995, 2003, 2011, 2019, 2027, 2035, 2043, 2051, 2059, 2067, 2075, 2083, 2091, 2099, 2107, 2115, 2123, 2131, 2139, 2147, 2155, 2163, 2171, 2179, 2187, 2195, 2203, 2211, 2219, 2237, 2251, 2265, 2279, 2290, 2301, 2312, 2320, 2328, 2336, 2347, 2358, 2369, 2377, 2385, 2393, 2404, 2415, 2426, 2434, 2442, 2450, 2461, 2472, 2483, 2491, 2499, 2507, 2515, 2523, 2531, 2539, 2547, 2555, 2563, 2571, 2579, 2587, 2595, 2603, 2611, 2619, 2627, 2635, 2643, 2651, 2659, 2667, 2675, 2683, 2691, 2699, 2707, 2715, 2723, 2731, 2739, 2747, 2755, 2763, 2771, 2779, 2787, 2795, 2811, 2825, 2836, 2847, 2858, 2866, 2874, 2882, 2893, 2904, 2915, 2923, 2931, 2939, 2947, 2955, 2963, 2971, 2979, 2987, 2995, 3003, 3011, 3019, 3027, 3035, 3043, 3051, 3059, 3067, 3075, and 3083.

[00408] 49. The composition of matter of Embodiments 1-29, wherein X_{aa}^{6} is Nva.

[00409] 50. The composition of matter of Embodiment 49, wherein X_{aa}^{27} is Glu.

[00410] 51. The composition of matter of Embodiments 49-50, wherein X_{aa}^{29} is Asp, Glu, or Gln.

[00411] 52. The composition of matter of Embodiment 49, comprising an amino acid sequence selected from SEQ ID NOS: 606, 637, 650, 705, 708, 717, 759, 760, 805, 806, 1084, 1098, 1112, 1126, 1137, 1148, 1159, 1167, 1175, 1183, 1194, 1205, 1216, 1224, 1232, 1240, 1251, 1262, 1273, 1281, 1289, 1297, 1308, 1319, 1330, 1338, 1346, 1354, 1362, 1370, 1378, 1386, 1394, 1402, 1410, 1418, 1426, 1434, 1442, 1450, 1458, 1466, 1474, 1482, 1490, 1498, 1506, 1514, 1522, 1530, 1538, 1546, 1554, 1562, 1570, 1578, 1586, 1594, 1602, 1610, 1618, 1626, 1634, 1642, 1660, 1674, 1688, 1702, 1713, 1724, 1735, 1743, 1751, 1759, 1770, 1781, 1792, 1800, 1808, 1816, 1827, 1838, 1849, 1857, 1865, 1873, 1884, 1895, 1906, 1914, 1922, 1930, 1938, 1946, 1954, 1962, 1970, 1978, 1986, 1994, 2002, 2010, 2018, 2026, 2034, 2042, 2050, 2058, 2066, 2074, 2082, 2090, 2098, 2106, 2114, 2122, 2130, 2138, 2146, 2154, 2162, 2170, 2178, 2186, 2194, 2202, 2210, 2218, 2236, 2250, 2264, 2278, 2289, 2300, 2311, 2319, 2327, 2335, 2346, 2357, 2368, 2376, 2384, 2392, 2403, 2414, 2425, 2433, 2441, 2449, 2460, 2471, 2482, 2490, 2498, 2506, 2514, 2522, 2530, 2538, 2546, 2554, 2562, 2570, 2578, 2586, 2594, 2602, 2610, 2618, 2626, 2634, 2642, 2650, 2658, 2666, 2674, 2682, 2690, 2698, 2706, 2714, 2722, 2730, 2738, 2746, 2754, 2762, 2770, 2778, 2786, 2794, 2810, 2824, 2835, 2846, 2857, 2865, 2873, 2881, 2892, 2903, 2914, 2922, 2930, 2938, 2946, 2954, 2962, 2970, 2978, 2986, 2994, 3002, 3010, 3018, 3026, 3034, 3042, 3050, 3058, 3066, 3074, and 3082.

[00412] 53. The composition of matter of Embodiment 1, comprising an amino acid sequence selected from SEQ ID NOS: 3-30, 32-72, 74-134, 136-178, 180-211, 218-239, 241-305, 307-363, 366-386, 388-432, 434-474, 515-527, 532-588, 590, 591, 593-775, 777, 778, 780-788, 790-1049, and 1062-3086.

[00413] 54. A composition of matter, comprising an amino acid sequence selected from SEQ ID NOS: 3-134, 136-305, 307-386, 388-474, 515-527, 532-588, 590, 591, 593-1049, and 1062-3086.

[00414] 55. An isolated nucleic acid encoding any of SEQ ID NOS: 3-134, 136-305, 307-386, 388-474, 515-527, 532-588, 590, 591, 593-1049, or 1062-3086 that does not include a non-canonical amino acid.

[00415] 56. An expression vector comprising the nucleic acid of Embodiment 55.

[00416] 57. A recombinant host cell comprising the expression vector of Embodiment 56.

[00417] 58. The composition of matter of any of Embodiments 1-54, further comprising an optional linker moiety and a pharmaceutically acceptable, covalently linked half-life extending moiety.

[00418] 59. The composition of matter of Embodiment 58, wherein the half-life extending moiety is polyethylene glycol of molecular weight of about 1000 Da to about 100000 Da, an IgG Fc domain, a transthyretin, or a human serum albumin.

[00419] 60. The composition of matter of Embodiment 58, wherein the half-life extending moiety comprises a human immunoglobulin or a human immunoglobulin Fc domain, or both.

[00420] 61. The composition of matter of Embodiment 60 having a configuration as set forth in any of Figures 12A-N, or Figures 88-91.

[00421] 62. The composition of matter of Embodiment 60, wherein the composition comprises a monovalent immunoglobulin-peptide or Fc-peptide conjugate.

[00422] 63. The composition of matter of Embodiment 60, wherein the composition comprises a bivalent immunoglobulin-peptide or Fc-peptide conjugate.

[00423] 64. A pharmaceutical composition, comprising the composition of matter of any of Embodiments 1-54 or 58-63, and a pharmaceutically acceptable carrier.

[00424] 65. A method of preventing pain, comprising administering a prophylactically effective amount of the composition of matter of any of Embodiments 1-54 or 58-63.

[00425] 66. A method of treating pain, comprising administering a therapeutically effective amount of the composition of matter of any of Embodiments 1-54, or 58-63.

[00426] 67. The method of Embodiment 66, wherein the pain is chronic pain, acute pain, or persistent pain.

[00427] 68. The method of Embodiment 67, wherein the chronic pain is associated with cancer, chemotherapy, osteoarthritis, fibromyalgia, primary erythromelalgia, post-herpetic neuralgia, painful diabetic neuropathy, idiopathic painful neuropathy, neuromas, paroxysmal extreme pain disorder, migraine, trigeminal neuralgia, orofacial pain, cluster headaches, complex regional pain syndrome (CRPS), failed back surgery syndrome, sciatica, interstitial cystitis, pelvic pain, lower back pain, inflammation-induced pain, or joint pain.

[00428] 69. The method of Embodiment 67, wherein the acute or persistent pain is associated with trauma, burn, or surgery.

[00429] 70. The composition of matter of Embodiments 1-30, wherein X_{aa}^{29} is an acidic or neutral hydrophilic residue.

[00430] 71. The composition of matter of Embodiment 70, wherein X_{aa}^{29} is selected from Ala, Asp, Glu, Gly, Asn, Gln, Ser, Thr, phosphoserine, phosphotyrosine, and gamma-carboxyglutamic acid residues.

[00431] 72. The composition of matter of Embodiment 70, comprising an amino acid sequence selected from SEQ ID NOS: 1071-2798.

[00432] The following working examples are illustrative and not to be construed in any way as limiting the scope of the present invention.

[00433] EXAMPLES

[00434] Example 1: Isolation and purification of GpTx-1 from venom

[00435] Venom Sample Preparation. Venom from the tarantula *Gammostola porteri* was extracted via electrical stimulation of an anesthetized spider. Venom samples were collected, lyophilized, and dissolved in 0.1% trifluoroacetic acid (TFA) in water to approximately 1 mg venom/mL. The crude venom solutions were desalted by solid-phase extraction (SPE) with Sep-Pak C18 cartridges (Waters, Milford, MA, USA) equilibrated in 0.1% TFA, and eluted with 60% aqueous acetonitrile and then evaporated. The dried material was dissolved in 0.1% TFA to 1 mg venom/mL concentration and higher molecular components removed with a 10kDa molecular weight cut-off Ultrafree-CL (Millipore). The <10 kDa venom extract was then dried under in vacuo and stored at -80°C.

[00436] Fractionation. The crude venom was fractionated by reversed phase (RP) HPLC, collecting 84 samples in time slices. Less than 10 kDa venom extracts were dissolved in 0.1% TFA to approximately 1mg venom/mL, and then separated by C18 RP HPLC chromatography and collected into approximately 1 minute wide fractions. HPLC method: Buffer A (0.1% TFA in water) and buffer B (90% acetonitrile/10% water containing 0.1% TFA) at 1 mL/min with a 1% /min gradient 0-100% buffer B. The fractions were then transferred into a plate format, dried under in vacuo, and then stored at -80°C.

[00437] The venom fractions were screened for activity in the $Na_V1.7$ and $Na_V1.3$ IonWorks® Quatrro (IWQ) assays. (See, Example 3 and Figure 1). Several fractions with significant (>80% of control) Nav1.7 inhibitory activity were identified, the first of which was fraction 31. A second aliquot of fraction 31 was tested in the $Na_V1.7$, $Na_V1.3$, and $Na_V1.5$ IWQ assays to confirm the activity of the "hit" and evaluate selectivity. The sample was then analyzed by high-resolution electro-spray ionization (ESI) and matrix-assisted laser desorption ionization time-of-flight (MALDI-TOF) mass spectrometry (MS), which indicated that the fraction was a mixture of at least four distinct peptide species. (See, Figure 2 and Figure 3). Fraction 31 was then separated by RP-HPLC, and the corresponding sub-fractions were screened for activity in the $Na_V1.7$ and $Na_V1.5$ assays. Sub-fraction 11 was the major peak in the RP-HPLC chromatogram and showed > 90% inhibition of $Na_V1.7$ activity. (See Figure 4). Deconvolution of sub-fraction 11 revealed the primary peptide sequence of GpTx-1. As with all proteins, GpTx-1 is expected to have essentially zero access to the central nervous system.

[00438] GpTx-2 through GpTx-7 (SEQ ID NOS:467-474; see, Table 5A) were identified through transcriptomic analysis of the venom gland of *Grammostola porteri* using expressed sequence tag methodologies. (See, Siang AS, Doley R, Vonk FJ, Kini RM., "Transcriptomic analysis of the venom gland of the red-headed krait (Bungarus flaviceps) using expressed sequence tags", *BMC Molecular Biology* 2010, 11:24; Jiang Y, Li Y, Lee W, Xu X, Zhang Y, Zhao R, Zhang Y, Wang W., "Venom gland transcriptomes of two elapid snakes (Bungarus multicinctus and Naja atra) and evolution of toxin genes", *BMC Genomics* 2011, 12:1; Wagstaff SC, Sanz L, Juárez P,

Harrison RA, Calvete JJ., "Combined snake venomics and venom gland transcriptomic analysis of the ocellated carpet viper, Echis ocellatus.", *J Proteomics.* 2009 71(6):609-23; Magalhães GS, Junqueira-de-Azevedo IL, Lopes-Ferreira M, Lorenzini DM, Ho PL, Moura-da-Silva AM. "Transcriptome analysis of expressed sequence tags from the venom glands of the fish Thalassophryne nattereri", *Biochimie* 2006 88(6):693-9; Wagstaff SC, Harrison RA., "Venom gland EST analysis of the saw-scaled viper, Echis ocellatus, reveals novel alpha9beta1 integrin-binding motifs in venom metalloproteinases and a new group of putative toxins, renin-like aspartic proteases." *Gene* 2006 377:21-32).

[00439] Peptide Sequencing: Edman degradation and de novo MS/MS. N-terminal sequencing of peptides were performed by Edman degradation (Reference: (1) Edman, P. (1950), "Method for determination of the amino acid sequence in peptides", Acta Chem. Scand. 4: 283–293; (2) Niall, H.D. (1973). "Automated Edman degradation: the protein sequenator". Meth. Enzymol. 27: 942–1010). Phenylthiohydantoin (PTH)- amino acid derivatives were analyzed with an Applied Biosystems automatic 473A sequencer.

[00440] De novo peptide sequencing was accomplished by tandem mass spectrometry (References: Vlado Dančík, Theresa A. Addona, Karl R. Clauser, James E. Vath, Pavel A. Pevzner., J. Comp. Biol., Volume 6, 3/4, (1999); (2) Favreau, P., Menin, L., Michalet, S., Perret, F., Cheneval, Stöcklin, M., Bulet, A. and Stöcklin, R., Toxicon, 47(6),676-687, (2006), (3) Favreau, P., Cheneval, O., Menin, L., Michalet, S., Gaertner, H., Principaud, F., Thai, R., Ménez, A., Bulet, P. and Stöcklin, R. (2007), The venom of the snake genus Atheris contains a new class of peptides with clusters of histidine and glycine residues. Rapid Communications in Mass Spectrometry, 21: 406–412).

[00441] Example 2: Synthesis of GpTx-1 peptide analogs

[00442] Small-scale peptide synthesis. Peptides were assembled using N^{α}-Fmoc solid-phase peptide synthesis methodologies with appropriate orthogonal protection and resin linker strategies. The peptides were synthesized on a 0.012 mmol scale using Rink

Amide MBHA resin (100-200 mesh, 1% DVB, RFR-1063-PI, 0.52 meq/g initial loading, 408291, Peptides International, Louisville, KY). Dry resin (17 mg per well) was added to a Phenomenex deep well protein precipitation plate (CEO-7565, 38710-1) using a resin loader (Radley). Amino acids were added to the growing peptide chain by stepwise addition using standard solid phase methods on an automated peptide synthesizer (Intavis Multipep). Amino acids (5 molar equivalents, 120 μL, 0.5 M in DMF) were pre-activated (1 min) with (1-Cyano-2-ethoxy-2-oxoethylidenaminooxy)dimethylamino-morpholino-carbenium hexafluorophosphate (COMU®; 5 molar equivalents, 170 μL, 0.35 M in dimethylformamide (DMF)) and N,N-Diisopropylethylamine (DIEA; 7.5 molar equivalents, 70 μL, 1.25 M in dichloromethane (DCM)). Pre-activated amino acids were transferred to the appropriate well. Resins were incubated for 30 min, drained, and the cycle repeated. Following the 2nd amino acid incubation the plates were drained and washed with DMF 8 times (3 mL per column of 8 wells). The Fmoc groups were then removed by 2 sequential incubations in 500 μL of a 20% piperidine in DMF solution. The 1st incubation was 5 min, the resin drained, and the 2nd incubation was for 20 min. The resin was drained and washed with DMF 10 times (3 mL per column of 8 wells). After removal of the final Fmoc protecting group, the resin was washed with DCM 5 times (3 mL per column of 8 wells) and allowed to air dry.

[00443] Cleavage. To the bottom of the filter plate was affixed a drain port sealing mat (ArcticWhite, AWSM-1003DP). To the resin in each well was added triisopropylsilane (100 μL), DODT (100 μL), and water (100 μL) using a multichannel pipette. To the resin in each well was added TFA (1 mL) using a Dispensette Organic dispenser. To the resin was added a triangular micro stir bar, and the mixture was stirred for 3 h. The sealing mat was removed, and the cleavage solution was eluted into a solid bottom 96-well deep well plate. The resin in each well was washed with and additional 1 mL of TFA. The solutions were concentrated using rotary evaporation (Genevac). To each well in a new 96-well filter plate with a bottom sealing mat attached was added 1 mL of cold diethyl ether using a Dispensette Organic dispenser. To the ether was added the concentrated peptide solutions using a multichannel pipette with wide bore tips. The solution was agitated with the pipette to ensure complete

mixing and precipitation. The white solid was filtered, washed with a second 1 mL of cold ether, filtered, and dried under vacuum.

[00444] Folding. To the crude peptide in each well was added 0.9 mL of 50:50 water/acetonitrile with a multichannel pipette and a micro stir bar. The mixture was stirred for 1 h. The solution was filtered into a solid bottom 96-well deep well plate. To the crude peptide in each well was added another 0.9 mL of 50:50 water/acetonitrile with a multichannel pipette. The solution was filtered into the same solid bottom 96-well deep well plate. In a 4 L bottle was prepared 4.0 L of folding buffer (3.3 L water, 300 mL acetonitrile, 2.0 g oxidized glutathione, 1.0 g reduced glutathione, 400 mL 1 M Tris-HCl pH 7.5). To 96 50-mL centrifuge tubes was added 40 mL of peptide folding buffer using a Dispensette dispenser. To the folding buffer was added the 1.8 mL of dissolved peptide using the Tecan automated liquid handler. The pH of the folding solutions was measured to about 7.7. The folding reactions were allowed to stand overnight. To each tube was added 1 mL of glacial acetic acid. To a 96-well filter plate was added SP Sepharose High Performance as a slurry (1 mL per well) with a multichannel pipette. Using the Tecan automated liquid handler, the gel was conditioned with folding buffer (3 x 0.9 mL), loaded with the folded peptide solution (50 x 0.9 mL, pH = 4.0, on the Tecan automated liquid handler), washed (4 x 0.9 mL, 20 mM NaOAc, pH = 4.0), and eluted manually on a vacuum manifold with 2 x 1 mL (1 M NaCl, 20 mM NaOAc, pH = 4.0) into a solid bottom 96-well deep well plate.

[00445] Conjugation of peptides to PEG. Some GpTx-1 peptide analogs were conjugated to azido-NPEG10 (e.g., see, Table 30, Table 31, and Table 32, below). To 1 mL of the folded peptide in the IEX elution buffer was added in order 32-azido-3,6,9,12,15,18,21,24,27,30-decaoxadotriacontan-1-amine (70 µL, 50 mM aq.), tris(2-phenyl-1-(1H-1,2,3-triazol-4-yl)ethyl)amine (TBTA; 88 µL, 10 mM in DMSO), L-ascorbic acid sodium salt (438 µL, 75 mM aq.), and copper(ii) sulfate, anhydrous, powder (188 µL, 35 mM aq.). The reaction mixture turned slightly cloudy after the addition of the TBTA. After overnight incubation, the plate was centrifuged for 1 h at 1600 rpm to pellet any precipitate. The supernatant was transferred to a 96-well filter plate with a multichannel pipette and filtered into a solid bottom 96-well plate.

[00446] Purification and characterization of molecules. The folded (conjugated) peptide (2 mL) was purified by mass-triggered semi-prep HPLC (Agilent/LEAP 'Ariel',

Jupiter 5u C18 300 A, 100 x 10 mm 5 micron) with a gradient of 15-35% B over 45 min, with a 5 min flush, and 5 min equilibration at 8 mL/min. The collected fractions were pooled and reformatted into vials on the Tecan. Final QC (Phenomenex Jupiter 20 × 2 mm, 100 Å, 5 micron column eluted with a 10 to 60% B over 10 min gradient at a 0.750 mL/min flow rate monitoring absorbance at 220 nm) and CLND quantification were performed. Peptides with > 95% purity and correct (m/z) ratio were screened. (See Figures 5 and 6 for LC-MS characterization of synthetic GpTx-1).

[00447] Large-scale peptide synthesis. Rink Amide Chem Matrix resin (0.2 mmol, 0.45 mmol/g loading, 0.444g, Matrix Innovation) was weighed into a CS BIO reaction vessel. The reaction vessel was connected to a channel of the CS BIO 336X automated peptide synthesizer, and the resin was washed 2 x DMF and allowed to swell in DMF for 15 min. Fmoc-amino acid (1.0 mmol, Midwest Biotech or Novabiochem) was dissolved in 2.5 mL of 0.4 M 6-chloro-1-hydroxybenzotriazole (6-Cl-HOBt, Matrix Innovation) in DMF. To the solution was added 1.0 mL of 1.0 M 1,3-diisopropylcarbodiimide (DIC, Sigma-Aldrich) in DMF. The solution was agitated with nitrogen bubbling for 15 min to accomplish pre-activation and then added to the resin. The mixture was shaken for 2 h. The resin was filtered and washed 3 x DMF, 2 x DCM, and 3 x DMF. Fmoc-removal was accomplished by treatment with 20% piperdine in DMF (5 mL, 2 x 15 min, Fluka). The resin was filtered and washed 3 x DMF. All residues were single coupled through repetition of the Fmoc-amino acid coupling and Fmoc removal steps described above.

[00448] Cleavage and linear peptide purification. After final Fmoc-removal from the N-terminal residue, resin-bound linear peptide (0.2 mmol scale) was transferred to a 25 mL solid phase extraction (SPE) filter tube, washed 3 x DMF and 3 x DCM, and dried under vacuum. To the resin was added triisopropylsilane (1.0 mL), 3,6-dioxa-1,8-octane-dithiol (DODT, 1.0 mL), water (1.0 mL), trifluoroacetic acid (TFA, 15 mL), and a stir bar, and the mixture was stirred for 3 h. The mixture was filtered into a 50 mL centrifuge tube. The resin was washed with TFA (~ 5 mL), and the combined filtrate was concentrated by rotary evaoporation in a Genevac HT-12 (30°C chamber temperature, pressure ramp from 500 to 50 mbar over 40 min and a final pressure of 8 mbar for 2 h). To the residue (~5 mL) was added 40 mL cold diethyl ether. A white precipitate formed. The solid was stirred in the ether. The mixture was centrifuged (4

min, 4,400 rpm), and the ether was decanted. To the tube was added another 40 mL of cold ether, and the precipitate was stirred. The mixture was centrifuged, and the ether was decanted. The solid was dried overnight under vacuum. The crude linear peptide was purified by preparative LC-MS. The filtered sample (500 mg in 10 mL DMSO) was injected onto a preparative HPLC column (Jupiter 10u C18 300A, 250 x 50 mm 10 micron). The peptide was eluted with a 10-40%B over 60 min gradient at 50 mL/min, followed by a 10 min flush and a 10 min equilibration. The fractions were analyzed by LC-MS, pooled, and lyophilized to afford pure the linear peptide precursor.

[00449] Folding. In a 2L FEP bottle was prepared a folding buffer with water (944 mL), acetonitrile (55.5 mL), Tris-HCl pH 7.5 (111 mL), (-)-glutathione, oxidized (680 mg, 1.110 mmol), and l-glutathione reduced (340 mg, 1.110 mmol). To the pure linear peptide (111 mg, 0.028 mmol) was added 2.5 mL acetonitrile and 2.5 mL water. The mixture was vortexed to complete dissolution of the peptide. The peptide solution was added to the folding buffer (0.1 mg/mL peptide concentration, 1 mM oxidized glutathione, 1 mM reduced glutathione, 10% v/v acetonitrile, 0.1 M Tris pH 7.5). The pH value was measured to be 7.7. The folding mixture was stirred at 80 rpm at room temperature overnight. A small aliquot was removed and the sample was analyzed by LC-MS to ensure that the folding was complete. The solution was quenched by the addition of 4 mL AcOH and 4 mL TFA (pH = 2.5). The aqueous solution was filtered (0.45 uM cellulose membrane).

[00450] Purification. The filtered solution (1110 mL, 111 mg peptide) was loaded onto a preparative HPLC column (Phenomenex Synergi 4u MAX-RP 80A AXIA, 250 x 30 mm) at 30 mL/min using an Agilent preparative loading pump. The column was was flushed for 10 min with 10% B at 30 mL/min to elute the AcOH/TFA. The column was attached to a prep HPLC, Agilent/LEAP prep LC-MS, and the peptide was eluted with a 10-40% B gradient over 60 min, followed by a 10 min flush and a 10 min equilibration. The fractions were analyzed by LC-MS, pooled, and lyophilized to afford pure folded peptide.

[00451] Counterion exchange for peptide in vivo studies. A 4 mL SPE tube containing VariPure IPE (Varian, PL-HCO3 MP-Resin, polymer-supported hydrogencarbonate, 1.8 mmol/g, 100A, 150-300μm) was pre-conditioned with 2mL of MeOH, followed by 2mL of water, draining by gravity. 2.0 mL of a ≤5.0 mM solution

of purified folded peptide in water was applied to the bed. The device was washed with 4 x 2.0 mL of water to elute all of the peptide. To the eluent was added 50 μL of acetic acid. The solution was concentrated by rotary evaporation (Genevac) to afford the acetate salt of the purified folded peptide. A 100 mM stock solution of trifluoroethanol (TFE) in deuterium oxide (D2O) was prepared fresh by weighing 50 mg of TFE into a 5 mL volumetric flask, followed by addition of D2O to a final volume of 5 mL. A 5 mM solution of TFE in D2O was then prepared by dilution for dissolving all samples for 19F-NMR. The solution was used to dissolve peptide to a concentration of 1 mM, and the sample was analyzed by 19F-NMR using a fluorine long delay (d1 = 5 sec) method. The TFE integral (triplet at -76.75 ppm) was normalized to 5 and the integral of TFA (singlet at -75.6) recorded. NMR tube was cut, and sample was recovered by rotary evaporation (Genevac).

[00452] Example 3: Electrophysiology

[00453] Cell lines expressing Nav channels. Stable cell lines constitutively expressing human (h) voltage-gated sodium (Nav) channels (HEK293-hNav1.2, CHO-hNav1.3, HEK293-hNav1.4, HEK293-hNav1.5, and HEK293-hNav1.7) or CHO cells expressing hNav1.8 under an inducible promoter were used for experiments.

[00454] Ion-Works® Quatro population patch clamp electrophysiology. Adherent cells were isolated from tissue culture flasks using 0.25% trypsin-EDTA treatment for 10 minutes and were resuspended in external solution consisting of 140 mM NaCl, 5.0 mM KCl, 10 mM HEPES, 2 mM $CaCl_2$, 1 mM $MgCl_2$, 10 mM Glucose, pH 7.4. Internal solution consisted of 70 mM KCl, 70mM KF, 10 HEPES, 5mM EDTA, pH 7.3. Cells were voltage clamped, using the perforated patch clamp configuration at room temperature (~22°C), to -110mV and depolarized to -10mV before and 5 min after test compound addition. Compound dilutions contained 0.1% bovine serum albumin to minimize non-specific binding. Peak inward currents were measured from different cells for each compound concentration and IC_{50} values were calculated with Excel software. All compounds were tested in duplicate (n = 2).

[00455] PatchXpress® 7000A electrophysiology. Adherent cells were isolated from tissue culture flasks using 1:10 diluted 0.25% trypsin-EDTA treatment for 2-3 minutes and then were incubated in complete culture medium containing 10% fetal bovine serum for at least 15 minutes prior to resuspension in external solution consisting of 70 mM NaCl, 140 mM D-Mannitol, 10 mM HEPES, 2 mM $CaCl_2$, 1 mM $MgCl_2$, pH 7.4 with NaOH. Internal solution consisted of 62.5 mM CsCl, 75mM CsF, 10 HEPES, 5 mM EGTA, 2.5 mM $MgCl_2$, pH 7.25 with CsOH. Cells were voltage clamped using the whole cell patch clamp configuration at room temperature (~22°C) at a holding potential of -125mV with test potentials to -10mV (hNav1.2, hNav1.3, hNav1.4, and hNav1.7) or -20mV (hNav1.5). To record from partially inactivated channels, cells were switched to a voltage that yielded ~20% channel inactivation. Test compounds were added and Nav currents were monitored at 0.1 Hz at the appropriate test potential. All compound dilutions contained 0.1% bovine serum albumin to minimize non-specific binding. Cells were used for additional compound testing if currents recovered to >80% of starting values following compound washout. IC_{50} values were calculated by pooling single point determinations at different compound concentrations and fitting the resulting dataset with a Hill (4-parameter logistic) fit in DataXpress 2.0 software.

[00456] Whole cell patch clamp electrophysiology. Cells were voltage clamped using the whole cell patch clamp configuration at room temperature (~22°C). Pipette resistances were between 1.5 and 2.0 MΩ. Whole cell capacitance and series resistance were uncompensated. Currents were digitized at 50 kHz and filtered (4-pole Bessel) at 10 kHz using pClamp10.2. Cells were lifted off the culture dish and positioned directly in front of a micropipette connected to a solution exchange manifold for compound perfusion. To record from non-inactivated channels, cells were held at -140 mV and depolarized to -10 mV (0 mV for hNav1.8). To record from partially inactivated channels, cells were held at -140 mV initially and then switched to a voltage that yielded ~20% channel inactivation. 10 ms pulses were delivered every 10 seconds and peak inward currents were recorded before and after compound addition. Compound dilutions contained 0.1% bovine serum albumin to minimize non-specific binding. For hNav1.8 channel recordings, tetrodotoxin (TTX, 0.5 uM) was added to inhibit endogenous TTX-sensitive voltage-gated sodium channels and record only Nav1.8-

mediated TTX-resistant currents. External solution consisted of: 140 mM NaCl, 5.0 mM KCl, 2.0 mM $CaCl_2$, 1.0 mM $MgCl_2$, 10 mM HEPES, and 11 mM Glucose, pH 7.4 by NaOH. Internal solution consisted of: 62.5 mM CsCl, 75 mM CsF, 2.5 mM $MgCl_2$, 5 mM EGTA, and 10 mM HEPES, pH 7.25 by CsOH. Escalating compound concentrations were analyzed on the same cell and IC_{50} values were calculated with Clampfit 10.2 software and by fitting the resulting dataset with a Hill (4-parameter logistic) fit in Origin Pro 8 software.

[00457] DRG neuron isolation. Adult male and female C57BL/6 mice (Harlan Laboratories, Indianapolis, IN) were euthanized with sodium pentobarbital (Nembutal, 80 mg/kg, i.p., Western Med Supply, Arcadia, CA) followed by decapitation. DRG from cervical, thoracic and lumbar regions were removed, placed in Ca^{2+} and Mg^{2+}-free Hanks' Balanced Salt Solution (Invitrogen, Carlsbad, CA), and trimmed of attached fibers under a dissecting microscope. DRG were sequentially digested at 37°C with papain (20 U/ml, Worthington Biochemical Corporation, Lakewood, NJ) and L-cysteine (25 μM) in Ca^{2+} and Mg^{2+}-free Hanks' (pH 7.4) for 20-30 min and then with collagenase type 2 (0.9% w/v, Worthington Biochemical Corporation) for 20-30 min. Digestions were quenched with a 1:1 mixture of DMEM and Ham's F-12 Nutrient Mixture (Invitrogen) supplemented with 10% calf serum (Invitrogen), and cells were triturated with a fire-polished Pasteur pipette prior to plating on Poly-D-Lysine-coated glass coverslips (Cole-Parmer, Vernon Hills, IL). Cells were maintained in a humidified incubator at 28°C with 5% CO_2 for 3-7 days in the presence of 1% NSF-1 (Lonza, Basel, Switzerland) to increase the expression of tetrodotoxin-sensitive sodium channel currents.

[00458] Manual patch-clamp electrophysiology for DRG neurons. DRG neurons were voltage clamped using the whole-cell patch clamp configuration at room temperature (21-24°C) using an Axopatch 200 B or MultiClamp 700 B amplifier and DIGIDATA 1322A with pCLAMP software (Molecular Devices, Sunnyvale, CA). Pipettes, pulled from borosilicate glass capillaries (World Precision Instruments, Sarasota, FL), had resistances between 1.0 and 3.0 MΩ. Voltage errors were minimized using >80% series resistance compensation. A P/4 protocol was used for leak subtraction. Currents were digitized at 50 kHz and filtered (4-pole Bessel) at 10 kHz. Cells were lifted off the culture dish and positioned directly in front of a micropipette

connected to a solution exchange manifold for compound perfusion. Cells were held at -140 mV or a voltage yielding approximately 20% inactivation and depolarized to -10 mV for 40 msec every 10 seconds. Tetrodotoxin (TTX, Sigma) was used following peptide addition to block any residual TTX-sensitive sodium currents. Pipette solution contained (in mM): 62.5 CsCl, 75 CsF, 2.5 $MgCl_2$, 5 EGTA, and 10 HEPES, pH 7.25 by CsOH. Bath solution contained (in mM): 70 NaCl, 5.0 KCl, 2.0 $CaCl_2$, 1.0 $MgCl_2$, 10 HEPES, and 11 glucose, 140 mannitol, pH 7.4 by NaOH. Data were analyzed with Clampfit and Origin Pro8 (OriginLab Corp, Northampton, MA).

[00459] Results of electrophysiology studies and structure-activity relationship. Results of electrophysiology studies are shown in Table 6 through Table 32, below. Extensive systematic analoging has given considerable insight into how individual positions within GpTx-1 (SEQ ID NO:1) contribute to its overall VGSC activity profile. Concerning the overall molecular framework, the disulfide bonds (or diselenide bonds) between Cys9 (or SeCys9) and Cys23 (or SeCys23) (C2—C5) and between Cys16 (or SeCys16) and Cys30 (or SeCys30) (C3—C6) are essential for function. However, simultaneous substitution of Cys2 and Cys17, as in [2-Abu2,17]GpTx-1 (SEQ ID NO: 125), which removes the (C1—C4) disulfide bond, retains significant activity against $Na_V1.7$ and $Na_V1.3$ with potentially improved selectivity against Nav1.4. (See, Table 29).

[00460] The N-terminal portion of GpTx-1, including the N-terminus, Asp1, Leu3, and Gly4, is amenable to modification without affecting either VGSC potency or selectivity in comparison with GpTx-1. (See, Table 7, Table 8, Table 9, and Table 10). Extension of the polypeptide chain by coupling additional amino acid(s) to to the N-terminus is well-tolerated. (See Table 7). Acetylation of the N-terminal aspartic acid residue to give Ac-GpTx-1 (SEQ ID NO:132) maintains potency at $Na_V1.7$ and increases selectivity against $Na_V1.3$ and $Na_V1.4$ in the PatchXpress® (PX) format. (See, Table 30). Asp1 of GpTx-1 can be truncated or substituted with a variety of amino acids with no impact on potency at $Na_V1.7$ and $Na_V1.3$ or selectivity against $Na_V1.4$ and $Na_V1.5$. (See Table 8). Leu3 and Gly4 in GpTx-1 may be individually replaced with a hydrophobic or a basic amino acid and still retain potency against $Na_V1.7$ and $Na_V1.3$, but these positions are less tolerant of substitution with acidic

residues. (See Table 9 and Table 10). However, substitution of glutamic acid for Leu3 increases selectivity against Nav1.4 in the PX assay format. (See Table 30).

[00461] Hydrophobic residues at positions 5 and 6 (Phe5 and Met6 in GpTx-1), in relation to SEQ ID NO:1, are essential to $Na_V1.7$ and $Na_V1.3$ inhibitory potency. (See Table 11 and Table 12). The identity of the amino acid at position 5 in GpTx-1 (SEQ ID NO:1) also has great impact on the selectivity of the peptide between $Na_V1.7$, $Na_V1.3$, and $Na_V1.4$. Substitution of aliphatic or aromatic hydrophobic residues for the native phenylalanine maintains or increases potency against $Na_V1.7$ while increasing selectivity against $Na_V1.4$ and not reducing the selectivity against $Na_V1.5$. (See Table 11). Incorporation of alanine in [Ala5]GpTx-1 (SEQ ID NO:22) retains potency against $Na_V1.7$ while greatly increasing selectivity against $Na_V1.3$ and Nav1.4 in the PX format. Besides alanine, many other aliphatic residues may be incorporated at position 5 to improve selectivity against Nav1.4, including but not limited to glycine, 2-aminobutyric acid (Abu), 2-aminoisobutyric acid (Aib), norvaline, valine, leucine, and isoleucine. (See Table 30). Two para-substituted phenylalanine derivatives, [pI-Phe5]GpTx-1 (SEQ ID NO:247) and [Bip5]GpTx-1 (SEQ ID NO:242) have increased potency against $Na_V1.3$ and are selective against $Na_V1.7$. (See Table 30). Incorporation of hydrophobic residues at position 6 increases potency against all four Na_V sub-types tested in proportion to their size. (See Table 12). A variety of hydrophobic residues including leucine and phenylalanine can be incorporated at position 6 in combination with alanine at position 5 to maintain good potency against Nav1.7 and selectivity against Nav1.4 in the PX assay format. (See Table 30).

[00462] While each position has recognizable preferences, the sequence of amino acids from Arg8 to Thr26 is quite tolerant of individual substitutions, with the exception of Asp14 relative to SEQ ID NO:1. Peptides synthesized without an aspartic acid residue at position 14 of GpTx-1 have not been isolated in sufficiently pure form for screening, indicating this residue may be critical for proper folding of the peptide. Basic or neutral hydrophilic amino acids are acceptable as substitutions for Arg7 and Lys8, relative to SEQ ID NO:1, to maintain $Na_V1.7$ and $Na_V1.3$ inhibitory potency. (See Table 13). However, substitution of glutamic acid for Arg7 increases selectivity against Nav1.4 in the PX assay format. (See Table 30). Ile10, Pro11, Asp12, Asn13, Lys15, Arg18, and Pro19, relative to SEQ ID NO:1, can be substituted with a variety of amino

acids with little effect on potency against $Na_V1.7$ and $Na_V1.3$. (See Table 14, Table 15, Table 16, Table 17, and Table 18). The ability to substitute alternative residues for Pro11, i.e., [Glu11]GpTx-1 (SEQ ID NO:147) and [Trp11]GpTx-1 (SEQ ID NO:171), without affecting Nav1.7 activity is notable, since this residue is conserved in the peptide sequences of HWTX-IV SEQ ID NO:528) and HWTX-I (SEQ ID NO:529). (See Table 15; Figure 15A-B). Substitutions of acidic residues at positions 10 or 11 can improve selectivity against Nav1.4, i.e., [Asp10]GpTx-1 (SEQ ID NO:119) , [Glu10]GpTx-1 (SEQ ID NO:146) , and [Glu11]GpTx-1 (SEQ ID NO:147) (See Table 30). Substitution of Asn13 improves the Fmoc solid-phase synthesis of the peptide analogs, likely through reduction of aspartimide formation during subsequent Fmoc-removal steps. Substitutions at position 18 can improve selectivity against Nav1.4. (See Table 18 and Table 30). Asn20, Leu21, Val22, Ser24, Arg25, and Thr26, relative to SEQ ID NO:1, may be individually substituted with non-acidic amino acids and retain full Nav1.7 and Nav1.3 inhibitory potencies. (See Table 19, Table 20, Table 21, and Table 22). The threonine at position 26 of GpTx-1 (SEQ ID NO:1) differs from the conserved lysine in HWTX-IV (SEQ ID NO:528) and HWTX-I (SEQ ID NO:529; see Figure 15A-B). Substitutions at this position increase selectivity against $Na_V1.4$ as in [Leu26]GpTx-1 (SEQ ID NO:121) and [Glu26]GpTx-1 (SEQ ID NO:152). (See Table 30). The loop in GpTx-1 (SEQ ID NO:1) between Cys17 and Cys23 may be increased or decreased in length by insertion or deletion of one amino acid residue without substantial impact on the activity of the peptide against the VGSCs tested, as shown by [Ser-Ser19]GpTx-1 (SEQ ID NO:93) and [Glu18;desAsn20]GpTx-1 (SEQ ID NO:134). (See Table 18 and Table 29).

[00463] The C-terminal portion of the GpTx-1 sequence is most critical for the activity of the peptide against $Na_V1.7$ and $Na_V1.3$. Substitution of His27 in GpTx-1 (SEQ ID NO:1) with retention of potency and selectivity is best accomplished with aromatic and basic residues. See Table 23). Residues Lys28 and Val33, relative to SEQ ID NO:1, are most tolerant to substitution with a variety of different amino acids without affecting $Na_V1.7$ and $Na_V1.3$ inhibitory potency. (See Table 23 and Table 26). [Arg28]GpTx-1 (SEQ ID NO:72), [Glu28]GpTx-1 (SEQ ID NO:153), [Asp28]GpTx-1 (SEQ ID NO:750), [Gln28]GpTx-1 (SEQ ID NO:763), and [Glu33]GpTx-1 (SEQ ID NO:33), show increased selectivity against $Na_V1.4$. (See Table 30). A trytophan (or

thiotryptophan) at position 29 of GpTx-1 (SEQ ID NO:1) appears to be important to obtain high levels of potency against $Na_V1.7$ and $Na_V1.3$. (See Table 24). Analogs with large hydrophobic substitutions, [1-Nal29]GpTx-1 (SEQ ID NO:79) and [2-Nal29]GpTx-1 (SEQ ID NO:129), retain the most activity but are still 5-fold less potent than GpTx-1, though they may have increased selectivity against Nav1.4. (See Table 30). Lys31, relative to SEQ ID NO:1, is also apparently important for potent inhibition of Nav1.7 and $Na_V1.3$ by GpTx-1. (See Table 25). The tyrosine at position 32 of GpTx-1 (SEQ ID NO:1) can be substituted with aliphatic or aromatic hydrophobic amino acids with retention of potency against $Na_V1.7$ and $Na_V1.3$, but these substitutions often increase activity against $Na_V1.5$ and $Na_V1.4$, leading to reduced selectivity. (See Table 25). The phenylalanine at position 34 of GpTx-1 (SEQ ID NO:1) can only be substituted with other hydrophobic amino acids without losing potency against $Na_V1.7$ and $Na_V1.3$, though large hydrophobic amino acids tend to increase potency and hence reduce selectivity against $Na_V1.4$ and $Na_V1.5$. (See Table 27). The C-terminus of GpTx-1 (SEQ ID NO:1) is amenable to extension by at least one amino acid with retention of Na_V inhibitory activity, but truncation of the C-terminus of GpTx-1 or substitution of the native C-terminal amide with a free acid reduces potency against $Na_V1.7$ and $Na_V1.3$. (See Table 28). Additional analogs of GpTx-1 (SEQ ID NO:1) that combine individual substitutions have demonstrated further improvements in selectivity against $Na_V1.4$ and $Na_V1.5$ and potency toward Nav1.7 and Nav1.3, i.e., [Ala5,Phe6,Leu26,Arg28]GpTx-1 (SEQ ID NO:262) and [Ala5,Phe6,Glu10,2-Abu13,Leu26,Arg28]GpTx-1 (SEQ ID NO:1035). (See Table 29 and Table 30). The IC_{50} of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) against partially inactivated hNav1.2 channels was 0.265 μM.

[00464] Manual whole cell patch clamp electrophysiology was performed on GpTx-1 (SEQ ID NO:1) and [Ala5]GpTx-1 (SEQ ID NO:22) on human clones of Nav1.7, Nav1.3, Nav1.4, and Nav1.5. Testing with 100 nM GpTx-1 showed complete inhibition of the Nav1.7 current. (See Figure 20). The IC_{50} value of Nav1.7 inhibition for GpTx-1 was 7.40 nM. (See Figure 21). The effects of GpTx-1 addition in increasing concentrations and wash out on Nav1.7 current were recorded. (See Figure 22). Testing with 300 nM GpTx-1 showed complete inhibition of the Nav1.3 current. (See Figure 23). The IC_{50} value of Nav1.3 inhibition for GpTx-1 was 16.8 nM. (See Figure 24).

The effects of GpTx-1 addition in increasing concentrations and wash out on Nav1.3 current were recorded. (See Figure 25). Testing with 3.0 μM GpTx-1 showed partial inhibition of the Nav1.4 current. (See Figure 26). The IC_{50} value of Nav1.4 inhibition for GpTx-1 was 2.9 μM and 0.26 μM for the closed and partially inactivated states, respectively. (See Figures 27 and 28). The effects of GpTx-1 addition in increasing concentrations and wash out on Nav1.4 current were recorded on the closed and partially inactivated states, respectively. (See Figures 29 and 30). GpTx-1 is more potent against hNav1.4 when channels are partially inactivated. Testing with 3.0 μM GpTx-1 showed weak inhibition of the Nav1.5 current. (See Figure 31). The IC_{50} value of Nav1.5 inhibition for GpTx-1 was 8.9 μM. (See Figure 32). The effects of GpTx-1 addition in increasing concentrations and wash out on Nav1.5 current were recorded. (See Figure 33). These results demonstrate that GpTx-1 (SEQ ID NO:1) is a potent dual peptide inhibitor of Nav1.7 and Nav1.3 with selectivity against Nav1.4 and Nav1.5. Testing with 300 nM [Ala5]GpTx-1 (SEQ ID NO:22) showed complete inhibition of the Nav1.7 current. (See Figure 34). The IC_{50} value of Nav1.7 inhibition for [Ala5]GpTx-1 was 13.2 nM. (See Figure 35). The effects of [Ala5]GpTx-1 addition in increasing concentrations and wash out on Nav1.7 current were recorded. (See Figure 36). These results demonstrate that [Ala5]GpTx-1 (SEQ ID NO:22) is also a potent inhibitor of Nav1.7.

[00465] Manual patch clamp electrophysiology was performed on GpTx-1 (SEQ ID NO:1) and [Ala5]GpTx-1 (SEQ ID NO:22) on isolated mouse DRG neurons. The effects of GpTx-1 addition in increasing concentrations and wash out on sodium channel current in mouse DRG neurons were recorded. (See Figure 37). The IC_{50} value of TTX-sensitive sodium channel current inhibition for GpTx-1 was 7.1 nM. (See Figure 38). Testing with 200 nM GpTx-1 showed almost complete inhibition of the TTX-sensitive sodium current in mouse DRG neurons. (See, Figure 39). The effects of GpTx-1 addition in increasing concentrations and wash out on sodium channel current in mouse DRG neurons at a holding voltage that produced 20% inactivation were recorded. (See Figure 40). The IC_{50} value of TTX-sensitive sodium channel current inhibition with a holding voltage yielding 20% inactivation for GpTx-1 was 4.7 nM. (See Figure 41). Testing with 200 nM GpTx-1 showed complete inhibition of the TTX-sensitive sodium current in mouse DRG neurons with a holding voltage that yielded

20% inactivation (See, Figure 42). The effects of [Ala5]GpTx-1 (SEQ ID NO:22) addition in increasing concentrations and wash out on sodium channel current in mouse DRG neurons were recorded. (See, Figure 43). The IC_{50} value of TTX-sensitive sodium channel current inhibition for [Ala5]GpTx-1 (SEQ ID NO:22) was 17.0 nM. (See Figure 44). Testing with 300 nM GpTx-1 showed almost complete inhibition of the TTX-sensitive sodium current in mouse DRG neurons. (See, Figure 45).

[00466] Manual whole cell patch clamp electrophysiology was performed on Homodimeric Conjugate 1 on human clones of Nav1.7 and Nav1.5 (see, Example 5). The effects of adding Homodimeric Conjugate 1 in increasing concentrations and wash out on Nav1.7 current were recorded. (See Figure 46). The IC_{50} value of Nav1.7 inhibition for Homodimeric Conjugate 1 was 1.2 nM. (See, Figure 47). Testing with 3 nM Homodimeric Conjugate 1 showed that the compound was very slow to wash out during an extended wash (10min), and testing with 300 nM Homodimeric Conjugate 1 showed that the compound did not wash out during an extended wash (10 min). (See Figure 48). Testing with 300 nM Homodimeric Conjugate 1 gave complete inhibition of the Nav1.7 current. (See Figure 49). The effects of Homodimeric Conjugate 1 addition in increasing concentrations and wash out on Nav1.7 current with a holding votage that yielded ~20% inactivation were recorded. (See Figure 50). The IC_{50} value of Nav1.7 inhibition with a holding votage that yielded ~20% inactivation for Homodimeric Conjugate 1 was 0.66 nM. (See Figure 51). Testing with 3 nM Homodimeric Conjugate 1 gave complete inhibition of the Nav1.7 current with a holding votage that yielded ~20% inactivation. (See Figure 52). The effects of Homodimeric Conjugate 1 addition in increasing concentrations and wash out on Nav1.5 current were recorded. (See Figure 53). The IC_{50} value of Nav1.5 inhibition for Homodimeric Conjugate 1 was 75.5 nM. (See Figure 54). Testing with 2 μM Homodimeric Conjugate 1 gave complete inhibition of the Nav1.5 current. (See Figure 55). The effects of Homodimeric Conjugate 1 addition in increasing concentrations and wash out on Nav1.5 current with a holding votage that yielded ~20% inactivation were recorded. (See Figure 56). The IC_{50} value of Nav1.5 inhibition with a holding votage that yielded ~20% inactivation for Homodimeric Conjugate 1 was 57 nM. (See Figure 57). Testing with 2 μM Homodimeric Conjugate 1 gave complete inhibition of

the Nav1.5 current with a holding votage that yielded ~20% inactivation. (See Figure 58).

[00467] Potassium channel study. Dorsal root ganglia were harvested from adult Sprague-Dawley rats (aged 14 to 15 weeks), trimmed of connective tissue, and enzymatically dissociated with papain (3 mL calcium and magnesium-free Hank's buffer + 1 mg L-cysteine + 4 uL saturated sodium bicarbonate + 60 microliters papain, Worthington biochemical) for 30 minutes at 37°C. The preparation was spun at 1000 rpm for 2 minutes and the pellet was resuspended for a second enzymatic incubation in collagenase and dispase (4 mL calcium and magnesium-free Hank's buffer + 120 microliters of collagenase / dispase mix 100 mg/mL from Roche) for 60 minutes with gentle trituration every 10 minutes. Cells were spun again at 2000 rpm for 2 minutes, resuspended in F-12 medium, plated on poly-D-laminin coated coverslips, placed in a humidified 37°C incubator with 5% CO_2, and used for electrophysiological recording on the same day.

[00468] Electrophysiological recordings were made with the whole-cell configuration of the patch-clamp technique (Hamill OP et al., "Improved patch-clamp techniques for high-resolution current recording from cells and cell-free membrane patches, Pfluger's Archiv 391:85-100, 1981), with internal (pipette) solution containing, in millimolar, 70 KF, 70 KCl, 10 HEPES, 5 HEDTA, pH 7.25 with KOH. External solution contained, in millimolar, 140 NaCl, 5 KCl, 2 $CaCl_2$, 1 $MgCl_2$, 10 HEPES, 10 glucose, pH 7.4 with NaOH. After formation of the whole-cell configuration of the patch clamp, the cell was lifted off the dish bottom by moving the patch pipette and manually positioned in front of a gravity-driven microperfusion array under electronic control (BioLogique). Combined sodium and potassium currents were evoked every 5 seconds by a 20 ms test depolarization to 0 mV delivered from a holding potential of -90 mV. [Ala5]GpTx-1 (SEQ ID NO:22; 500 nM) peptide was added by switching perfusion tubes, and while fast sodium currents (presumably tetrodotoxin-sensitive, encoded at least partially by Nav1.7) steadily decreased, reflecting block by peptide, there was no change in the outward potassium currents. Currents shown in Figure 94 are not leak-subtracted, but as the test pulse was to 0 mV, contamination by leak currents should be minimal. The results shown in Figure 94 demonstrate that 500 nM [Ala5]GpTx-1 (SEQ ID NO:22) did not block voltage-gated potassium currents.

Table 6. Electrophysiology by IonWorks® Quattro: comparison of GpTx-1 (SEQ ID NO:1) and other toxins from *Grammostola porteri*.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1. 3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
467	{H}-DCLGFMRKCSPDNDKCCRPNLVCSRKHKWCKYEI-{Amide}	GpTx-2(1-34)	4.34	7.21	11.73	1.15	2.7	10.2	3.8
468	{H}-DCLGWFKGCDPDNDKCCEGYKCNRRDKWCKYKL-{Amide}	GpTx-3(1-33)	8.93	7.80	20.00	9.37	2.2	2.1	1.0
469	{H}-DCLGWFKGCDPDNDKCCENYKCNRREQWCKYKL-{Amide}	GpTx-4(1-33)	9.25	10.38	11.00	4.92	1.2	2.2	1.9
473	{H}-DCLGWFKGCDPDNDKCCENYKCNRRDKWCKYKLWK-{FreeAcid}	GpTx-7(1-35)	10.4	7.6	10.0	3.5	1.0	2.8	2.9
474	{H}-DCLGWFKGCDPDNDKCCENYKCNRRDKWCKYKLW-{FreeAcid}	GpTx-7(1-34)	4.0	7.9	10.5	1.4	2.6	7.7	2.9
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 7. Electrophysiology by IonWorks® Quattro: Position 0 additions relative to GpTx-1 (SEQ ID NO:1) and Ac-GpTx-1 (SEQ ID NO:132).

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1. 3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
100	{H}-ADCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	Ala-GpTx-1(1-34)	0.37	19.58	7.07	0.32	19.2	21.9	1.1
17	{H}-EDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	Glu-GpTx-1(1-34)	0.26	12.77	3.63	0.19	13.9	18.7	1.3
36	{H}-KDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	Lys-GpTx-1(1-34)	0.11	8.35	2.38	0.10	20.8	23.6	1.1
61	{H}-RDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	Arg-GpTx-1(1-34)	0.17	15.08	2.58	0.08	15.6	31.8	2.0
106	{H}-WDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	Trp-GpTx-1(1-34)	0.22	21.96	3.83	0.25	17.5	15.1	0.9
201	{H}-[1-Nal]DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	1-Nal-GpTx-1(1-34)							
132	{Acetyl}DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	Ac-GpTx-1(1-34)	0.31	12.69	2.86	0.22	9.3	12.9	1.4
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 8. Electrophysiology by IonWorks® Quattro Position 1 substitutions or deletions relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
20	{H}-ACLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala1]GpTx-1(1-34)	0.10	9.86	1.68	0.08	16.8	21.1	1.3
18	{H}-ECLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Glu1]GpTx-1(1-34)	0.22	14.16	3.46	0.15	15.7	23.2	1.5
37	{H}-KCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Lys1]GpTx-1(1-34)	0.15	7.29	1.49	0.07	10.2	21.0	2.1
62	{H}-RCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Arg1]GpTx-1(1-34)	0.11	8.78	1.45	0.10	12.9	15.2	1.2
81	{H}-WCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Trp1]GpTx-1(1-34)	0.05	8.79	3.06	0.10	56.1	30.9	0.6
77	{H}-[1-Nal]CLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[1-Nal1]GpTx-1(1-34)	0.11	13.38	6.77	0.14	62.9	48.0	0.8
97	{H}-YCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Tyr1]GpTx-1(1-34)	0.16	10.61	3.89	0.13	24.5	29.0	1.2
108	{H}-CLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(2-34)	0.07	8.22	1.10	0.05	14.8	20.3	1.4
188	{H}-[PE]CLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[PE1]GpTx-1(1-34)	0.17	10.69	2.64	0.11	15.7	24.2	1.5
189	{H}-ICLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ile1]GpTx-1(1-34)	0.10	8.15	1.34	0.07	13.1	20.3	1.5
190	{H}-PCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Pro1]GpTx-1(1-34)	0.09	9.73	1.19	0.04	13.7	29.4	2.2
191	{H}-SCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ser1]GpTx-1(1-34)	0.07	9.40	1.14	0.05	15.7	21.2	1.4
192	{H}-TCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Thr1]GpTx-1(1-34)	0.11	9.21	1.41	0.07	12.5	20.5	1.6
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 9. Electrophysiology by IonWorks® Quattro: Position 3 substitutions relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav 1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
21	{H}-DCAGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala3]GpTx-1(1-34)	0.51	19.01	14.46	0.10	28.2	138.2	4.9
19	{H}-DCEGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Glu3]GpTx-1(1-34)	0.67	10.47	8.34	0.83	12.5	10.0	0.8
38	{H}-DCKGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Lys3]GpTx-1(1-34)	0.08	6.95	1.87	0.06	23.0	33.1	1.4
155	{H}-DCRGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Arg3]GpTx-1(1-34)	0.03	8.45	0.85	0.05	26.7	16.0	0.6
98	{H}-DCQGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Gln3]GpTx-1(1-34)	0.25	16.40	5.25	0.24	20.7	21.5	1.0
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 10. Electrophysiology by IonWorks® Quattro: Position 4 substitutions relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
141	{H}-DCLAFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala4]GpTx-1(1-34)	0.27	11.30	3.24	0.21	12.0	15.4	1.3
24	{H}-DCLEFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Glu4]GpTx-1(1-34)	1.74	17.61	8.50	1.33	4.9	6.4	1.3
39	{H}-DCLKFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Lys4]GpTx-1(1-34)	0.20	9.82	6.49	0.18	32.7	36.2	1.1
63	{H}-DCLRFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Arg4]GpTx-1(1-34)	0.21	20.09	5.82	0.23	27.1	24.8	0.9
169	{H}-DCLWFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Trp4]GpTx-1(1-34)	0.05	10.33	0.52	0.03	10.0	19.3	1.9
160	{H}-DCL[1-Nal]FMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[1-Nal4]GpTx-1(1-34)	0.04	5.09	0.50	0.03	13.7	18.9	1.4
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 11. Electrophysiology by IonWorks® Quattro: Position 5 substitutions relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4 / Nav1.3	Nav1.7 / Nav1.3
22	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5]GpTx-1(1-34)	0.64	10.34	11.07	1.75	17.4	6.3	0.4
143	{H}-DCLGEMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Glu5]GpTx-1(1-34)	17.67	10.01	22.26	22.29	1.3	1.0	0.8
156	{H}-DCLGRMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Arg5]GpTx-1(1-34)	3.63	12.64	25.69	4.09	7.1	6.3	0.9
82	{H}-DCLGWMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Trp5]GpTx-1(1-34)	0.15	9.32	2.30	0.11	15.6	21.4	1.4
105	{H}-DCLG[1-Nal]MRKCIPDND KCCRPNLVCSRTHKWCKYVF-{Amide}	[1-Nal5]GpTx-1(1-34)	0.08	13.41	2.13	0.10	26.4	21.7	0.8
88	{H}-DCLGIMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ile5]GpTx-1(1-34)	0.36	6.65	10.78	0.62	30.0	17.3	0.6
128	{H}-DCLG[2-Nal]MRKCIPDND KCCRPNLVCSRTHKWCKYVF-{Amide}	[2-Nal5]GpTx-1(1-34)	0.11	6.11	0.94	0.05	8.2	17.3	2.1
242	{H}-DCLG[Bip]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Bip5]GpTx-1(1-34)	0.06	3.38	0.14	-	2.3	-	-
243	{H}-DCLG[Cha]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Cha5]GpTx-1(1-34)	0.01	6.99	0.64	0.02	47.6	34.8	0.7
247	{H}-DCLG[pI-Phe]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[pI-Phe5]GpTx-1(1-34)	0.16	6.16	19.68	0.02	121.9	1152.0	9.4
264	{H}-DCLG[1'NMeW]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[1'NMeW5]GpTx-1(1-34)	0.09	8.17	2.81	0.09	32.9	30.5	0.9
265	{H}-DCLGGMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Gly5]GpTx-1(1-34)	0.75	7.47	10.73	1.24	14.3	8.6	0.6
266	{H}-DCLGHMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[His5]GpTx-1(1-34)	4.74	6.62	14.86	8.37	3.1	1.8	0.6
267	{H}-DCLGLMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Leu5]GpTx-1(1-34)	0.17	7.40	12.14	0.30	70.9	40.0	0.6

268	{H}-DCLGMMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Met5]GpTx-1(1-34)	0.10	12.81	11.20	0.24	113.6	45.9	0.4
269	{H}-DCLGPMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Pro5]GpTx-1(1-34)	1.17	6.61	11.40	1.73	9.7	6.6	0.7
270	{H}-DCLGTMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Thr5]GpTx-1(1-34)	1.22	15.25	15.54	2.19	12.7	7.1	0.6
271	{H}-DCLGYMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Tyr5]GpTx-1(1-34)	1.43	15.58	6.48	1.64	4.5	3.9	0.9
272	{H}-DCLGVMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Val5]GpTx-1(1-34)	0.71	13.22	13.88	1.03	19.7	13.5	0.7
273	{H}-DCLGfMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[D-Phe5]GpTx-1(1-34)	1.23	>5	>5	3.00	-	-	0.4
274	{H}-DCLG[NMeTrp]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[NMeTrp5]GpTx-1(1-34)	0.19	>5	2.40	0.15	12.8	16.3	1.3
275	{H}-DCLG[Phg]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Phg5]GpTx-1(1-34)	0.09	>5	2.55	0.17	28.4	15.4	0.5
276	{H}-DCLG[4CO2-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4CO2-F5]GpTx-1(1-34)	15.96	8.12	21.45	5.42	1.3	4.0	2.9
277	{H}-DCLG[2PAL]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[2PAL5]GpTx-1(1-34)	2.07	9.25	11.86	4.58	5.7	2.6	0.5
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 12. Electrophysiology by IonWorks® Quattro: Position 6 substitutions relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
23	{H}-DCLGFARKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala6]GpTx-1(1-34)	0.51	17.38	3.71	0.21	7.3	17.5	2.4
144	{H}-DCLGFERKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Glu6]GpTx-1(1-34)	3.51	9.39	22.42	20.36	6.4	1.1	0.2
154	{H}-DCLGFKRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Lys6]GpTx-1(1-34)	14.52	13.95	24.95	8.49	1.7	2.9	1.7
64	{H}-DCLGFRRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Arg6]GpTx-1(1-34)	6.98	17.59	14.74	5.90	2.1	2.5	1.2
170	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Trp6]GpTx-1(1-34)	0.013	3.58	0.25	0.002	19.1	123.5	6.5
161	{H}-DCLGF[1-Nal]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[1-Nal6]GpTx-1(1-34)	0.007	2.34	0.27	0.006	39.3	43.8	1.1
89	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Phe6]GpTx-1(1-34)	0.05	9.21	1.39	0.03	28.2	40.7	1.4
3	{H}-DCLGF[SeMet]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[SeMet6]GpTx-1(1-34)	0.10	13.89	2.25	0.10	23.5	22.6	1.0
123	{H}-DCLGF[Nle]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Nle6]GpTx-1(1-34)	0.05	4.50	0.43	0.02	8.1	23.3	2.9
124	{H}-DCLGF[2-Abu]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[2-Abu6]GpTx-1(1-34)	0.11	10.59	2.09	0.10	18.6	21.3	1.1
244	{H}-DCLGFLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Leu6]GpTx-1(1-34)	0.06	6.42	15.94	0.04	270.6	364.7	1.3
245	{H}-DCLGF[Cha]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Cha6]GpTx-1(1-34)	0.02	2.37	0.10	-	6.3	-	-
278	{H}-DCLGFNRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Asn6]GpTx-1(1-34)	6.89	10.27	21.16	6.28	3.1	3.4	1.1
279	{H}-DCLGFQRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Gln6]GpTx-1(1-34)	8.62	7.57	14.08	5.96	1.6	2.4	1.4

280	{H}-DCLGFGRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Gly6]GpTx-1(1-34)	0.18	8.20	2.89	0.14	15.7	20.5	1.3
281	{H}-DCLGFHRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[His6]GpTx-1(1-34)	4.72	10.06	17.82	7.77	3.8	2.3	0.6
282	{H}-DCLGFIRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ile6]GpTx-1(1-34)	0.07	8.63	1.19	0.06	16.6	18.9	1.1
283	{H}-DCLGFPRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Pro6]GpTx-1(1-34)	0.79	10.00	11.00	0.76	13.8	14.4	1.0
284	{H}-DCLGFSRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ser6]GpTx-1(1-34)	1.02	16.94	21.30	0.71	20.8	30.1	1.4
285	{H}-DCLGFTRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Thr6]GpTx-1(1-34)	0.59	18.71	4.25	0.28	7.2	15.4	2.1
286	{H}-DCLGFYRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Tyr6]GpTx-1(1-34)	0.97	6.38	11.59	0.52	11.9	22.2	1.9
287	{H}-DCLGFVRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Val6]GpTx-1(1-34)	0.09	9.23	1.77	0.08	18.8	23.4	1.2
288	{H}-DCLGF[Phg]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Phg6]GpTx-1(1-34)	0.15	>5	2.88	0.09	19.5	32.2	1.7
289	{H}-DCLGF[NMeTrp]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[NMeTrp6]GpTx-1(1-34)	0.14	21.45	3.69	0.24	26.5	15.4	0.6
290	{H}-DCLGF[NMePhe]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[NMePhe6]GpTx-1(1-34)	0.24	10.56	2.59	0.14	10.7	18.8	1.8
291	{H}-DCLGF[pI-Phe]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[pI-Phe6]GpTx-1(1-34)	0.02	0.95	0.04	-	2.6	-	-
292	{H}-DCLGF[1'NMeW]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[1'NMeW6]GpTx-1(1-34)	0.04	5.66	0.42	0.03	10.2	16.6	1.6
293	{H}-DCLGF[4CO2-F]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4CO2-F6]GpTx-1(1-34)	15.79	11.11	21.50	13.78	1.4	1.6	1.1
294	{H}-DCLGF[2PAL]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[2PAL6]GpTx-1(1-34)	0.37	9.11	7.04	0.09	18.8	75.3	4.0
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 13. Electrophysiology by IonWorks® Quattro: Substitutions at position 7 or 8 relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
43	{H}-DCLGFMAKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala7]GpTx-1(1-34)	0.94	21.55	4.72	0.83	5.0	5.7	1.1
145	{H}-DCLGFMEKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Glu7]GpTx-1(1-34)	0.88	19.11	20.15	1.68	22.9	12.0	0.5
40	{H}-DCLGFMKKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Lys7]GpTx-1(1-34)	0.53	23.28	6.48	0.47	12.1	13.8	1.1
115	{H}-DCLGFM[Cit]KCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Cit7]GpTx-1(1-34)	0.63	14.37	6.52	0.56	10.3	11.7	1.1
295	{H}-DCLGFM[K(Me2)]KCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[K(Me2)7]GpTx-1(1-34)	0.82	13.27	10.69	0.27	13.0	39.0	3.0
296	{H}-DCLGFM[SDMA]KCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[SDMA7]GpTx-1(1-34)	0.24	10.34	4.89	0.12	20.2	39.2	1.9
44	{H}-DCLGFMRACIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala8]GpTx-1(1-34)	0.49	16.77	4.73	0.41	9.6	11.4	1.2
25	{H}-DCLGFMRECIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Glu8]GpTx-1(1-34)	1.70	24.85	13.46	1.36	7.9	9.9	1.2
65	{H}-DCLGFMRRCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Arg8]GpTx-1(1-34)	0.14	13.76	1.78	0.12	13.1	14.4	1.1
118	{H}-DCLGFMRTCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Thr8]GpTx-1(1-34)	0.35	9.86	6.13	0.15	17.4	41.3	2.4
297	{H}-DCLGFMR[SDMA]CIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[SDMA8]GpTx-1(1-34)	0.20	9.05	5.47	0.20	28.0	27.1	1.0
298	{H}-DCLGFMR[K(Me2)]CIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[K(Me2)8]GpTx-1(1-34)	0.19	9.46	4.43	0.18	23.1	25.2	1.1
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 14. Electrophysiology by IonWorks® Quattro: Substitutions at position 10 relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
45	{H}-DCLGFMRKCAPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala10]GpTx-1(1-34)	0.21	16.48	2.95	0.19	14.1	15.5	1.1
146	{H}-DCLGFMRKCEPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Glu10]GpTx-1(1-34)	0.09	9.55	4.47	0.15	50.9	29.8	0.6
41	{H}-DCLGFMRKCKPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Lys10]GpTx-1(1-34)	0.24	9.00	2.57	0.15	10.9	17.3	1.6
66	{H}-DCLGFMRKCRPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Arg10]GpTx-1(1-34)	0.16	15.24	0.89	0.11	5.4	8.0	1.5
83	{H}-DCLGFMRKCWPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Trp10]GpTx-1(1-34)	0.10	8.02	4.35	0.19	44.1	23.1	0.5
78	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[1-Nal10]GpTx-1(1-34)	0.15	10.03	9.02	0.21	58.3	42.9	0.7
90	{H}-DCLGFMRKCNPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Asn10]GpTx-1(1-34)	0.49	14.14	9.33	0.19	19.2	49.4	2.6
119	{H}-DCLGFMRKCDPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Asp10]GpTx-1(1-34)	0.22	11.34	8.36	0.16	37.4	52.9	1.4
299	{H}-DCLGFMRKCYPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Tyr10]GpTx-1(1-34)	0.14	5.41	0.96	0.07	6.7	14.5	2.2
300	{H}-DCLGFMRKC[NMeTrp]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[NMeTrp10]GpTx-1(1-34)	0.08	9.89	1.93	0.07	24.4	28.9	1.2
301	{H}-DCLGFMRKCVPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Val10]GpTx-1(1-34)	0.10	7.88	1.41	0.09	13.6	15.3	1.1
302	{H}-DCLGFMRKCFPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Phe10]GpTx-1(1-34)	0.11	5.33	1.08	0.08	9.7	12.8	1.3
303	{H}-DCLGFMRKCLPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Leu10]GpTx-1(1-34)	0.13	8.13	2.54	0.08	19.1	30.9	1.6
304	{H}-DCLGFMRKCHPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[His10]GpTx-1(1-34)	0.05	6.36	0.69	0.03	15.0	20.8	1.4
305	{H}-DCLGFMRKCSPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ser10]GpTx-1(1-34)	0.05	4.64	1.95	0.09	36.6	22.2	0.6
307	{H}-DCLGFMRKCMPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Met10]GpTx-1(1-	0.09	3.38	3.09	0.10	32.9	32.4	1.0

		34)							
308	{H}-DCLGFMRKCPPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Pro10]GpTx-1(1-34)	0.40	>5	1.19	0.24	3.0	5.0	1.7
309	{H}-DCLGFMRKCTPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Thr10]GpTx-1(1-34)	0.10	>5	1.08	0.06	10.7	17.7	1.7
310	{H}-DCLGFMRKC[4CO2-F]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4CO2-F10]GpTx-1(1-34)	0.28	6.87	3.94	0.23	14.2	17.3	1.2
311	{H}-DCLGFMRKC[2PAL]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[2PAL10]GpTx-1(1-34)	0.19	8.83	2.91	0.04	15.4	66.3	4.3
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 15. Electrophysiology by IonWorks® Quattro: Substitutions at position 11 or 12 relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
46	{H}-DCLGFMRKCIADNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala11]GpTx-1(1-34)	0.21	16.05	2.97	0.18	14.4	16.6	1.2
147	{H}-DCLGFMRKCIEDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Glu11]GpTx-1(1-34)	0.22	15.61	6.64	0.21	30.7	32.0	1.0
171	{H}-DCLGFMRKCIWDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Trp11]GpTx-1(1-34)	0.07	9.50	1.66	0.04	22.4	36.9	1.6
4	{H}-DCLGFMRKCIPANDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala12]GpTx-1(1-34)	0.12	8.05	0.70	0.13	6.0	5.4	0.9
26	{H}-DCLGFMRKCIPENDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Glu12]GpTx-1(1-34)	0.26	6.45	2.24	0.19	8.5	11.9	1.4
42	{H}-DCLGFMRKCIPKNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Lys12]GpTx-1(1-34)	0.12	6.51	0.53	0.09	4.5	5.8	1.3
67	{H}-DCLGFMRKCIPRNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Arg12]GpTx-1(1-34)	0.11	5.00	0.52	0.14	4.6	3.8	0.8
172	{H}-DCLGFMRKCIPWNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Trp12]GpTx-1(1-34)	0.05	8.04	0.49	0.04	10.4	12.7	1.2
162	{H}-DCLGFMRKCIP[1-Nal]NDKCCRPNLVCSRTHKWCKYVF-{Amide}	[1-Nal12]GpTx-1(1-34)	0.06	9.88	0.55	0.04	9.4	12.3	1.3
91	{H}-DCLGFMRKCIPSNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ser12]GpTx-1(1-34)	0.08	9.58	1.68	0.19	20.5	8.9	0.4
194	{H}-DCLGFMRKCIPGNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Gly12]GpTx-1(1-34)	0.075	8.764	0.510	0.047	6.8	10.9	1.6
195	{H}-DCLGFMRKCIPINDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ile12]GpTx-1(1-34)	0.662	18.322	5.834	0.607	8.8	9.6	1.1
193	{H}-DCLGFMRKCIPLNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Leu12]GpTx-1(1-34)	0.080	6.832	0.586	0.071	7.4	8.2	1.1
196	{H}-DCLGFMRKCIPTNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Thr12]GpTx-1(1-34)	0.097	7.079	0.649	0.074	6.7	8.8	1.3

197	{H}-DCLGFMRKCIPYNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Tyr12]GpTx-1(1-34)	0.098	6.920	0.475	0.042	4.8	11.2		2.3
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8		0.9

Table 16. Electrophysiology by IonWorks® Quattro: Substitutions at position 13 relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
5	{H}-DCLGFMRKCIPDADKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala13]GpTx-1(1-34)	0.17	8.15	2.64	0.16	15.9	16.9	1.1
27	{H}-DCLGFMRKCIPDEDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Glu13]GpTx-1(1-34)	0.26	9.38	4.41	0.22	17.2	19.8	1.2
48	{H}-DCLGFMRKCIPDKDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Lys13]GpTx-1(1-34)	0.21	9.72	2.44	0.13	11.5	19.1	1.7
103	{H}-DCLGFMRKCIPDRDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Arg13]GpTx-1(1-34)	0.16	15.96	4.64	0.22	29.4	21.4	0.7
173	{H}-DCLGFMRKCIPDWDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Trp13]GpTx-1(1-34)	0.09	17.29	2.28	0.05	26.2	49.3	1.9
163	{H}-DCLGFMRKCIPD[1-Nal]DKCCRPNLVCSRTHKWCKYVF-{Amide}	[1-Nal13]GpTx-1(1-34)	0.11	8.27	2.84	0.09	24.9	32.4	1.3
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 17. Electrophysiology by IonWorks® Quattro: Substitutions at position 15 relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
6	{H}-DCLGFMRKCIPDNDACCRPNLVCSRTHKWCKYVF-{Amide}	[Ala15]GpTx-1(1-34)	0.22	9.64	4.68	0.19	21.5	24.2	1.1
28	{H}-DCLGFMRKCIPDNDECCRPNLVCSRTHKWCKYVF-{Amide}	[Glu15]GpTx-1(1-34)	0.59	12.09	8.75	0.49	14.8	17.8	1.2
68	{H}-DCLGFMRKCIPDNDRCCRPNLVCSRTHKWCKYVF-{Amide}	[Arg15]GpTx-1(1-34)	0.20	18.14	2.27	0.14	11.2	16.0	1.4
92	{H}-DCLGFMRKCIPDNDQCCRPNLVCSRTHKWCKYVF-{Amide}	[Gln15]GpTx-1(1-34)	0.13	7.60	2.42	0.12	19.3	20.9	1.1
312	{H}-DCLGFMRKCIPDND[SDMA]CCRPNLVCSRTHKWCKYVF-{Amide}	[SDMA15]GpTx-1(1-34)	0.14	9.67	1.96	0.15	14.0	13.0	0.9
313	{H}-DCLGFMRKCIPDND[K(Me2)]CCRPNLVCSRTHKWCKYVF-{Amide}	[K(Me2)15]GpTx-1(1-34)	0.19	10.13	4.75	0.13	24.4	36.6	1.5
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 18. Electrophysiology by IonWorks® Quattro: Substitutions at position 18 or 19 relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.7	Nav1.7/ Nav1.3
148	{H}-DCLGFMRKCIPDNDKCCEPNLVCSRTHKWCKYVF-{Amide}	[Glu18]GpTx-1(1-34)	0.22	14.60	4.95	0.21	22.8	23.7	1.0
49	{H}-DCLGFMRKCIPDNDKCCKPNLVCSRTHKWCKYVF-{Amide}	[Lys18]GpTx-1(1-34)	0.30	17.56	3.78	0.21	12.5	18.1	1.4
174	{H}-DCLGFMRKCIPDNDKCCWPNLVCSRTHKWCKYVF-{Amide}	[Trp18]GpTx-1(1-34)	0.19	14.73	8.66	0.08	46.6	108.0	2.3
116	{H}-DCLGFMRKCIPDNDKCC[Cit]PNLVCSRTHKWCKYVF-{Amide}	[Cit18]GpTx-1(1-34)	0.17	11.00	5.24	0.23	30.2	23.1	0.8
314	{H}-DCLGFMRKCIPDNDKCC[K(Me2)]PNLVCSRTHKWCKYVF-{Amide}	[K(Me2)18]GpTx-1(1-34)	0.21	6.55	6.70	0.08	31.8	82.8	2.6
315	{H}-DCLGFMRKCIPDNDKCC[SDMA]PNLVCSRTHKWCKYVF-{Amide}	[SDMA18]GpTx-1(1-34)	0.14	10.48	3.41	0.10	25.1	32.8	1.3
316	{H}-DCLGFMRKCIPDNDKCC[2PAL]PNLVCSRTHKWCKYVF-{Amide}	[2PAL18]GpTx-1(1-34)	0.19	9.17	9.85	0.06	51.9	167.0	3.2
50	{H}-DCLGFMRKCIPDNDKCCRKNLVCSRTHKWCKYVF-{Amide}	[Lys19]GpTx-1(1-34)	0.12	10.63	4.29	0.18	36.2	24.2	0.7
157	{H}-DCLGFMRKCIPDNDKCCRRNLVCSRTHKWCKYVF-{Amide}	[Arg19]GpTx-1(1-34)	0.07	6.16	1.42	0.06	21.0	23.4	1.1
181	{H}-DCLGFMRKCIPDNDKCCRSNLVCSRTHKWCKYVF-{Amide}	[Ser19]GpTx-1(1-34)	0.088	11.392	3.107	0.031	35.5	101.2	2.9
93	{H}-DCLGFMRKCIPDNDKCCRSSNLVCSRTHKWCKYVF-{Amide}	[Ser-Ser19]GpTx-1(1-34)	0.27	13.92	6.67	0.32	24.3	20.6	0.8
126	{H}-DCLGFMRKCIPDNDKCCRGNLVCSRTHKWCKYVF-{Amide}	[Gly19]GpTx-1(1-34)	0.10	11.92	1.82	0.11	18.6	17.2	0.9
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 19. Electrophysiology by IonWorks® Quattro: Substitutions at position 20 or 21 relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
7	{H}-DCLGFMRKCIPDNDKCCRPALVCSRTHKWCKYVF-{Amide}	[Ala20]GpTx-1(1-34)	0.69	19.53	7.13	0.41	10.4	17.5	1.7
149	{H}-DCLGFMRKCIPDNDKCCRPELVCSRTHKWCKYVF-{Amide}	[Glu20]GpTx-1(1-34)	1.42	7.49	20.92	1.02	14.7	20.6	1.4
51	{H}-DCLGFMRKCIPDNDKCCRPKLVCSRTHKWCKYVF-{Amide}	[Lys20]GpTx-1(1-34)	0.61	18.96	3.72	0.33	6.1	11.4	1.9
69	{H}-DCLGFMRKCIPDNDKCCRPRLVCSRTHKWCKYVF-{Amide}	[Arg20]GpTx-1(1-34)	0.17	14.91	1.42	0.08	8.5	17.8	2.1
175	{H}-DCLGFMRKCIPDNDKCCRPWLVCSRTHKWCKYVF-{Amide}	[Trp20]GpTx-1(1-34)	0.05	7.39	0.85	0.02	16.7	37.6	2.3
164	{H}-DCLGFMRKCIPDNDKCCRP[1-Nal]LVCSRTHKWCKYVF-{Amide}	[1-Nal20]GpTx-1(1-34)	0.07	7.36	0.42	0.06	5.7	6.4	1.1
200	{H}-DCLGFMRKCIPDNDKCCRPYLVCSRTHKWCKYVF-{Amide}	[Tyr20]GpTx-1(1-34)	0.116	9.054	1.145	0.055	9.8	20.8	2.1
198	{H}-DCLGFMRKCIPDNDKCCRPGLVCSRTHKWCKYVF-{Amide}	[Gly20]GpTx-1(1-34)	0.229	9.754	2.629	0.126	11.5	20.9	1.8
199	{H}-DCLGFMRKCIPDNDKCCRPFLVCSRTHKWCKYVF-{Amide}	[Phe20]GpTx-1(1-34)	0.154	10.787	1.837	0.067	12.0	27.4	2.3
176	{H}-DCLGFMRKCIPDNDKCCRPNWVCSRTHKWCKYVF-{Amide}	[Trp21]GpTx-1(1-34)	0.10	13.75	2.65	0.05	26.8	48.6	1.8
165	{H}-DCLGFMRKCIPDNDKCCRPN[1-Nal]VCSRTHKWCKYVF-{Amide}	[1-Nal21]GpTx-1(1-34)	0.08	10.63	3.17	0.09	38.9	35.5	0.9
120	{H}-DCLGFMRKCIPDNDKCCRPNMVCSRTHKWCKYVF-{Amide}	[Met21]GpTx-1(1-34)	0.14	9.54	1.79	0.09	12.9	19.3	1.5
317	{H}-DCLGFMRKCIPDNDKCCRPN[4CO2-F]VCSRTHKWCKYVF-{Amide}	[4CO2-F21]GpTx-1(1-34)	3.98	8.90	19.74	3.67	5.0	5.4	1.1

318	{H}-DCLGFMRKCIPDNDKCCRPN[2PAL]VCSRTHKWCKYVF-{Amide}	[2PAL21]GpTx-1(1-34)	0.18	7.52	3.48	0.08	19.8	41.6	2.1
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 20. Electrophysiology by IonWorks® Quattro: Substitutions at position 22 relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
8	{H}-DCLGFMRKCIPDNDKCCRPNLACSRTHKWCKYVF-{Amide}	[Ala22]GpTx-1(1-34)	0.38	20.43	13.76	0.32	36.1	43.2	1.2
102	{H}-DCLGFMRKCIPDNDKCCRPNLECSRTHKWCKYVF-{Amide}	[Glu22]GpTx-1(1-34)	1.40	20.78	8.31	2.14	6.0	3.9	0.7
52	{H}-DCLGFMRKCIPDNDKCCRPNLKCSRTHKWCKYVF-{Amide}	[Lys22]GpTx-1(1-34)	0.19	15.03	1.96	0.08	10.4	25.7	2.5
158	{H}-DCLGFMRKCIPDNDKCCRPNLRCSRTHKWCKYVF-{Amide}	[Arg22]GpTx-1(1-34)	0.06	8.20	0.70	0.03	11.7	24.3	2.1
177	{H}-DCLGFMRKCIPDNDKCCRPNLWCSRTHKWCKYVF-{Amide}	[Trp22]GpTx-1(1-34)	0.03	8.02	4.23	0.06	137.2	75.1	0.5
319	{H}-DCLGFMRKCIPDNDKCCRPNLFCSRTHKWCKYVF-{Amide}	[Phe22]GpTx-1(1-34)	0.70	>5	>5	1.02	-	-	0.7
320	{H}-DCLGFMRKCIPDNDKCCRPNLPCSRTHKWCKYVF-{Amide}	[Pro22]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-
321	{H}-DCLGFMRKCIPDNDKCCRPNLICSRTHKWCKYVF-{Amide}	[Ile22]GpTx-1(1-34)	0.08	11.51	1.54	0.07	19.3	20.6	1.1
322	{H}-DCLGFMRKCIPDNDKCCRPNLLCSRTHKWCKYVF-{Amide}	[Leu22]GpTx-1(1-34)	0.09	9.58	0.83	0.07	9.3	11.4	1.2
323	{H}-DCLGFMRKCIPDNDKCCRPNLSCSRTHKWCKYVF-{Amide}	[Ser22]GpTx-1(1-34)	0.10	4.42	1.44	0.09	14.7	16.1	1.1
324	{H}-DCLGFMRKCIPDNDKCCRPNLGCSRTHKWCKYVF-{Amide}	[Gly22]GpTx-1(1-34)	0.14	10.86	4.66	0.10	33.5	45.2	1.4
325	{H}-DCLGFMRKCIPDNDKCCRPNLNCSRTHKWCKYVF-{Amide}	[Asn22]GpTx-1(1-34)	0.24	8.07	1.78	0.09	7.5	19.3	2.6
326	{H}-DCLGFMRKCIPDNDKCCRPNLHCSRTHKWCKYVF-{Amide}	[His22]GpTx-1(1-34)	0.41	15.64	2.51	0.10	6.0	24.1	4.0
327	{H}-DCLGFMRKCIPDNDKCCRPNLDCSRTHKWCKYVF-{Amide}	[Asp22]GpTx-1(1-34)	1.50	13.26	7.31	0.63	4.9	11.7	2.4
328	{H}-DCLGFMRKCIPDNDKCCRPNL[NMePhe]CSRTHKWCKYVF-{Amide}	[NMePhe22]GpTx-1(1-34)	20.60	20.39	18.40	7.37	0.9	2.5	2.8

329	{H}-DCLGFMRKCIPDNDKCCRPNLTCSRTHKWCKYVF-{Amide}	[Thr22]GpTx-1(1-34)	0.12	4.59	1.38	0.08	11.3	18.2	1.6
330	{H}-DCLGFMRKCIPDNDKCCRPNL[Phg]CSRTHKWCKYVF-{Amide}	[Phg22]GpTx-1(1-34)	0.18	4.69	1.82	0.07	10.0	25.0	2.5
331	{H}-DCLGFMRKCIPDNDKCCRPNLYCSRTHKWCKYVF-{Amide}	[Tyr22]GpTx-1(1-34)	0.56	4.26	7.91	0.50	14.1	15.9	1.1
332	{H}-DCLGFMRKCIPDNDKCCRPNLMCSRTHKWCKYVF-{Amide}	[Met22]GpTx-1(1-34)	0.09	4.61	0.43	0.08	4.9	5.5	1.1
333	{H}-DCLGFMRKCIPDNDKCCRPNL[4CO2-F]CSRTHKWCKYVF-{Amide}	[4CO2-F22]GpTx-1(1-34)	5.77	7.50	22.51	4.47	3.9	5.0	1.3
334	{H}-DCLGFMRKCIPDNDKCCRPNL[2PAL]CSRTHKWCKYVF-{Amide}	[2PAL22]GpTx-1(1-34)	0.33	10.96	6.80	0.14	20.5	49.4	2.4
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 21. Electrophysiology by IonWorks® Quattro: Substitutions at position 24 or 25 relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
142	{H}-DCLGFMRKCIPDNDKCCRPNLVCARTHKWCKYVF-{Amide}	[Ala24]GpTx-1(1-34)	0.47	8.20	1.93	0.25	4.1	7.8	1.9
150	{H}-DCLGFMRKCIPDNDKCCRPNLVCERTHKWCKYVF-{Amide}	[Glu24]GpTx-1(1-34)	6.12	11.48	23.12	6.78	3.8	3.4	0.9
9	{H}-DCLGFMRKCIPDNDKCCRPNLVCSATHKWCKYVF-{Amide}	[Ala25]GpTx-1(1-34)	0.30	18.78	6.19	0.84	20.8	7.3	0.4
151	{H}-DCLGFMRKCIPDNDKCCRPNLVCSETHKWCKYVF-{Amide}	[Glu25]GpTx-1(1-34)	0.71	13.99	16.27	1.17	22.8	13.9	0.6
53	{H}-DCLGFMRKCIPDNDKCCRPNLVCSKTHKWCKYVF-{Amide}	[Lys25]GpTx-1(1-34)	0.38	15.21	3.89	0.24	10.4	16.2	1.6
117	{H}-DCLGFMRKCIPDNDKCCRPNLVCS[Cit]THKWCKYVF-{Amide}	[Cit25]GpTx-1(1-34)	0.32	8.87	10.49	0.51	32.3	20.6	0.6
335	{H}-DCLGFMRKCIPDNDKCCRPNLVCS[K(Me2)]THKWCKYVF-{Amide}	[K(Me2)25]GpTx-1(1-34)	0.31	7.93	13.57	0.11	43.2	126.4	2.9
336	{H}-DCLGFMRKCIPDNDKCCRPNLVCS[SDMA]THKWCKYVF-{Amide}	[SDMA25]GpTx-1(1-34)	0.14	9.22	2.68	0.11	19.8	23.5	1.2
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 22. Electrophysiology by IonWorks® Quattro: Substitutions at position 26 relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
10	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRAHKWCKYVF-{Amide}	[Ala26]GpTx-1(1-34)	0.25	10.45	3.16	0.17	12.5	18.2	1.5
152	{H}-DCLGFMRKCIPDNDKCCRPNLVCSREHKWCKYVF-{Amide}	[Glu26]GpTx-1(1-34)	0.68	17.15	23.59	0.71	34.5	33.5	1.0
54	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRKHKWCKYVF-{Amide}	[Lys26]GpTx-1(1-34)	0.05	7.96	0.75	0.02	14.5	43.0	3.0
70	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRRHKWCKYVF-{Amide}	[Arg26]GpTx-1(1-34)	0.03	3.06	0.53	0.008	15.5	68.3	4.4
178	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRWHKWCKYVF-{Amide}	[Trp26]GpTx-1(1-34)	0.03	5.84	0.63	0.02	19.7	27.4	1.4
94	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRKTKWCKYVF-{Amide}	[Lys26;Thr27]GpTx-1(1-34)	0.10	9.29	3.52	0.05	36.2	65.7	1.8
121	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKWCKYVF-{Amide}	[Leu26]GpTx-1(1-34)	0.07	10.20	3.45	0.07	51.9	46.8	0.9
337	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRHHKWCKYVF-{Amide}	[His26]GpTx-1(1-34)	0.10	4.52	10.31	0.08	100.6	124.4	1.2
338	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRSHKWCKYVF-{Amide}	[Ser26]GpTx-1(1-34)	0.10	12.32	1.12	0.09	11.2	12.9	1.2
339	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRQHKWCKYVF-{Amide}	[Gln26]GpTx-1(1-34)	0.14	17.95	1.90	0.09	13.2	21.5	1.6
340	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRYHKWCKYVF-{Amide}	[Tyr26]GpTx-1(1-34)	0.08	5.51	1.24	0.06	16.2	19.7	1.2
341	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRFHKWCKYVF-{Amide}	[Phe26]GpTx-1(1-34)	0.08	5.88	1.47	0.10	18.8	15.2	0.8
342	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRNHKWCKYVF-{Amide}	[Asn26]GpTx-1(1-34)	0.09	6.29	1.08	0.10	11.6	10.9	0.9
343	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRGHKWCKYVF-{Amide}	[Gly26]GpTx-1(1-34)	0.10	4.07	0.99	0.09	10.1	11.1	1.1

344	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRVHKWCKYVF-{Amide}	[Val26]GpTx-1(1-34)	0.06	8.93	1.57	0.04	24.9	37.9	1.5
345	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRPHKWCKYVF-{Amide}	[Pro26]GpTx-1(1-34)	0.18	6.65	1.78	0.16	9.7	11.5	1.2
346	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRMHKWCKYVF-{Amide}	[Met26]GpTx-1(1-34)	0.04	4.24	1.28	0.02	31.8	73.1	2.3
347	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRDHKWCKYVF-{Amide}	[Asp26]GpTx-1(1-34)	0.96	14.12	5.38	0.64	5.6	8.4	1.5
348	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRIHKWCKYVF-{Amide}	[Ile26]GpTx-1(1-34)	0.05	8.15	2.05	0.03	42.2	58.8	1.4
349	{H}-DCLGFMRKCIPDNDKCCRPNLVCSR[2PAL]HKWCKYV F-{Amide}	[2PAL26]GpTx-1(1-34)	0.26	10.60	5.14	0.06	19.6	86.3	4.4
350	{H}-DCLGFMRKCIPDNDKCCRPNLVCSR[4CO2-F]HKWCKYVF-{Amide}	[4CO2-F26]GpTx-1(1-34)	0.40	6.46	18.59	2.62	46.3	7.1	0.2
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 23. Electrophysiology by IonWorks® Quattro: Substitutions at position 27 or 28 relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
11	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTAKWCKYVF-{Amide}	[Ala27]GpTx-1(1-34)	0.95	14.71	3.94	1.15	4.1	3.4	0.8
29	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTEKWCKYVF-{Amide}	[Glu27]GpTx-1(1-34)	8.54	15.16	21.40	12.26	2.5	1.7	0.7
55	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTKKWCKYVF-{Amide}	[Lys27]GpTx-1(1-34)	1.51	11.53	6.16	2.48	4.1	2.5	0.6
71	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTRKWCKYVF-{Amide}	[Arg27]GpTx-1(1-34)	0.51	5.22	2.61	0.51	5.2	5.1	1.0
84	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTWKWCKYVF-{Amide}	[Trp27]GpTx-1(1-34)	0.32	5.59	2.57	0.59	8.0	4.4	0.5
166	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[1-Nal]KWCKYVF-{Amide}	[1-Nal27]GpTx-1(1-34)	0.30	0.88	0.62	0.43	2.0	1.5	0.7
109	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTFKWCKYVF-{Amide}	[Phe27]GpTx-1(1-34)	0.22	2.06	2.92	0.53	13.2	5.5	0.4
110	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTYKWCKYVF-{Amide}	[Tyr27]GpTx-1(1-34)	0.19	6.39	5.78	0.31	29.9	18.4	0.6
111	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTLKWCKYVF-{Amide}	[Leu27]GpTx-1(1-34)	1.15	6.19	9.04	1.01	7.9	8.9	1.1
351	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[4CO2-F]KWCKYVF-{Amide}	[4CO2-F27]GpTx-1(1-34)	15.44	6.65	19.35	8.41	1.3	2.3	1.8

352	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[2PAL]KWCKYVF-{Amide}	[2PAL27]GpTx-1(1-34)	0.09	7.82	2.93	0.05	33.5	61.4		1.8
353	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[SDMA]KWCKYVF-{Amide}	[SDMA27]GpTx-1(1-34)	2.00	8.32	9.84	2.42	4.9	4.1		0.8
354	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[K(Me2)]KWCKYVF-{Amide}	[K(Me2)27]GpTx-1(1-34)	7.00	12.39	11.94	3.82	1.7	3.1		1.8
12	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHAWCKYVF-{Amide}	[Ala28]GpTx-1(1-34)	0.36	17.34	6.86	0.66	19.2	10.4		0.5
153	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	[Glu28]GpTx-1(1-34)	0.34	14.07	13.93	0.80	41.4	17.5		0.4
72	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{Amide}	[Arg28]GpTx-1(1-34)	0.08	8.95	7.55	0.13	93.8	58.1		0.6
355	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTH[K(Me2)]WCKYVF-{Amide}	[K(Me2)28]GpTx-1(1-34)	0.27	8.73	14.42	0.19	54.4	76.5		1.4
356	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTH[SDMA]WCKYVF-{Amide}	[SDMA28]GpTx-1(1-34)	0.18	9.52	5.01	0.23	28.1	22.1		0.8
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8		0.9

Table 24. Electrophysiology by IonWorks® Quattro: Substitutions at position 29 relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
47	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKACKYVF-{Amide}	[Ala29]GpTx-1(1-34)	11.74	16.17	4.49	27.50	0.4	0.2	0.4
30	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKECKYVF-{Amide}	[Glu29]GpTx-1(1-34)	18.06	18.91	23.53	16.05	1.3	1.5	1.1
56	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKKCKYVF-{Amide}	[Lys29]GpTx-1(1-34)	20.10	14.74	27.34	24.53	1.4	1.1	0.8
104	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKRCKYVF-{Amide}	[Arg29]GpTx-1(1-34)	9.73	18.76	7.35	11.39	0.8	0.6	0.9
79	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[1-Nal]CKYVF-{Amide}	[1-Nal29]GpTx-1(1-34)	0.46	9.25	16.23	1.55	35.1	10.5	0.3
113	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKYCKYVF-{Amide}	[Tyr29]GpTx-1(1-34)	1.46	9.49	9.52	4.03	6.5	2.4	0.4
114	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKLCKYVF-{Amide}	[Leu29]GpTx-1(1-34)	6.99	7.27	23.17	9.80	3.3	2.4	0.7
112	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKFCKYVF-{Amide}	[Phe29]GpTx-1(1-34)	2.18	6.21	15.19	4.82	7.0	3.1	0.5
129	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[2-Nal]CKYVF-{Amide}	[2-Nal29]GpTx-1(1-34)	0.58	11.67	9.46	0.73	16.2	12.9	0.8
357	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[NMeTrp]CKYVF-{Amide}	[NMeTrp29]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-
358	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[pI-Phe]CKYVF-{Amide}	[pI-Phe29]GpTx-1(1-34)	1.01	14.90	12.98	1.27	12.9	10.2	0.8
359	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[NMePhe]CKYVF-{Amide}	[NMePhe29]GpTx-1(1-34)	19.15	18.84	15.35	7.39	0.8	2.1	2.6
360	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[Bip]CKYVF-{Amide}	[Bip29]GpTx-1(1-34)	4.79	9.77	19.69	6.95	4.1	2.8	0.7

361	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[1'NMeW]CKYVF-{Amide}	[1'NMeW29]GpTx-1(1-34)	3.89	12.24	7.04	4.58	1.8	1.5		0.9
362	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[Phg]CKYVF-{Amide}	[Phg29]GpTx-1(1-34)	5.52	7.85	16.33	3.18	3.0	5.1		1.7
363	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[4CO2-F]CKYVF-{Amide}	[4CO2-F29]GpTx-1(1-34)	15.03	18.77	19.34	14.94	1.3	1.3		1.0
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8		0.9

Table 25. Electrophysiology by IonWorks® Quattro: Substitutions at position 31 or 32 relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
13	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCAYVF-{Amide}	[Ala31]GpTx-1(1-34)	7.94	14.54	5.96	7.39	0.7	0.8	1.1
31	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCEYVF-{Amide}	[Glu31]GpTx-1(1-34)	22.96	21.69	20.41	13.06	0.9	1.6	1.8
73	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCRYVF-{Amide}	[Arg31]GpTx-1(1-34)	1.36	9.17	7.14	4.95	5.2	1.4	0.3
179	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCWYVF-{Amide}	[Trp31]GpTx-1(1-34)	23.61	10.84	21.31	10.17	0.9	2.1	2.3
364	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWC[2PAL]YVF-{Amide}	[2PAL31]GpTx-1(1-34)	10.95	9.49	21.73	16.93	2.0	1.3	0.6
365	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWC[SDMA]YVF-{Amide}	[SDMA31]GpTx-1(1-34)	4.15	14.21	10.75	4.55	2.6	2.4	0.9
14	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKAVF-{Amide}	[Ala32]GpTx-1(1-34)	0.80	20.61	5.96	0.77	7.5	7.8	1.0
32	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKEVF-{Amide}	[Glu32]GpTx-1(1-34)	13.95	22.80	22.80	9.14	1.6	2.5	1.5
57	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKKVF-{Amide}	[Lys32]GpTx-1(1-34)	4.96	10.89	15.71	4.19	3.2	3.8	1.2
159	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKRVF-{Amide}	[Arg32]GpTx-1(1-34)	1.02	8.65	18.71	0.87	18.4	21.5	1.2
85	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKWVF-{Amide}	[Trp32]GpTx-1(1-34)	0.09	6.74	4.99	0.16	53.5	31.3	0.6
167	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[1-Nal]VF-{Amide}	[1-Nal32]GpTx-1(1-34)	0.004	3.96	0.15	0.001	36.0	135.0	3.8
246	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[1'NMeW]VF-{Amide}	[1'NMeW32]GpTx-1(1-34)	0.06	14.44	21.36	0.03	372.6	806.3	2.2
366	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKQVF-{Amide}	[Gln32]GpTx-1(1-34)	4.87	21.01	12.08	2.39	2.5	5.1	2.0

367	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKIVF-{Amide}	[Ile32]GpTx-1(1-34)	0.07	8.71	1.33	0.06	19.9	23.0	1.2
368	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKMVF-{Amide}	[Met32]GpTx-1(1-34)	0.35	6.21	5.99	0.14	17.1	42.9	2.5
369	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKTVF-{Amide}	[Thr32]GpTx-1(1-34)	3.54	11.05	11.19	3.29	3.2	3.4	1.1
370	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[NMePhe]VF-{Amide}	[NMePhe32]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-
371	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[NMeTrp]VF-{Amide}	[NMeTrp32]GpTx-1(1-34)	4.88	>5	>5	>5	-	-	-
372	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKVVF-{Amide}	[Val32]GpTx-1(1-34)	0.15	14.81	1.59	0.08	10.7	19.5	1.8
373	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKLVF-{Amide}	[Leu32]GpTx-1(1-34)	0.12	8.83	1.19	0.08	10.0	14.1	1.4
374	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[Phg]VF-{Amide}	[Phg32]GpTx-1(1-34)	0.14	7.06	1.80	0.10	13.2	18.9	1.4
375	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[Cha]VF-{Amide}	[Cha32]GpTx-1(1-34)	0.05	8.88	0.39	0.02	8.0	16.7	2.1
376	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[Bip]VF-{Amide}	[Bip32]GpTx-1(1-34)	0.03	2.90	0.19	0.00	7.0	68.6	9.8
377	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKFVF-{Amide}	[Phe32]GpTx-1(1-34)	0.05	6.84	0.67	0.05	12.3	13.7	1.1
378	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKGVF-{Amide}	[Gly32]GpTx-1(1-34)	0.71	11.18	7.97	0.62	11.3	12.8	1.1
379	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKNVF-{Amide}	[Asn32]GpTx-1(1-34)	4.86	10.56	8.40	6.85	1.7	1.2	0.7
380	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKHVF-{Amide}	[His32]GpTx-1(1-34)	0.60	10.16	7.18	0.75	11.9	9.6	0.8
381	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[pI-Phe]VF-{Amide}	[pI-Phe32]GpTx-1(1-34)	0.03	4.44	0.30	0.01	11.7	49.6	4.3
382	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKSVF-{Amide}	[Ser32]GpTx-1(1-34)	3.95	>5	>5	1.47	-	-	2.7
383	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKPVF-{Amide}	[Pro32]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-

384	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[2PAL]VF-{Amide}	[2PAL32]GpTx-1(1-34)	0.81	7.65	19.08	0.66	23.4	28.8	1.2
385	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[4CO2-F]VF-{Amide}	[4CO2-F32]GpTx-1(1-34)	11.42	7.70	19.26	4.05	1.7	4.8	2.8
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 26. Electrophysiology by IonWorks® Quattro: Substitutions at position 33 relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
15	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYAF-{Amide}	[Ala33]GpTx-1(1-34)	0.33	18.60	4.40	0.35	13.5	12.5	0.9
33	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYEF-{Amide}	[Glu33]GpTx-1(1-34)	0.56	11.48	10.26	0.39	18.4	26.3	1.4
58	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYKF-{Amide}	[Lys33]GpTx-1(1-34)	0.07	9.56	1.28	0.07	18.6	19.3	1.0
74	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYRF-{Amide}	[Arg33]GpTx-1(1-34)	0.08	9.55	2.11	0.05	26.7	40.0	1.5
180	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYWF-{Amide}	[Trp33]GpTx-1(1-34)	0.05	9.06	0.63	0.009	12.0	70.3	5.9
168	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[1-Nal]F-{Amide}	[1-Nal33]GpTx-1(1-34)	0.06	15.74	0.57	0.02	9.2	26.7	2.9
95	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYQF-{Amide}	[Gln33]GpTx-1(1-34)	0.12	10.59	9.56	0.11	81.2	85.7	1.1
248	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYIF-{Amide}	[Ile33]GpTx-1(1-34)	0.15	6.89	21.63	0.09	142.1	238.9	1.7
249	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[pI-Phe]F-{Amide}	[pI-Phe33]GpTx-1(1-34)	0.09	7.78	11.54	0.06	127.3	192.9	1.5
250	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[1'NMeW]F-{Amide}	[1'NMeW33]GpTx-1(1-34)	0.09	5.35	7.87	0.07	88.9	120.1	1.4
386	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[Cha]F-{Amide}	[Cha33]GpTx-1(1-34)	0.07	12.18	1.12	0.07	15.4	15.5	1.0
388	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[NMePhe]F-{Amide}	[NMePhe33]GpTx-1(1-34)	1.28	>5	4.91	1.09	3.8	4.5	1.2

389	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[NMeTrp]F-{Amide}	[NMeTrp33]GpTx-1(1-34)	0.35	>5	1.55	0.29	4.5	5.4	1.2
390	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYFF-{Amide}	[Phe33]GpTx-1(1-34)	0.06	8.66	0.74	0.04	12.7	18.5	1.5
391	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYMF-{Amide}	[Met33]GpTx-1(1-34)	0.07	15.06	1.54	0.08	20.8	20.3	1.0
392	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYHF-{Amide}	[His33]GpTx-1(1-34)	0.02	8.16	0.32	0.01	19.6	33.2	1.7
393	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[Phg]F-{Amide}	[Phg33]GpTx-1(1-34)	0.02	7.63	0.50	0.04	22.9	13.1	0.6
394	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYNF-{Amide}	[Asn33]GpTx-1(1-34)	0.36	7.94	1.22	0.07	3.4	16.3	4.8
395	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYDF-{Amide}	[Asp33]GpTx-1(1-34)	0.77	8.79	3.87	0.17	5.0	22.4	4.4
396	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYTF-{Amide}	[Thr33]GpTx-1(1-34)	0.02	3.78	1.29	0.04	70.8	28.9	0.4
397	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYSF-{Amide}	[Ser33]GpTx-1(1-34)	0.04	6.28	1.14	0.06	26.0	19.0	0.7
398	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYPF-{Amide}	[Pro33]GpTx-1(1-34)	5.19	6.93	6.87	3.34	1.3	2.1	1.6
399	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYYF-{Amide}	[Tyr33]GpTx-1(1-34)	0.07	>5	2.03	0.03	30.3	69.4	2.3
400	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYLF-{Amide}	[Leu33]GpTx-1(1-34)	0.13	>5	0.82	0.07	6.3	11.3	1.8
401	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYGF-{Amide}	[Gly33]GpTx-1(1-34)	0.29	>5	1.62	0.04	5.6	40.0	7.1
402	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[2PAL]F-{Amide}	[2PAL33]GpTx-1(1-34)	0.12	8.36	11.61	0.16	98.2	72.3	0.7
403	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[4CO2-F]F-{Amide}	[4CO2-F33]GpTx-1(1-34)	0.16	9.06	9.23	0.31	59.1	29.8	0.5
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 27. Electrophysiology by IonWorks® Quattro: Substitutions at position 34 relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
101	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVA-{Amide}	[Ala34]GpTx-1(1-34)	7.19	9.33	16.41	4.76	2.3	3.5	1.5
34	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVE-{Amide}	[Glu34]GpTx-1(1-34)	16.98	16.76	16.97	11.17	1.0	1.5	1.5
59	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVK-{Amide}	[Lys34]GpTx-1(1-34)	5.68	18.06	20.19	7.74	3.6	2.6	0.7
75	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVR-{Amide}	[Arg34]GpTx-1(1-34)	3.58	8.99	22.67	4.69	6.3	4.8	0.8
86	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVW-{Amide}	[Trp34]GpTx-1(1-34)	0.26	10.02	6.70	0.18	25.7	36.3	1.4
80	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{Amide}	[1-Nal34]GpTx-1(1-34)	0.02	10.24	0.94	0.03	40.9	31.5	0.8
96	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVI-{Amide}	[Ile34]GpTx-1(1-34)	0.28	10.79	5.33	0.28	18.8	19.0	1.0
122	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVL-{Amide}	[Leu34]GpTx-1(1-34)	0.24	8.46	3.31	0.13	13.5	25.4	1.9
130	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[2-Nal]-{Amide}	[2-Nal34]GpTx-1(1-34)	0.04	3.59	0.34	0.02	8.7	14.3	1.6
404	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVf-{Amide}	[D-Phe34]GpTx-1(1-34)	0.98	20.72	6.15	0.52	6.3	11.8	1.9
405	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[Cha]-{Amide}	[Cha34]GpTx-1(1-34)	0.02	5.53	0.63	0.01	26.3	57.7	2.2
406	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[Phg]-{Amide}	[Phg34]GpTx-1(1-34)	0.04	5.95	0.27	0.02	6.2	11.9	1.9

407	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[NMeTrp]-{Amide}	[NMeTrp34]GpTx-1(1-34)	6.85	10.16	10.29	4.64	1.5	2.2	1.5
408	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[NMePhe]-{Amide}	[NMePhe34]GpTx-1(1-34)	10.05	18.85	9.29	4.56	0.9	2.0	2.2
409	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[1'NMeW]-{Amide}	[1'NMeW34]GpTx-1(1-34)	0.09	5.61	1.22	0.07	14.1	18.3	1.3
410	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[4CO2-F]-{Amide}	[4CO2-F34]GpTx-1(1-34)	9.19	7.11	21.92	6.31	2.4	3.5	1.5
411	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[2PAL]-{Amide}	[2PAL34]GpTx-1(1-34)	5.82	8.16	21.31	4.83	3.7	4.4	1.2
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

Table 28. Electrophysiology by IonWorks® Quattro: Substitutions at position 35 and C-terminal deletions relative to SEQ ID NO:1 and free acids

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
16	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFA-{Amide}	GpTx-1(1-34)-Ala	0.41	14.15	7.13	0.26	17.6	27.2	1.5
35	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFE-{Amide}	GpTx-1(1-34)-Glu	4.47	19.59	21.73	2.47	4.9	8.8	1.8
60	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFK-{Amide}	GpTx-1(1-34)-Lys	0.59	12.53	7.00	0.21	11.8	32.7	2.8
76	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFR-{Amide}	GpTx-1(1-34)-Arg	0.30	9.73	5.53	0.10	18.5	56.3	3.0
131	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[2-Nal]-{Amide}	GpTx-1(1-34)-2-Nal	0.05	2.55	0.44	0.02	9.2	18.2	2.0
87	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFW-{Amide}	GpTx-1(1-34)-Trp	0.05	7.87	2.69	0.07	55.0	36.0	0.7
133	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFW-{FreeAcid}	GpTx-1(1-34)-Trp-FreeAcid	0.48	8.28	2.15	0.11	4.5	19.9	4.4
412	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[2-Nal]-{Amide}	GpTx-1(1-34)-2-Nal	0.05	2.55	0.44	0.02	9.2	18.2	2.0
413	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[4CO2-F]-{Amide}	GpTx-1(1-34)-4CO2-F	1.15	8.65	12.34	5.35	10.7	2.3	0.2
414	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[2PAL]-{Amide}	GpTx-1(1-34)-2PAL	0.26	9.29	9.78	0.63	38.1	15.5	0.4

415	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV-{Amide}	GpTx-1(1-33)	2.35	10.84	10.61	1.30	4.5	8.1		1.8
416	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY-{Amide}	GpTx-1(1-32)	1.50	8.64	11.48	0.88	7.6	13.1		1.7
417	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK-{Amide}	GpTx-1(1-31)	18.32	11.88	6.94	9.09	0.4	0.8		2.0
107	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{FreeAcid}	GpTx-1(1-34)-FreeAcid	1.98	9.44	6.75	0.54	3.4	12.5		3.7
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8		0.9

Table 29. Electrophysiology by IonWorks® Quattro: Substitutions, additions or deletions at multiple positions relative to SEQ ID NO:1.

SEQ ID NO.	Amino Acid Sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
2	{H}-dclgfmrkcipdndkccrpnlvcsrthkwckyvf-{Amide}	[All D-isomer]GpTx-1(1-34)	7.51	11.27	18.01	21.05	2.4	0.9	0.4
140	{H}-DALGFMRKCIPDNDKCARPNLVCSRTHKWCKYVF-{Amide}	[Ala2,17]GpTx-1(1-34)	2.45	18.95	15.39	0.79	6.3	19.4	3.1
125	{H}-D[2-Abu]LGFMRKCIPDNDKC[2-Abu]RPNLVCSRTHKWCKYVF-{Amide}	[2-Abu2,17]GpTx-1(1-34)	0.30	9.51	11.58	0.24	38.9	48.6	1.2
135	{H}-DCLGFMRK[2-Abu]IPDNDKCCRPNLV[2-Abu]SRTHKWCKYVF-{Amide}	[2-Abu9,23]GpTx-1(1-34)	8.14	9.21	20.81	12.27	2.6	1.7	0.7
139	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[2-Nal]W-{Amide}	[2-Nal34]GpTx-1(1-34)-Trp	0.11	2.12	0.30	0.05	2.7	6.5	2.4
99	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKKV[1-Nal]W-{Amide}	[Lys32;1-Nal34]GpTx-1(1-34)-Trp	0.11	9.14	3.19	0.16	28.0	20.3	0.7
136	{H}-DCLG[2-Nal]MRKCIPDNDKCCRPNLVCSRTHKWCKYV[2-Nal]-{Amide}	[2-Nal5,34]GpTx-1(1-34)	0.14	5.14	0.29	0.03	2.1	10.7	5.1
137	{H}-DCLG[2-Nal]MRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{Amide}	[2-Nal5;1-Nal34]GpTx-1(1-34)	0.11	3.15	0.24	0.02	2.2	10.4	4.7
134	{H}-DCLGFMRKCIPDNDKCCEGLVCSRTHKWCKYVF-{Amide}	[Glu18;desAsn20]GpTx-1(1-34)	0.89	11.54	8.95	0.51	10.0	17.7	1.8
138	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]W-{Amide}	[1-Nal34]GpTx-1(1-34)-Trp	0.13	2.57	0.55	0.07	4.3	7.8	1.8
127	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKKVFW-{Amide}	[Lys32]GpTx-1(1-34)-Trp	0.73	18.91	8.41	0.70	11.5	12.0	1.0

252	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCK YWF-{Amide}	[Ala5;Trp33]GpTx-1(1-34)	0.23	5.00	3.86	0.40	16.7	9.7	0.6
253	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCK WVF-{Amide}	[Ala5;Trp32]GpTx-1(1-34)	0.27	5.00	5.00	0.53	18.6	9.5	0.5
254	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCK[1-Nal]VF-{Amide}	[Ala5;1-Nal32]GpTx-1(1-34)	0.06	5.00	4.43	0.20	77.9	21.6	0.3
255	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRLHKWCK YVF-{Amide}	[Ala5;Leu26]GpTx-1(1-34)	0.28	5.00	5.00	0.68	17.7	7.4	0.4
256	{H}-DCLGA[1-Nal]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;1-Nal6]GpTx-1(1-34)	0.10	5.00	1.15	0.06	11.4	19.5	1.7
257	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHKWCK YVF-{Amide}	[Ala5;Phe6]GpTx-1(1-34)	0.07	5.00	2.24	0.05	32.0	48.8	1.5
258	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCK Y[1-Nal]F-{Amide}	[Ala5;1-Nal33]GpTx-1(1-34)	0.38	5.00	4.83	0.80	12.6	6.0	0.5
259	{H}-DCLGAMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;1-Nal10]GpTx-1(1-34)	1.50	5.00	5.00	3.12	3.3	1.6	0.5
260	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHRWCK YVF-{Amide}	[Ala5;Arg28]GpTx-1(1-34)	0.33	5.00	5.00	0.24	15.2	20.6	1.4
261	{H}-DCLGAWRKCIPDNDKCCRPNLVCSRTHKWCK YVF-{Amide}	[Ala5;Trp6]GpTx-1(1-34)	1.01	5.00	5.00	0.67	5.0	7.5	1.5
262	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRLHRWCK YVF-{Amide}	[Ala5;Phe6;Leu26;Arg28]GpTx-1(1-34)	0.05	5.00	5.00	0.04	110.5	131.1	1.2
263	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRLHKWCK YVF-{Amide}	[Ala5;Phe6;Leu26]GpTx-1(1-34)	0.08	5.00	5.00	0.05	63.1	105.1	1.7

419	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCK YEF-{Amide}	[Ala5;Glu33]GpTx-1(1-34)	4.00	9.04	11.46	3.58	2.9	3.2		1.1
420	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHRWCK Y[1-Nal]F-{Amide}	[Ala5;Arg28;1-Nal33]GpTx-1(1-34)	0.20	7.50	12.77	0.32	62.9	39.9		0.6
421	{H}-DCLGAMRKCIPDNDKCCRP[1-Nal]LVCSRTHKWCKYVF-{Amide}	[Ala5;1-Nal20]GpTx-1(1-34)	0.16	4.42	0.25	0.25	1.6	1.0		0.6
422	{H}-DCLGAMRKCIPDNDKCCRPWLVCSRTHKWCK YVF-{Amide}	[Ala5;Trp20]GpTx-1(1-34)	0.28	>5	>5	0.39	-	-		0.7
423	{H}-DCLGAMRKCIPWNDKCCRPNLVCSRTHKWCK YVF-{Amide}	[Ala5;Trp12]GpTx-1(1-34)	0.43	>5	>5	1.09	-	-		0.4
424	{H}-DCLWAMRKCIPDNDKCCRPNLVCSRTHKWCK YVF-{Amide}	[Trp4;Ala5]GpTx-1(1-34)	0.49	>5	>5	1.17	-	-		0.4
425	{H}-[1-Nal]CLGAMRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{Amide}	[1-Nal1;Ala5]GpTx-1(1-34)	0.50	>5	>5	0.77	-	-		0.6
426	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCK YAF-{Amide}	[Ala5,33]GpTx-1(1-34)	0.58	>5	>5	1.58	-	-		0.4
427	{H}-DCLGAMRKCIPD[1-Nal]DKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;1-Nal13]GpTx-1(1-34)	0.65	>5	>5	1.18	-	-		0.6
428	{H}-DCLGAMRKCIPDWDKCCRPNLVCSRTHKWCK YVF-{Amide}	[Ala5;Trp13]GpTx-1(1-34)	0.67	>5	>5	1.10	-	-		0.6
429	{H}-DCLEAMRKCIPDNDKCCRPNLVCSRTHKWCK YVF-{Amide}	[Glu4;Ala5]GpTx-1(1-34)	4.64	>5	>5	3.99	-	-		1.2
430	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCK YVE-{Amide}	[Ala5;Glu34]GpTx-1(1-34)	>5	>5	>5	>5	-	-		-
431	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCK YVA-{Amide}	[Ala5,34]GpTx-1(1-34)	>5	>5	>5	>5	-	-		-

432	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKAVF-{Amide}	[Ala5,32]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-
433	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCAYVF-{Amide}	[Ala5,31]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-
434	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKACKYVF-{Amide}	[Ala5,29]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-
435	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Glu28]GpTx-1(1-34)	>5	3.66	0.23	>5	-	-	-
436	{H}-DCLGAMEKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Glu7]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-
437	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKECKYVF-{Amide}	[Ala5;Glu29]GpTx-1(1-34)	11.93	9.26	22.27	6.09	1.9	3.7	2.0
438	{H}-DCLGAMRKCIPDNDKCCRPNLVCSETHKWCKYVF-{Amide}	[Ala5;Glu25]GpTx-1(1-34)	5.50	18.21	21.08	5.95	3.8	3.5	0.9
439	{H}-DCLGAMRKCIPDNDECCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Glu15]GpTx-1(1-34)	2.41	10.81	20.47	4.80	8.5	4.3	0.5
251	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCK[1-Nal]VF-{Amide}	[Arg28;1-Nal32]GpTx-1(1-34)	0.005	2.56	0.19	0.002	35.9	112.3	3.1
440	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKWVF-{Amide}	[1-Nal10;Trp32]GpTx-1(1-34)	0.37	>5	4.58	0.26	12.5	17.9	1.4
441	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHRWCKYVF-{Amide}	[1-Nal10;Arg28]GpTx-1(1-34)	0.02	>5	1.29	0.04	52.7	36.4	0.7
442	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCKY[1-Nal]F-{Amide}	[Arg28;1-Nal33]GpTx-1(1-34)	0.03	>5	0.60	0.04	20.2	13.6	0.7

443	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCK WVF-{Amide}	[Arg28;Trp32]GpTx-1(1-34)	0.07	4.92	2.49	0.07	38.2	35.0	0.9
444	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCK YWF-{Amide}	[Arg28;Trp33]GpTx-1(1-34)	0.03	>5	0.68	0.04	19.6	18.2	0.9
445	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHRWCK YVF-{Amide}	[Leu26;Arg28]GpTx-1(1-34)	0.03	>5	>5	0.06	-	-	0.6
446	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKWCK WVF-{Amide}	[Leu26;Trp32]GpTx-1(1-34)	0.04	>5	2.92	0.06	75.9	51.8	0.7
447	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKWCK YWF-{Amide}	[Leu26;Trp33]GpTx-1(1-34)	0.03	>5	0.95	0.02	36.7	43.5	1.2
448	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRTHRWCK YVF-{Amide}	[Trp6;Arg28]GpTx-1(1-34)	0.01	2.91	0.33	0.01	28.7	37.9	1.3
449	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRTHKWCK WVF-{Amide}	[Trp6,32]GpTx-1(1-34)	0.03	2.93	0.25	0.01	8.6	29.2	3.4
450	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK WWF-{Amide}	[Trp32,33]GpTx-1(1-34)	0.05	11.50	0.38	0.03	7.1	11.0	1.6
451	{H}-DCLGF[1-Nal]RKCIPDNDKCCRPNLVCSRTHKWCKWVF-{Amide}	[1-Nal6;Trp32]GpTx-1(1-34)	0.004	>5	2.53	0.02	572.7	161.3	0.3
452	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCK[1-Nal]VF-{Amide}	[1-Nal10,32]GpTx-1(1-34)	0.005	>5	4.51	0.003	956.6	1322.1	1.4
453	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKWCK[1-Nal]VF-{Amide}	[Leu26;1-Nal32]GpTx-1(1-34)	0.01	>5	1.69	0.01	289.5	161.2	0.6
454	{H}-DCLGF[1-Nal]RKCIPDNDKCCRPNLVCSRTHRWCKYVF-{Amide}	[1-Nal6;Arg28]GpTx-1(1-34)	0.01	>5	4.42	0.01	732.2	661.7	0.9

455	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKW[1-Nal]F-{Amide}	[Trp32;1-Nal33]GpTx-1(1-34)	0.02	>5	>5	0.04	-	-	0.6
456	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRLHKWCKYVF-{Amide}	[Trp6;Leu26]GpTx-1(1-34)	0.03	>5	2.91	0.01	91.6	228.8	2.5
457	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRLHKWCKYVF-{Amide}	[1-Nal10;Leu26]GpTx-1(1-34)	0.06	>5	2.53	0.03	44.2	76.0	1.7
458	{H}-DCLGFWRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Trp6;1-Nal10]GpTx-1(1-34)	0.06	>5	>5	0.05	-	-	1.2
459	{H}-DCLGFMRKC[1-Nal]PWNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[1-Nal10;Trp12]GpTx-1(1-34)	0.08	>5	0.70	0.09	8.5	7.8	0.9
460	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[1-Nal]WF-{Amide}	[1-Nal32;Trp33]GpTx-1(1-34)	0.08	>5	1.43	0.03	17.1	47.8	2.8
461	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRTHKWCKY[1-Nal]F-{Amide}	[Trp6;1-Nal33]GpTx-1(1-34)	0.10	>5	1.38	0.05	13.4	28.5	2.1
462	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKY[1-Nal]F-{Amide}	[1-Nal10,33]GpTx-1(1-34)	0.11	>5	0.88	0.07	8.2	13.0	1.6
463	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKWCKY[1-Nal]F-{Amide}	[Leu26;1-Nal33]GpTx-1(1-34)	0.13	>5	>5	0.18	-	-	0.7
464	{H}-WDCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	Trp-[1-Nal10]GpTx-1(1-34)	0.20	>5	2.61	0.22	13.1	12.0	0.9
465	{H}-WCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Trp1;1-Nal10]GpTx-1(1-34)	0.23	>5	1.98	0.15	8.7	13.0	1.5
466	{H}-[1-Nal]CLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[1-Nal1,10]GpTx-1(1-34)	0.61	>5	>5	0.43	-	-	1.4

467	{H}-DCLGFMRKCSPDNDKCCRPNLVCSRKHKWC KYEI-{Amide}	GpTx-2	4.34	7.21	11.73	1.15	2.7	10.2		3.8
468	{H}-DCLGWFKGCDPDNDKCCEGYKCNRRDKWCK YKL-{Amide}	GpTx-3	8.93	7.80	20.00	9.37	2.2	2.1		1.0
469	{H}-DCLGWFKGCDPDNDKCCENYKCNRREQWCK YKL-{Amide}	GpTx-4	9.25	10.38	11.00	4.92	1.2	2.2		1.9
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK YVF-{Amide}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8		0.9
471	{H}-DCLGWFKGCDPDNDKCCEGYKCNRRDKWCK YKLWK-{FreeAcid}	GpTx-6(1-35)	9.6	14.6	17.4	1.7	1.8	10.0		5.5
472	{H}-DCLGWFKGCDPDNDKCCEGYKCNRRDKWCK YKLW-{FreeAcid}	GpTx-6(1-34)	1.3	7.3	4.1	0.54	3.2	7.6		2.4
593	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTH[Atz(20 kDa PEG)]WCKYVF-{Amide}	[Phe6,Atz(20kDa Peg)28]GpTx-1(1-34)	3.5	15.6	13.4	4.5	3.8	3.0		0.8
594	{H}-DCLGFFRKCIPDNDKCCRPNL[Atz(20kDa PEG)]CSRTHKWCKYVF-{Amide}	[Phe6,Atz(20kDa Peg)22]GpTx-1(1-34)	3.2	11.0	12.9	5.7	4.0	2.3		0.6
595	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKECKYVF-{Amide}	[1-Nal10;Glu29]GpTx-1(1-34)	9.8	18.9	11.2	10.8	1.1	1.0		0.9
596	{H}-DCLG[3Pal]MRKCIPDNDKCCRPNLVCSRTHK WCKYVF-{Amide}	[3Pal5]GpTx-1(1-34)	2.6	>5	>5	>5	1.9	1.0		0.5
597	{H}-DCLGAFRKCIPDYDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Phe6;Tyr13;Arg28]GpTx-1(1-34)-FreeAcid	>5	7.35	>5	1.1	-	-		-
598	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHGWCK YVF-{FreeAcid}	[Ala5;Leu6;Gly28]GpTx-1(1-34)-FreeAcid	>5	12.57	>5	4.0	-	-		-
599	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHHWCK YVF-{FreeAcid}	[Ala5;Leu6;His28]GpTx-1(1-34)-FreeAcid	>5	12.65	>5	2.2	-	-		-

600	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{FreeAcid}	[Ala5;Leu6]GpTx-1(1-34)-FreeAcid	>5	12.63	>5	3.1	-	-	-
601	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHNWCKYVF-{FreeAcid}	[Ala5;Leu6;Asn28]GpTx-1(1-34)-FreeAcid	>5	10.02	>5	2.6	-	-	-
602	{H}-DCLGaFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[D-Ala5;Phe6]GpTx-1(1-34)	2.1	13.1	8.1	2.7	3.8	3.0	0.8
603	{H}-DCLG[bAla]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[bAla5;Phe6]GpTx-1(1-34)	15.3	9.5	9.1	11.8	0.6	0.8	1.3
604	{H}-DCLG[Aib]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Aib5;Phe6]GpTx-1(1-34)	0.44	6.4	7.9	0.61	17.9	12.8	0.7
605	{H}-DCLG[2-Abu]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[2-Abu5;Phe6]GpTx-1(1-34)	0.17	9.5	5.6	0.36	33.2	15.5	0.5
606	{H}-DCLG[Nva]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Nva5;Phe6]GpTx-1(1-34)	0.084	7.8	2.7	0.17	32.3	16.1	0.5
607	{H}-DCLG[Nle]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Nle5;Phe6]GpTx-1(1-34)	0.016	11.3	1.0	0.067	64.4	15.1	0.2
608	{H}-DCLG[OctylG]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[OctylG5;Phe6]GpTx-1(1-34)	11.3	20.2	15.8	21.8	1.4	0.7	0.5
609	{H}-DCLG[Tle]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Tle5;Phe6]GpTx-1(1-34)	0.081	6.7	4.6	0.26	56.4	17.6	0.3
610	{H}-DCLG[hLeu]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[hLeu5;Phe6]GpTx-1(1-34)	0.011	8.2	0.76	0.041	70.1	18.7	0.3
611	{H}-DCLGMFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Met5;Phe6]GpTx-1(1-34)	0.043	13.3	2.4	0.11	55.7	20.9	0.4
612	{H}-DCLGLFRKCIPDNDKCCRPNLVCSRTHKWCKY	[Leu5;Phe6]GpTx-1(1-34)	0.057	20.1	3.4	0.22	59.8	15.6	0.3

	VF-{Amide}								
613	{H}-DCLG[3Pal]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[3Pal5;Phe6]GpTx-1(1-34)	0.95	18.7	21.6	3.6	22.7	5.9	0.3
614	{H}-DCLG[Thi]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Thi5;Phe6]GpTx-1(1-34)	0.012	4.1	1.1	0.077	88.3	14.3	0.2
615	{H}-DCLG[Cpg]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Cpg5;Phe6]GpTx-1(1-34)	0.035	5.6	2.0	0.12	55.9	16.7	0.3
616	{H}-DCLG[Chg]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Chg5;Phe6]GpTx-1(1-34)	0.023	6.9	1.2	0.075	54.0	16.6	0.3
617	{H}-DCLGSFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ser5;Phe6]GpTx-1(1-34)	0.76	11.9	13.9	1.7	18.2	8.0	0.4
618	{H}-DCLGVFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Val5;Phe6]GpTx-1(1-34)	0.12	9.4	2.3	0.099	19.1	23.3	1.2
619	{H}-DCLG[4-Bz-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4-Bz-F5;Phe6]GpTx-1(1-34)	0.14	7.7	0.57	0.042	4.0	13.8	3.4
620	{H}-DCLG[DiMeO-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[DiMeO-F5;Phe6]GpTx-1(1-34)	0.64	10.4	10.1	0.99	15.7	10.2	0.6
621	{H}-DCLG[DiCl-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[DiCl-F5;Phe6]GpTx-1(1-34)	0.048	4.1	0.16	0.005	3.4	29.7	8.8
622	{H}-DCLG[pI-Phe]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[pI-Phe5;Phe6]GpTx-1(1-34)	12.3	12.9	22.9	21.0	1.9	1.1	0.6
623	{H}-DCLG[4CF3-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4CF3-F5;Phe6]GpTx-1(1-34)	0.096	7.1	0.23	0.013	2.3	17.1	7.3
624	{H}-DCLG[4-F-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4-F-F5;Phe6]GpTx-1(1-34)	0.060	11.7	0.27	0.020	4.5	13.7	3.1
625	{H}-DCLG[4-Me-	[4-Me-F5;Phe6]GpTx-	0.063	6.5	0.70	0.051	11.1	13.8	1.2

	F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	1(1-34)							
626	{H}-DCLG[4tBu-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4tBu-F5;Phe6]GpTx-1(1-34)	0.052	4.7	0.26	0.021	5.0	12.6	2.5
627	{H}-DCLG[NMeVal]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[NMeVal5;Phe6]GpTx-1(1-34)	0.19	6.0	4.2	0.25	22.6	16.9	0.7
628	{H}-DCLG[NMeLeu]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[NMeLeu5;Phe6]GpTx-1(1-34)	0.076	8.4	1.4	0.091	17.9	15.0	0.8
629	{H}-DCLG[NMePhe]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[NMePhe5;Phe6]GpTx-1(1-34)	0.077	13.6	1.3	0.095	17.3	14.0	0.8
630	{H}-DCLG[2-Cl-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[2-Cl-F5;Phe6]GpTx-1(1-34)	0.060	5.8	0.35	0.009	5.9	38.9	6.6
631	{H}-DCLG[hPhe]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[hPhe5;Phe6]GpTx-1(1-34)	0.019	4.9	0.18	0.005	9.4	38.4	4.1
632	{H}-DCLG[Sar]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Sar5;Phe6]GpTx-1(1-34)	0.68	10.5	7.6	0.45	11.2	17.0	1.5
633	{H}-DCLGaLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[D-Ala5;Leu6]GpTx-1(1-34)	10.7	7.1	10.6	11.5	1.0	0.9	0.9
634	{H}-DCLG[bAla]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[bAla5;Leu6]GpTx-1(1-34)	9.3	14.1	22.0	18.1	2.4	1.2	0.5
635	{H}-DCLG[Aib]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Aib5;Leu6]GpTx-1(1-34)	0.23	14.8	14.8	0.38	64.6	39.1	0.6
636	{H}-DCLG[2-Abu]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[2-Abu5;Leu6]GpTx-1(1-34)	0.29	16.7	6.8	1.0	23.8	6.7	0.3
637	{H}-DCLG[Nva]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Nva5;Leu6]GpTx-1(1-34)	0.095	8.0	5.1	0.71	53.7	7.2	0.1

638	{H}-DCLG[Nle]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Nle5;Leu6]GpTx-1(1-34)	0.025	10.6	1.9	0.099	76.6	19.2	0.3
639	{H}-DCLG[OctylG]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[OctylG5;Leu6]GpTx-1(1-34)	0.015	1.7	0.11	0.033	7.8	3.5	0.4
640	{H}-DCLGAFRKCIPD[Pra]DKCCRPNLVCSRLHRWCKYVF-{Amide}	[Ala5,Phe6,Pra13,Leu26,Arg28]GpTx-1(1-34)	0.103	>5	4.9	0.090	47.3	54.6	1.2
641	{H}-DCLGMLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Met5;Leu6]GpTx-1(1-34)	0.069	>5	4.4	0.24	64.7	18.5	0.3
642	{H}-DCLG[3Pal]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[3Pal5;Leu6]GpTx-1(1-34)	1.7	>5	>5	3.9	-	-	0.4
643	{H}-DCLGSLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ser5;Leu6]GpTx-1(1-34)	1.3	>5	>5	3.2	-	-	0.4
644	{H}-DCLGVLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Val5;Leu6]GpTx-1(1-34)	0.15	>5	>5	0.48	-	-	0.3
645	{H}-DCLG[DiMeO-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[DiMeO-F5;Leu6]GpTx-1(1-34)	2.4	>5	>5	2.6	-	-	0.9
646	{H}-DCLG[Sar]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Sar5;Leu6]GpTx-1(1-34)	0.92	>5	>5	1.7	-	-	0.6
647	{H}-DCLGaMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[D-Ala5]GpTx-1(1-34)	4.5	>5	>5	>5	-	-	-
648	{H}-DCLG[bAla]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[bAla5]GpTx-1(1-34)	4.7	>5	>5	>5	-	-	-
649	{H}-DCLG[2-Abu]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[2-Abu5]GpTx-1(1-34)	0.69	>5	>5	1.3	-	-	0.5
650	{H}-DCLG[Nva]MRKCIPDNDKCCRPNLVCSRTHKW	[Nva5]GpTx-1(1-34)	0.20	>5	>5	0.57	-	-	0.3

	CKYVF-{Amide}								
651	{H}-DCLG[Nle]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Nle5]GpTx-1(1-34)	0.077	>5	3.0	0.17	39.6	17.6	0.4
652	{H}-DCLG[DiMeO-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[DiMeO-F5]GpTx-1(1-34)	2.9	>5	>5	3.6	-	-	0.8
653	{H}-DCLG[DiCl-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[DiCl-F5]GpTx-1(1-34)	0.14	>5	1.2	0.069	8.8	17.7	2.0
654	{H}-DCLG[4CF3-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4CF3-F5]GpTx-1(1-34)	0.32	>5	1.3	0.072	4.1	18.4	4.4
655	{H}-DCLG[4-F-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4-F-F5]GpTx-1(1-34)	0.26	>5	1.9	0.070	7.1	26.6	3.8
656	{H}-DCLG[NMeVal]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[NMeVal5]GpTx-1(1-34)	1.2	>5	>5	2.5	-	-	0.5
657	{H}-DCLG[NMePhe]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[NMePhe5]GpTx-1(1-34)	0.36	>5	>5	0.28	-	-	1.3
658	{H}-DCLG[Sar]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Sar5]GpTx-1(1-34)	1.5	>5	>5	2.0	-	-	0.7
659	{H}-DCLG[Tle]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Tle5;Leu6]GpTx-1(1-34)	0.26	>5	>5	0.58	-	-	0.4
660	{H}-DCLG[hLeu]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[hLeu5;Leu6]GpTx-1(1-34)	0.031	>5	0.80	0.059	25.6	13.6	0.5
661	{H}-DCLGLLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Leu5,6]GpTx-1(1-34)	0.095	>5	3.4	0.32	36.0	10.6	0.3
662	{H}-DCLG[Thi]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Thi5;Leu6]GpTx-1(1-34)	0.022	>5	0.93	0.068	42.7	13.6	0.3
663	{H}-	[Cpg5;Leu6]GpTx-1(1-	0.059	>5	2.2	0.24	36.6	9.1	0.2

	DCLG[Cpg]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	34)							
664	{H}-DCLG[Chg]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Chg5;Leu6]GpTx-1(1-34)	0.019	>5	1.3	0.11	65.3	11.4	0.2
665	{H}-DCLG[4-Bz-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4-Bz-F5;Leu6]GpTx-1(1-34)	0.23	>5	0.57	0.030	2.5	19.1	7.7
666	{H}-DCLG[DiCl-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[DiCl-F5;Leu6]GpTx-1(1-34)	0.029	4.5	0.32	0.016	10.9	20.2	1.9
667	{H}-DCLG[pI-Phe]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[pI-Phe5;Leu6]GpTx-1(1-34)	0.12	>5	0.39	0.017	3.2	23.3	7.3
668	{H}-DCLG[4CF3-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4CF3-F5;Leu6]GpTx-1(1-34)	0.18	4.4	0.47	0.011	2.6	42.8	16.3
669	{H}-DCLG[4-F-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4-F-F5;Leu6]GpTx-1(1-34)	0.091	>5	0.78	0.037	8.6	20.9	2.4
670	{H}-DCLG[4-Me-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4-Me-F5;Leu6]GpTx-1(1-34)	0.19	>5	0.99	0.055	5.2	17.9	3.4
671	{H}-DCLG[4tBu-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4tBu-F5;Leu6]GpTx-1(1-34)	0.14	>5	0.43	0.050	3.1	8.5	2.8
672	{H}-DCLG[NMeVal]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[NMeVal5;Leu6]GpTx-1(1-34)	0.47	>5	>5	0.75	-	-	0.6
673	{H}-DCLG[NMeLeu]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[NMeLeu5;Leu6]GpTx-1(1-34)	0.17	>5	>5	0.69	-	-	0.2
674	{H}-DCLG[NMePhe]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[NMePhe5;Leu6]GpTx-1(1-34)	0.24	>5	3.5	0.31	14.3	11.3	0.8
675	{H}-DCLG[2-Cl-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[2-Cl-F5;Leu6]GpTx-1(1-34)	0.066	>5	0.92	0.072	14.0	12.9	0.9

676	{H}-DCLG[hPhe]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[hPhe5;Leu6]GpTx-1(1-34)	0.016	>5	0.90	0.061	56.2	14.6	0.3
677	{H}-DCLG[OctylG]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[OctylG5]GpTx-1(1-34)	0.17	>5	0.89	0.17	5.2	5.1	1.0
678	{H}-DCLG[Tle]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Tle5]GpTx-1(1-34)	0.70	>5	>5	1.36	-	-	0.5
679	{H}-DCLG[hLeu]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[hLeu5]GpTx-1(1-34)	0.086	>5	2.2	0.24	26.0	9.4	0.4
680	{H}-DCLG[Cha]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Cha5;Phe6]GpTx-1(1-34)	0.019	3.5	0.38	0.032	20.1	11.9	0.6
681	{H}-DCLG[Cha]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Cha5;Leu6]GpTx-1(1-34)	0.023	>5	0.86	0.079	37.9	10.9	0.3
682	{H}-DCLG[Thi]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Thi5]GpTx-1(1-34)	0.11	>5	2.8	0.28	26.6	10.3	0.4
683	{H}-DCLG[Cpg]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Cpg5]GpTx-1(1-34)	0.23	>5	>5	0.63	-	-	0.4
684	{H}-DCLG[Chg]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Chg5]GpTx-1(1-34)	0.13	>5	4.6	0.36	34.1	12.6	0.4
685	{H}-DCLG[4-Bz-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4-Bz-F5]GpTx-1(1-34)	0.68	>5	3.3	0.15	4.8	21.2	4.4
686	{H}-DCLG[4-Me-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4-Me-F5]GpTx-1(1-34)	0.49	>5	2.2	0.18	4.5	12.5	2.8
687	{H}-DCLG[4tBu-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[4tBu-F5]GpTx-1(1-34)	0.27	>5	1.2	0.13	4.5	9.4	2.1
688	{H}-DCLG[NMeLeu]MRKCIPDNDKCCRPNLVCSRT	[NMeLeu5]GpTx-1(1-34)	0.29	>5	>5	0.73	-	-	0.4

	HKWCKYVF-{Amide}								
689	{H}-DCLG[2-Cl-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[2-Cl-F5]GpTx-1(1-34)	0.13	>5	1.9	0.11	14.2	18.2	1.3
690	{H}-DCLG[hPhe]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[hPhe5]GpTx-1(1-34)	0.090	>5	2.3	0.18	25.8	13.0	0.5
691	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Glu28]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-
692	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCK[1'NMeW]VF-{Amide}	[Ala5;1'NMeW32]GpTx-1(1-34)	0.18	>5	>5	0.63	-	-	0.3
693	{H}-DCLGMMRKCIPDNDKCCRPNLVCSRTHKWCK[1'NMeW]VF-{Amide}	[Met5;1'NMeW32]GpTx-1(1-34)	0.046	>5	4.3	0.10	95.0	43.0	0.5
694	{H}-DCLRMMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Arg4;Met5]GpTx-1(1-34)	0.080	>5	>5	0.29	-	-	0.3
695	{H}-DCLGFMRKCIPDNDKCCRSNLVCSRTHKWCK[1'NMeW]VF-{Amide}	[Ser19;1'NMeW32]GpTx-1(1-34)	0.030	>5	0.88	0.030	29.1	28.9	1.0
696	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Leu6]GpTx-1(1-34)	0.27	>5	>5	0.75	-	-	0.4
697	{H}-DCLGAGRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Gly6]GpTx-1(1-34)	8.1	>5	>5	4.4	-	-	1.8
698	{H}-DCLGAYRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Tyr6]GpTx-1(1-34)	4.4	>5	>5	>5	-	-	-
699	{H}-DCLGA[1'NMeW]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;1'NMeW6]GpTx-1(1-34)	0.34	>5	>5	0.32	-	-	1.1
700	{H}-DCLGAMRKCDPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Asp10]GpTx-1(1-34)	0.74	35	>50	0.84	-	-	0.9
701	{H}-	[Ala5;Asp10;Glu12]Gp	0.97	43	>50	1.5	-	-	0.6

	DCLGAMRKCDPENDKCCRPNLVCSRTHKWCKYVF-{Amide}	Tx-1(1-34)							
702	{H}-DCLGAFRKCDPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Phe6;Asp10]GpTx-1(1-34)	0.72	43	>50	0.37	-	-	1.9
703	{H}-DCLGAFRKCIPENDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Phe6;Glu12]GpTx-1(1-34)	0.61	45	15	0.20	23.9	73.9	3.1
704	{H}-DCLGVMRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Glu28]GpTx-1(1-34)	0.99	49	>50	>5	-	-	-
705	{H}-DCLG[Nva]MRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Glu28]GpTx-1(1-34)	0.43	33	>50	3.4	-	-	0.1
706	{H}-DCLG[2-Abu]MRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Glu28]GpTx-1(1-34)	1.4	>50	>50	>5	-	-	-
707	{H}-DCLG[2-Abu]LRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Leu6;Glu28]GpTx-1(1-34)	1.2	6	>50	>5	-	-	-
708	{H}-DCLG[Nva]LRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	[Nva5;Leu6;Glu28]GpTx-1(1-34)	0.37	31	>50	2.8	-	-	0.1
709	{H}-DCLGVLRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	[Val5;Leu6;Glu28]GpTx-1(1-34)	0.74	43	>50	4.8	-	-	0.2
710	{H}-DCLGVMRKCDPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Val5;Asp10]GpTx-1(1-34)	0.69	35	>50	1.3	-	-	0.5
711	{H}-DCLGVMRKCIPENDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Val5;Glu12]GpTx-1(1-34)	0.48	26	>50	0.75	-	-	0.6
712	{H}-DCLGVMRKCDPENDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Val5;Asp10;Glu12]GpTx-1(1-34)	0.46	34	>50	1.7	-	-	0.3
713	{H}-DCLGVMRKCIPDNDKCCRPNLVCS[Cit]THKWCKYVF-{Amide}	[Val5;Cit25]GpTx-1(1-34)	0.83	36	>50	4.2	-	-	0.2

714	{H}-DCLGTMRKCDPDNDKCCRPNLVCSRTHKWC KYVF-{Amide}	[Thr5;Asp10]GpTx-1(1-34)	1.6	48	>50	>5	-	-	-
715	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHGWCK YVF-{Amide}	[Ala5;Gly28]GpTx-1(1-34)	1.0	>50	>50	>5	-	-	-
716	{H}-D[2-Abu]LGAMRKCDPDNDKC[2-Abu]RPNLVCSRTHKWCKYVF-{Amide}	[2-Abu2,17;Ala5;Asp10]GpTx-1(1-34)	3.7	49	>50	>5	-	-	-
717	{H}-D[2-Abu]LG[Nva]LRKCIPDNDKC[2-Abu]RPNLVCSRTHEWCKYVF-{Amide}	[2-Abu2,17;Nva5;Leu6;Glu28]GpTx-1(1-34)	>5	>50	>50	>5	-	-	-
718	{H}-D[2-Abu]LG[2-Abu]LRKCIPDNDKC[2-Abu]RPNLVCSRTHEWCKYVF-{Amide}	[2-Abu2,5,17;Leu6;Glu28]GpTx-1(1-34)	4.3	>50	>50	>5	-	-	-
719	{H}-D[2-Abu]LGALRKCIPDNDKC[2-Abu]RPNLVCSRTHEWCKYVF-{Amide}	[2-Abu2,17;Ala5;Leu6;Glu28]GpTx-1(1-34)	4.3	>50	>50	>5	-	-	-
720	{H}-D[2-Abu]LGVLRKCIPDNDKC[2-Abu]RPNLVCSRTHEWCKYVF-{Amide}	[2-Abu2,17;Val5;Leu6;Glu28]GpTx-1(1-34)	>5	33	>50	>5	-	-	-
721	{H}-DCLGA[Nle]RKCIPDNDKCCRPNLVCSRTHKW CKYVF-{Amide}	[Ala5;Nle6]GpTx-1(1-34)	0.15	45	>50	0.41	-	-	0.4
722	{H}-DCLGA[Nle]RKCEPDNDKCCRPNLVCSRTHKW CKYVF-{Amide}	[Ala5;Nle6;Glu10]GpTx-1(1-34)	0.33	44	48	0.48	144.9	101.0	0.7
723	{H}-DCLGALRKCEPDNDKCCRPNLVCSRTHKWCK YVF-{Amide}	[Ala5;Leu6;Glu10]GpTx-1(1-34)	0.38	>50	>50	1.2	-	-	0.3
724	{H}-DCLGAFRKCEPDNDKCCRPNLVCSRTHKWCK YVF-{Amide}	[Ala5;Phe6;Glu10]GpTx-1(1-34)	0.38	36	41	0.32	109.5	130.1	1.2
725	{H}-DCLGA[Nle]RKCIPENDKCCRPNLVCSRTHKW CKYVF-{Amide}	[Ala5;Nle6;Glu12]GpTx-1(1-34)	0.38	47	>50	0.27	-	-	1.4
726	{H}-DCLGALRKCIPENDKCCRPNLVCSRTHKWCKY	[Ala5;Leu6;Glu12]GpTx-1(1-34)	0.35	>50	49	0.58	138.2	83.4	0.6

	VF-{Amide}								
727	{H}-DCLGA[Nle]RKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Nle6;Glu28]GpTx-1(1-34)	0.51	34	34	3.4	66.8	10.1	0.2
728	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Leu6;Glu28]GpTx-1(1-34)	1.6	43	41	6.6	26.7	6.3	0.2
729	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	[Ala5;Phe6;Glu28]GpTx-1(1-34)	1.1	48	>50	1.8	-	-	0.6
730	{H}-DCLGA[Nle]RKCIPDNDKCCRPNLVCSATHKWCKYVF-{Amide}	[Ala5,25;Nle6]GpTx-1(1-34)	0.84	47	49	1.7	58.0	29.3	0.5
731	{H}-DCLGALRKCIPDNDKCCRPNLVCSATHKWCKYVF-{Amide}	[Ala5,25;Leu6]GpTx-1(1-34)	0.60	38	37	2.8	61.5	13.2	0.2
732	{H}-DCLGAFRKCIPDNDKCCRPNLVCSATHKWCKYVF-{Amide}	[Ala5,25;Phe6]GpTx-1(1-34)	0.29	>50	45	0.60	156.1	73.7	0.5
733	{H}-DCLGA[Nle]RKCIPDNDKCCRPNLVCSETHKWCKYVF-{Amide}	[Ala5;Nle6;Glu25]GpTx-1(1-34)	1.6	33	42	5.2	25.9	8.1	0.3
734	{H}-DCLGALRKCIPDNDKCCRPNLVCSETHKWCKYVF-{Amide}	[Ala5;Leu6;Glu25]GpTx-1(1-34)	1.8	41	>50	9.3	-	-	0.2
735	{H}-DCLGAFRKCIPDNDKCCRPNLVCSETHKWCKYVF-{Amide}	[Ala5;Phe6;Glu25]GpTx-1(1-34)	1.5	41	48	3.6	32.0	13.3	0.4
736	{H}-DCLGFFRKCIPDND[Pra]CCRPNLVCSRTHKWCKYVF-{Amide}	[Phe6,Pra15]GpTx-1(1-34)	>5	32.6	>50	>5	-	-	-
737	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHHWCKYVF-{Amide}	[Ala5;His28]GpTx-1(1-34)	0.40	19.2	46.6	1.6	117.3	28.7	0.2
738	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHSWCKYVF-{Amide}	[Ala5;Ser28]GpTx-1(1-34)	0.65	21.9	>50	1.8	-	-	0.4
739	{H}-	[Ala5;Gln28]GpTx-1(1-	0.63	20.5	46.0	2.2	72.5	20.5	0.3

	DCLGAMRKCIPDNDKCCRPNLVCSRTHQWCK YVF-{Amide}	34)							
740	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[3Pal] WCKYVF-{Amide}	[Ala5;3Pal28]GpTx-1(1-34)	1.5	31.1	47.6	>5	32.5	-	-
741	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[4-aminoF]WCKYVF-{Amide}	[Ala5;4-aminoF28]GpTx-1(1-34)	1.1	24.4	>50	2.3	-	-	0.5
742	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[K(Ac)] WCKYVF-{Amide}	[Ala5;K(Ac)28]GpTx-1(1-34)	1.1	22.7	32.7	2.5	30.5	13.1	0.4
743	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[SDMA]WCKYVF-{Amide}	[Ala5;SDMA28]GpTx-1(1-34)	0.22	26.5	46.5	1.1	213.8	43.1	0.2
744	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[hArg] WCKYVF-{Amide}	[Ala5;hArg28]GpTx-1(1-34)	0.47	39.7	>50	0.82	-	-	0.6
745	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[R(Me)] WCKYVF-{Amide}	[Ala5;R(Me)28]GpTx-1(1-34)	0.25	40.0	>50	0.50	-	-	0.5
746	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Orn]W CKYVF-{Amide}	[Ala5;Orn28]GpTx-1(1-34)	0.29	20.7	>50	0.76	-	-	0.4
747	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Dap]W CKYVF-{Amide}	[Ala5;Dap28]GpTx-1(1-34)	0.37	38.3	34.5	0.78	94.0	44.4	0.5
748	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Cit]W CKYVF-{Amide}	[Ala5;Cit28]GpTx-1(1-34)	0.87	24.2	>50	2.7	-	-	0.3
749	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[HCit] WCKYVF-{Amide}	[Ala5;HCit28]GpTx-1(1-34)	0.79	20.3	46.4	2.3	58.6	20.1	0.3
750	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHDWCK YVF-{Amide}	[Asp28]GpTx-1(1-34)	0.73	37.9	49.6	0.77	67.8	64.1	0.9
751	{H}-DCLGGVRKCIPDNDKCCRPNLVCSRTHKWCK YVF-{Amide}	[Gly5;Val6]GpTx-1(1-34)	>5	25.5	49.3	>5	-	-	-

752	{H}-DCLGGIRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Gly5;Ile6]GpTx-1(1-34)	>5	25.4	44.7	>5	-	-	-
753	{H}-DCLG[2-Abu][Nle]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[2-Abu5;Nle6]GpTx-1(1-34)	0.06	40.2	>50	0.16	-	-	0.4
754	{H}-DCLGGFRKCEPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Gly5;Phe6;Glu10]GpTx-1(1-34)	0.35	34.2	>50	0.33	-	-	1.1
755	{H}-DCLGGFRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	[Gly5;Phe6;Glu28]GpTx-1(1-34)	>5	15.3	>50	>5	-	-	-
756	{4-Pen}-DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{Amide}	4-Pen-[Ala5;Phe6;2-Abu13;Arg28]GpTx-1(1-34)	0.18	44.4	>50	0.26	-	-	0.7
757	{4-Pen}-DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHKWCKYVF-{Amide}	4-Pen-[Ala5;Phe6;2-Abu13]GpTx-1(1-34)	0.71	34.9	>50	0.28	-	-	2.5
758	{4-Pen}-DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHKWCKYVF-{Amide}	4-Pen-[2-Abu5,13;Leu6]GpTx-1(1-34)	0.46	32.7	23.7	0.69	51.8	34.5	0.7
759	{4-Pen}-DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{Amide}	4-Pen-[Nva5;Leu6;2-Abu13;Arg28]GpTx-1(1-34)	0.10	46.2	28.0	0.23	270.9	121.0	0.4
760	{4-Pen}-DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRTHKWCKYVF-{Amide}	4-Pen-[Nva5;Leu6;2-Abu13]GpTx-1(1-34)	0.19	35.2	27.4	0.25	145.4	109.2	0.8
761	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Guf]WCKYVF-{Amide}	[Ala5;Guf28]GpTx-1(1-34)	0.16	26.9	>50	0.63	-	-	0.2
762	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Dab]WCKYVF-{Amide}	[Ala5;Dab28]GpTx-1(1-34)	0.32	23.3	>50	0.86	-	-	0.4
763	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHQWCKYVF-{Amide}	[Gln28]GpTx-1(1-34)	0.19	22.7	>50	0.27	-	-	0.7
764	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHFWCKYVF-{Amide}	[Ala5;Phe28]GpTx-1(1-34)	4.1	41.4	>50	>5	-	-	-
765	{H}-	[Ala5;Tyr28]GpTx-1(1-	0.79	42.0	46.8	1.4	58.8	33.2	0.6

	DCLGAMRKCIPDNDKCCRPNLVCSRTHYWCK YVF-{Amide}	34)							
766	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHLWCK YVF-{Amide}	[Ala5;Leu28]GpTx-1(1-34)	1.1	49.3	36.9	2.7	33.4	13.7	0.4
767	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHNWCK YVF-{Amide}	[Ala5;Asn28]GpTx-1(1-34)	1.7	>50	43.8	3.2	25.6	13.6	0.5
768	{H}-DCLGAMRKCIPDNDKCCRPNLVCS[Cit]THKW CKYVF-{Amide}	[Ala5;Cit25]GpTx-1(1-34)	1.8	23.5	>50	3.2	-	-	0.6
769	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHDWCK YVF-{Amide}	[Ala5;Asp28]GpTx-1(1-34)	>5	39.0	>50	>5	-	-	-
770	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHMWCK YVF-{Amide}	[Ala5;Met28]GpTx-1(1-34)	1.0	45.4	>50	4.1	-	-	0.3
771	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[K(Me)] WCKYVF-{Amide}	[Ala5;K(Me)28]GpTx-1(1-34)	1.6	40.1	>50	1.8	-	-	0.9
772	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTH[pS]W CKYVF-{Amide}	[pS28]GpTx-1(1-34)	0.90	>50	>50	0.81	-	-	1.1
773	{H}-DCLGTMRKCDPENDKCCRPNLVCSRTHKWCK YVF-{Amide}	[Thr5;Asp10;Glu12]GpTx-1(1-34)	4.5	28.4	>50	3.4	-	-	1.3
774	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYEF-{Amide}	[1-Nal10;Glu33]GpTx-1(1-34)	0.30	28.3	12.7	0.53	42.8	24.2	0.6
775	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKEVF-{Amide}	[1-Nal10;Glu32]GpTx-1(1-34)	>5	28.6	21.3	>5	-	-	-
776	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCEYVF-{Amide}	[1-Nal10;Glu31]GpTx-1(1-34)	>5	26.8	28.5	>5	-	-	-
777	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYAF-{Amide}	[1-Nal10;Ala33]GpTx-1(1-34)	0.20	39.5	8.6	0.20	43.7	42.4	1.0

778	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKAVF-{Amide}	[1-Nal10;Ala32]GpTx-1(1-34)	0.51	35.0	15.8	0.44	31.0	36.2	1.2
779	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCAYVF-{Amide}	[1-Nal10;Ala31]GpTx-1(1-34)	>5	36.5	38.0	3.2	-	12.0	-
780	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHEWCKYVF-{Amide}	[1-Nal10;Glu28]GpTx-1(1-34)	0.78	27.5	28.9	1.1	37.3	26.4	0.7
781	{H}-DCLGFMRKC[1-Nal]PDNDECCRPNLVCSRTHKWCKYVF-{Amide}	[1-Nal10;Glu15]GpTx-1(1-34)	0.93	34.3	24.8	1.1	26.6	21.7	0.8
782	{H}-DCLGFMREC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Glu8;1-Nal10]GpTx-1(1-34)	1.1	30.7	12.4	1.2	11.2	10.1	0.9
783	{H}-DCLEFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Glu4;1-Nal10]GpTx-1(1-34)	1.3	29.1	18.5	2.0	14.1	9.1	0.6
784	{H}-[1-Nal]CLGFMRECIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[1-Nal1;Glu8]GpTx-1(1-34)	1.0	32.0	26.0	0.90	25.9	29.0	1.1
785	{H}-[1-Nal]CLGFMEKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[1-Nal1;Glu7]GpTx-1(1-34)	1.8	30.6	27.7	1.9	15.4	14.7	1.0
786	{H}-[1-Nal]CLGFERKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[1-Nal1;Glu6]GpTx-1(1-34)	>5	26.3	33.9	>5	-	-	-
787	{H}-DCLGAMRKCIPDNDKCCRPNLVCSREHKWCKYVF-{Amide}	[Ala5;Glu26]GpTx-1(1-34)	>5	27.3	24.9	>5	-	-	-
788	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTEKWCKYVF-{Amide}	[Ala5;Glu27]GpTx-1(1-34)	>5	29.7	27.1	>5	-	-	-
789	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCEYVF-{Amide}	[Ala5;Glu31]GpTx-1(1-34)	>5	31.8	21.5	>5	-	-	-
790	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCK	[Ala5]GpTx-1(1-34)-Glu	>5	28.5	25.5	>5	-	-	-

	YVFE-{Amide}									
791	{H}-DCLGA[METO1]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5,Met(O)6]GpTx-1 isomer1	>5	39.5	>50	>5	-	-	-	-
792	{H}-DCLGA[METO1]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5,Met(O)6]GpTx-1 isomer2	>5	49.8	43.0	>5	-	-	-	-
793	{H}-DCLGAFRKCIPD[Pra]DKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Phe6;Pra13]GpTx-1(1-34)	0.53	28.6	12.3	0.47	23.0	26.4	1.1	
794	{H}-DCLGAFRKCIPD[K(Ac-Pra)]DKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Phe6;K(Ac-Pra)13]GpTx-1(1-34)	0.89	37.8	>50	0.70	-	-	1.3	
795	{H}-DCLGAFRKCIPD[K(Ac-Pra)]DKCCRPNLVCSRTHRWCKYVF-{Amide}	[Ala5;Phe6;K(Ac-Pra)13;Arg28]GpTx-1(1-34)	0.78	24.6	18.0	0.25	23.1	70.9	3.1	
796	{H}-DCLGALRKCIPD[Pra]DKCCRPNLVCSRLHRWCKYVF-{Amide}	[Ala5;Leu6,26;Pra13;Arg28]GpTx-1(1-34)	0.22	36.4	>50	0.48	-	-	0.5	
797	{H}-DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSRTHKWCKYVF-{Amide}	[2-Abu5;Leu6;Pra13]GpTx-1(1-34)	0.52	34.0	26.6	0.93	50.8	28.7	0.6	
798	{H}-DCLGAFRKCEPD[Pra]DKCCRPNLVCSRLHRWCKYVF-{Amide}	[Ala5;Phe6;Glu10;Pra13;Leu26;Arg28]GpTx-1(1-34)	0.54	32.2	>50	0.56	-	-	1.0	
799	{H}-DCLG[2-Abu]LRKCIPD[K(Ac-Pra)]DKCCRPNLVCSRTHKWCKYVF-{Amide}	[2-Abu5;Leu6;K(Ac-Pra)13]GpTx-1(1-34)	0.75	28.1	48.5	0.70	65.1	69.4	1.1	
800	{H}-DCLGALRKCEPD[Pra]DKCCRPNLVCSRLHRWCKYVF-{Amide}	[Ala5;Leu6,26;Glu10;Pra13;Arg28]GpTx-1(1-34)	0.70	>50	>50	1.4	-	-	0.5	
801	{H}-DCLG[2-Abu]LRKCIPD[K(4-Pen)]DKCCRPNLVCSRTHRWCKYVF-{Amide}	[2-Abu5;Leu6;K(4-Pen)13;Arg28]GpTx-1(1-34)	0.55	39.7	>50	0.81	-	-	0.7	
802	{H}-DCLGALRKCIP[Pra]NDKCCRPNLVCSRLHRWCKYVF-{Amide}	[Ala5;Leu6,26;Pra12;Arg28]GpTx-1(1-34)	0.26	>50	12.3	0.54	46.6	22.7	0.5	
803	{H}-DCLGAFRKCIP[Pra]NDKCCRPNLVCSRLHRWCKYVF-{Amide}	[Ala5;Phe6;Pra12;Leu26;Arg28]GpTx-1(1-34)	0.13	36.5	2.5	0.12	19.9	20.7	1.0	

804	{H}-DCLG[2-Abu]FRKCIPD[K(4-Pen)]DKCCRPNLVCSRTHKWCKYVF-{Amide}	[2-Abu5;Phe6;K(4-Pen)13]GpTx-1(1-34)	0.50	>50	5.3	0.35	10.5	15.2	1.5
805	{H}-DCLG[Nva]LRKCIPD[K(4-Pen)]DKCCRPNLVCSRTHRWCKYVF-{Amide}	[Nva5;Leu6;K(4-Pen)13;Arg28]GpTx-1(1-34)	0.31	37.5	12.2	0.27	39.4	45.7	1.2
806	{H}-DCLG[Nva]LRKCIPD[K(4-Pen)]DKCCRPNLVCSRTHKWCKYVF-{Amide}	[Nva5;Leu6;K(4-Pen)13]GpTx-1(1-34)	0.29	34.2	8.3	0.39	28.9	21.5	0.7
807	{4-Pen}-DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{Amide}	4-Pen-[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34)	0.54	36.8	>50	0.90	-	-	0.6
808	{H}-DCLG[2-Abu]LRKCIPD[K(4-Pen)]DKCCRPNLVCSRTHEWCKYVF-{Amide}	[2-Abu5;Leu6;K(4-Pen)13;Glu28]GpTx-1(1-34)	1.8	>5	>5	4.1	-	-	0.4
809	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{Amide}	[Ala5;Phe6;Arg28]GpTx-1(1-34)	0.3	>5	>5	0.3	-	-	1.0
810	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{Amide}	[Ala5;Leu6;Arg28]GpTx-1(1-34)	0.2	>5	>5	0.2	-	-	1.0
811	{H}-GSDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{Amide}	Gly-Ser-[Ala5;Phe6;Arg28]GpTx-1(1-34)	0.3	>5	>5	0.3	-	-	1.0
812	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{Amide}	Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)	0.2	>5	>5	0.2	-	-	1.0
813	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFW-{FreeAcid}	[Ala5;Phe6;Arg28]GpTx-1(1-34)-Trp-FreeAcid	>5	>5	>5	>5	-	-	-
814	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFW-{FreeAcid}	[Ala5;Leu6;Arg28]GpTx-1(1-34)-Trp-FreeAcid	0.6	>5	>5	0.6	-	-	1.0
815	{H}-GSDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFW-{FreeAcid}	Gly-Ser-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Trp-FreeAcid	>5	>5	>5	>5	-	-	-
816	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFW-{FreeAcid}	Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Trp-FreeAcid	>5	>5	>5	>5	-	-	-
817	{H}-	[Ala5;Phe6;Arg28]GpT	1.5	>5	>5	0.5	-	-	3.0

	DCLGAFRKCIPDNDKCCRPNLVCSRTHRWCK YVFF-{FreeAcid}	x-1(1-34)-Phe-FreeAcid							
818	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHRWCK YVFF-{FreeAcid}	[Ala5;Leu6;Arg28]GpT x-1(1-34)-Phe-FreeAcid	2.3	>5	>5	0.8	-	-	2.9
819	{H}-GSDCLGAFRKCIPDNDKCCRPNLVCSRTHRW CKYVFF-{FreeAcid}	Gly-Ser-[Ala5;Phe6;Arg28]GpT x-1(1-34)-Phe-FreeAcid	1.5	>5	>5	0.5	-	-	3.0
820	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRW CKYVFF-{FreeAcid}	Gly-Ser-[Ala5;Leu6;Arg28]GpT x-1(1-34)-Phe-FreeAcid	0.5	>5	>5	0.5	-	-	1.0
821	{H}-GSDCLGAFRKCIPDNDKCCRPNLVCSRTHRW CKYVF-{FreeAcid}	Gly-Ser-[Ala5;Phe6;Arg28]GpT x-1(1-34)-FreeAcid	3.2	>5	>5	3.2	-	-	1.0
822	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRW CKYVF-{FreeAcid}	Gly-Ser-[Ala5;Leu6;Arg28]GpT x-1(1-34)-FreeAcid	3.7	>5	>5	3.7	-	-	1.0
823	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Phe6;Arg28]GpT x-1(1-34)-FreeAcid	3.4	>5	>5	3.4	-	-	1.0
824	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHAWCK YVF-{FreeAcid}	[Ala5,28;Phe6]GpTx-1(1-34)-FreeAcid	>5	>5	>5	>5	-	-	-
825	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHDWCK YVF-{FreeAcid}	[Ala5;Phe6;Asp28]GpT x-1(1-34)-FreeAcid	>5	>5	>5	>5	-	-	-
826	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHEWCK YVF-{FreeAcid}	[Ala5;Phe6;Glu28]GpT x-1(1-34)-FreeAcid	>5	>5	>5	1.8	-	-	-
827	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHGWCK YVF-{FreeAcid}	[Ala5;Phe6;Gly28]GpT x-1(1-34)-FreeAcid	>5	>5	>5	>5	-	-	-
828	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHHWCK YVF-{FreeAcid}	[Ala5;Phe6;His28]GpT x-1(1-34)-FreeAcid	>5	>5	>5	>5	-	-	-
829	{H}-	[Ala5;Phe6]GpTx-1(1-	>5	>5	>5	2.3	-	-	-

	DCLGAFRKCIPDNDKCCRPNLVCSRTHKWCK YVF-{FreeAcid}	34)-FreeAcid							
830	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHLWCKY VF-{FreeAcid}	[Ala5;Phe6;Leu28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	-	-	-
831	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHMWCK YVF-{FreeAcid}	[Ala5;Phe6;Met28]GpTx-1(1-34)-FreeAcid	>5	>5	1.6	-	-	-
832	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHNWCK YVF-{FreeAcid}	[Ala5;Phe6;Asn28]GpTx-1(1-34)-FreeAcid	>5	>5	4.6	-	-	-
833	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHPWCK YVF-{FreeAcid}	[Ala5;Phe6;Pro28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	-	-	-
834	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHQWCK YVF-{FreeAcid}	[Ala5;Phe6;Gln28]GpTx-1(1-34)-FreeAcid	>5	>5	3.9	-	-	-
835	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHSWCK YVF-{FreeAcid}	[Ala5;Phe6;Ser28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	-	-	-
836	{H}-DCLGAFRKCIPDADKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5,13;Phe6;Arg28]GpTx-1(1-34)-FreeAcid	4.1	>5	1.3	-	-	3.1
837	{H}-DCLGAFRKCIPDDDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Phe6;Asp13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	2.3	-	-	-
838	{H}-DCLGAFRKCIPDEDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Phe6;Glu13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	1.9	-	-	-
839	{H}-DCLGAFRKCIPDFDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Phe6,13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	1.2	-	-	-
840	{H}-DCLGAFRKCIPDGDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Phe6;Gly13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	1.5	-	-	-
841	{H}-DCLGAFRKCIPDHDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Phe6;His13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	-	-	-

842	{H}-DCLGAFRKCIPDIDKCCRPNLVCSRTHRWCKY VF-{FreeAcid}	[Ala5;Phe6;Ile13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	3.0	-	-	-
843	{H}-DCLGAFRKCIPDKDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Phe6;Lys13;Arg28]GpTx-1(1-34)-FreeAcid	3.6	2.8	>5	0.3	-	-	11.8
844	{H}-DCLGAFRKCIPDLDKCCRPNLVCSRTHRWCKY VF-{FreeAcid}	[Ala5;Phe6;Leu13;Arg28]GpTx-1(1-34)-FreeAcid	4.5	>5	>5	4.5	-	-	1.0
845	{H}-DCLGAFRKCIPDMDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Phe6;Met13;Arg28]GpTx-1(1-34)-FreeAcid	4.7	>5	>5	0.8	-	-	5.8
846	{H}-DCLGAFRKCIPDPDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Phe6;Pro13;Arg28]GpTx-1(1-34)-FreeAcid	2.9	>5	>5	2.9	-	-	1.0
847	{H}-DCLGAFRKCIPDQDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Phe6;Gln13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	1.7	-	-	-
848	{H}-DCLGAFRKCIPDRDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Phe6;Arg13,28]GpTx-1(1-34)-FreeAcid	4.5	>5	>5	0.6	-	-	7.1
849	{H}-DCLGAFRKCIPDSDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Phe6;Ser13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	1.1	-	-	-
850	{H}-DCLGAFRKCIPDTDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Phe6;Thr13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	1.3	-	-	-
851	{H}-DCLGAFRKCIPDVDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Phe6;Val13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	1.7	-	-	-
852	{H}-DCLGAFRKCIPDWDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Phe6;Trp13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	>5	-	-	-
853	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Leu6;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	>5	-	-	-
854	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHDWCK	[Ala5;Leu6;Asp28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	>5	-	-	-

	YVF-{FreeAcid}							
855	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHEWCK YVF-{FreeAcid}	[Ala5;Leu6;Glu28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	-	-	-
856	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHLWCKY VF-{FreeAcid}	[Ala5;Leu6,28]GpTx-1(1-34)-FreeAcid	4.1	>5	4.1	-	-	1.0
857	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHMWCK YVF-{FreeAcid}	[Ala5;Leu6;Met28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	-	-	-
858	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHQWCK YVF-{FreeAcid}	[Ala5;Leu6;Gln28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	-	-	-
859	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHSWCK YVF-{FreeAcid}	[Ala5;Leu6;Ser28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	-	-	-
860	{H}-DCLGALRKCIPDADKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	4.5	-	-	-
861	{H}-DCLGALRKCIPDDDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Leu6;Asp13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	-	-	-
862	{H}-DCLGALRKCIPDEDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Leu6;Glu13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	-	-	-
863	{H}-DCLGALRKCIPDFDKCCRPNLVCSRTHRWCKY VF-{FreeAcid}	[Ala5;Leu6;Phe13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	-	-	-
864	{H}-DCLGALRKCIPDHDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Leu6;His13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	3.9	-	-	-
865	{H}-DCLGALRKCIPDIDKCCRPNLVCSRTHRWCKY VF-{FreeAcid}	[Ala5;Leu6;Ile13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	-	-	-
866	{H}-DCLGALRKCIPDKDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Leu6;Lys13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	2.3	-	-	-
867	{H}-	[Ala5;Leu6,13;Arg28]G	>5	>5	>5	4.9	-	-

	DCLGALRKCIPDLDKCCRPNLVCSRTHRWCKY VF-{FreeAcid}	pTx-1(1-34)-FreeAcid						
868	{H}-DCLGALRKCIPDMDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Leu6;Met13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	-	-	-
869	{H}-DCLGALRKCIPDQDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Leu6;Gln13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	-	-	-
870	{H}-DCLGALRKCIPDRDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Leu6;Arg13,28]GpTx-1(1-34)-FreeAcid	>5	>5	1.4	-	-	-
871	{H}-DCLGALRKCIPDSDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Leu6;Ser13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	-	-	-
872	{H}-DCLGALRKCIPDVDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Leu6;Val13;Arg28]GpTx-1(1-34)-FreeAcid	>5	>5	>5	-	-	-
873	{H}-DCLGALRKCIPDYDKCCRPNLVCSRTHRWCK YVF-{FreeAcid}	[Ala5;Leu6;Tyr13;Arg28]GpTx-1(1-34)-FreeAcid	4.8	>5	>5	-	-	-

Table 30. Electrophysiology by PatchXpress®

SEQ ID NO:	Designation	Nav1.3 Use IC50 (μM)	Nav1.4 Use IC50 (μM)	Nav1.5 Use IC50 (μM)	Nav1.7 Use IC50 (μM)	Nav1.4/ Nav1.3 Use	Nav1.5/ Nav1.3 Use	Nav1.4/ Nav1.7 Use	Nav1.5/ Nav1.7 Use	Nav1.3/ Nav1.7 Use
1	GpTx-1(1-34)	0.010	0.241	>10	0.005	24	>1000	48	>2000	2.0
528	Huwentoxin-IV	0.022	4.5	25.3	0.032	205	1150	141	791	0.7
529	Huwentoxin-I	0.905	24.89	>30	0.717	28	33	35	42	1.3
530	KIIIA	0.574	0.021		0.144	0	0	0	0	4.0
531	ProTxII	0.015	0.032	0.104	0.002	2	7	13	43	6.3
72	[Arg28]GpTx-1(1-34)	0.012	0.866	8.730	0.007	72	728	124	1247	1.7
22	[Ala5]GpTx-1(1-34)	0.129	4.460	>10	0.018	35	>78	248	>556	7.2
80	[1-Nal34]GpTx-1(1-34)	0.007	0.179	1.860	0.004	26	266	45	465	1.8
70	[Arg26]GpTx-1(1-34)	0.010	0.109	0.573	0.005	11	57	22	115	2.0
87	GpTx-1(1-34)-Trp	0.015	0.640	2.660	0.009	43	177	71	296	1.7
95	[Gln33]GpTx-1(1-34)	0.010	0.286	8.250	0.006	29	825	48	1375	1.7
77	[1-Nal1]GpTx-1(1-34)	0.066	0.439	7.6	0.023	7	115	19	330	2.9
78	[1-Nal10]GpTx-1(1-34)	0.039	0.402	12.91	0.005	10	331	80	2581	7.8
89	[Phe6]GpTx-1(1-34)	0.016	0.141	3.159	0.015	9	197	9	211	1.1
94	[Lys26;Thr27]GpTx-1(1-34)	0.016	0.462	1.393	0.004	29	87	116	348	4.0
121	[Leu26]GpTx-1(1-34)	0.023	0.508	5.008	0.003	22	218	169	1669	7.7
123	[Nle6]GpTx-1(1-34)	0.009	0.066	1.149	0.008	7	124	8	137	1.1

161	[1-Nal6]GpTx-1(1-34)	0.004	0.115	0.358	0.003	28	87	41	128	1.5
167	[1-Nal32]GpTx-1(1-34)	0.012	0.061	0.988	0.004	5	82	15	247	3.0
170	[Trp6]GpTx-1(1-34)	ND	0.234	3.674	0.022	--	--	10	164	0.0
177	[Trp22]GpTx-1(1-34)	ND	0.689	4.779	0.039	--	--	18	122	0.0
180	[Trp33]GpTx-1(1-34)	ND	0.096	2.350	0.018	--	--	6	134	0.0
33	[Glu33]GpTx-1(1-34)	0.052	2.753	>10	0.027	53	192	102	370	1.9
148	[Glu18]GpTx-1(1-34)	0.098	1.635	>10	0.018	17	>102	91	>556	5.4
242	[Bip5]GpTx-1(1-34)	0.003	0.103	2.077	0.062	34	692	2	34	0.05
243	[Cha5]GpTx-1(1-34)	0.007	0.126	3.389	0.003	18	484	42	1130	2.3
244	[Leu6]GpTx-1(1-34)	0.018	0.365	>10	0.026	20	556	14	385	0.7
245	[Cha6]GpTx-1(1-34)	0.002	0.092	2.678	0.003	46	1339	31	893	0.7
246	[1'NMeW32]GpTx-1(1-34)	0.018	0.154	6.849	0.006	9	381	26	1142	3.0
152	[Glu26]GpTx-1(1-34)	0.216	6.41	>10	0.052	30	46	123	192	4.2
174	[Trp18]GpTx-1(1-34)	0.042	1.46	>10	0.024	35	>238	61	>417	1.8
247	[pI-Phe5]GpTx-1(1-34)	0.090	1.1	>10	0.247	12	111	4	40	0.36
248	[Ile33]GpTx-1(1-34)	0.102	1.94	>10	0.037	19	98	52	270	2.8
249	[pI-Phe33]GpTx-1(1-34)	0.035	0.388	10.4	0.026	11	297	15	400	1.3
250	[1'NMeW33]GpTx-1(1-34)	0.037	0.396	9.54	0.054	11	258	7	177	0.7
251	[Arg28;1-Nal32]GpTx-1(1-34)	0.006	0.193	1.06	0.005	32	177	39	212	1.2
108	GpTx-1(2-34)	0.015	0.251	4.944	0.007	17	334	36	706	2.1
132	Ac-GpTx-1(1-34)	0.084	2.12	>10	0.013	25	>119	163	>769	6.5

252	[Ala5;Trp33]GpTx-1(1-34)	0.569	5.54	>10	0.034	10	>18	163	>294	16.7
253	[Ala5;Trp32]GpTx-1(1-34)	2.98	>10	>10	0.103	3	>3	97	>97	28.9
254	[Ala5;1-Nal32]GpTx-1(1-34)	0.122	2.8	>10	0.028	23	>82	100	>357	4.4
255	[Ala5;Leu26]GpTx-1(1-34)	0.47	>10	>10	0.049	21	>21	204	>204	9.6
256	[Ala5;1-Nal6]GpTx-1(1-34)	0.008	0.469	3.81	0.002	59	476	235	1905	4.0
257	[Ala5;Phe6]GpTx-1(1-34)	0.022	0.824	>10	0.012	37	>455	69	>833	1.8
22	[Ala5]GpTx-1(1-34)	0.158	11.14	>10	0.014	70	>63	795	>714	11.3
258	[Ala5;1-Nal33]GpTx-1(1-34)	0.201	2.95	>10	0.048	15	>50	61	>208	4.2
259	[Ala5;1-Nal10]GpTx-1(1-34)	0.482	>10	>10	0.097	21	>21	103	>103	5.0
260	[Ala5;Arg28]GpTx-1(1-34)	0.44	>10	>10	0.077	23	>23	130	>130	5.7
261	[Ala5;Trp6]GpTx-1(1-34)	0.081	6.11	>10	0.057	75	>123	107	>175	1.4
262	[Ala5;Phe6;Leu26;Arg28]GpTx-1(1-34)	0.008	1.895	>10	0.002	237	>1250	948	>5000	4.0
263	[Ala5;Phe6;Leu26]GpTx-1(1-34)	0.011	1.196	>10	0.004	109	>909	299	>2500	2.8
515	[Phe6; Atz(amino-PEG10)13]GpTx-1(1-34)	0.006	0.127	5.998	0.022	21	1000	6	273	0.3
590	[Phe6;Atz(20kDaPEG)13]GpTx-1(1-34)	0.232	7.98	>10	0.184	34	>43	43	>54	1.3
	[Phe6,Atz(2 kDa EtO-PEG*-	0.008	0.254	1.43	0.013	32	179	20	110	0.6

--	{[Phe6,Atz13*]GpTx-1(1-34)})13]GpTx-1(1-34); * = Et (Homodimeric Conjugate 1)										
--	[Phe6,Atz(EtO-PEG4*-{[Phe6,Atz13*]GpTx-1(1-34)})13]GpTx-1(1-34); * = Et (Homodimeric Conjugate 2)	0.046	0.299	0.863	0.019	7	19	16	45		2.4
19	[Glu3]GpTx-1(1-34)	-	3.81	>10	0.041	-	-	93	>244		-
21	[Ala3]GpTx-1(1-34)	-	0.569	>10	0.012	-	-	47	>833		-
63	[Arg4]GpTx-1(1-34)	-	0.165	5	0.003	-	-	55	1667		-
39	[Lys4]GpTx-1(1-34)	-	0.327	10.6	0.006	-	-	55	1767		-
265	[Gly5]GpTx-1(1-34)	-	12.8	>10	0.009	-	-	1422	>1111		-
88	[Ile5]GpTx-1(1-34)	-	2.12	>10	0.002	-	-	1060	>5000		-
268	[Met5]GpTx-1(1-34)	-	0.978	>10	0.002	-	-	489	>5000		-
272	[Val5]GpTx-1(1-34)	-	4.41	>10	0.018	-	-	245	>556		-

267	[Leu5]GpTx-1(1-34)	-	0.778	>10	0.007	-	-	111	>1429	-
649	[2-Abu5]GpTx-1(1-34)	-	>10	>10	0.083	-	-	>120	>120	-
650	[Nva5]GpTx-1(1-34)	-	4.26	>10	0.038	-	-	112	>263	-
657	[NMePhe5]GpTx-1(1-34)	-	0.727	>10	0.018	-	-	40	>556	-
678	[Tle5]GpTx-1(1-34)	-	4.819	>10	0.023	-	-	210	>435	-
683	[Cpg5]GpTx-1(1-34)	-	1.87	>10	0.005	-	-	374	>2000	-
684	[Chg5]GpTx-1(1-34)	-	1.749	>10	0.007	-	-	250	>1429	-
688	[NMeLeu5]GpTx-1(1-34)	-	8.47	>10	0.026	-	-	326	>385	-
286	[Tyr6]GpTx-1(1-34)	-	3.79	10	0.069	-	-	55	145	-
283	[Pro6]GpTx-1(1-34)	-	4.11	10	0.042	-	-	98	238	-
294	[2PAL6]GpTx-1(1-34)	-	2.94	10	0.042	-	-	70	238	-
296	[SDMA7]GpTx-1(1-34)	-	0.606	14	0.006	-	-	101	2333	-
145	[Glu7]GpTx-1(1-34)	-	>10	>10	0.098	-	-	>102	>102	-
295	[K(Me2)7]GpTx-1(1-34)	-	2.21	>10	0.02	-	-	111	>500	-

298	[K(Me2)8]GpTx-1(1-34)	-	0.884	>10	0.004	-	-	221	>2500	-
297	[SDMA8]GpTx-1(1-34)	-	0.57	>10	0.005	-	-	114	>2000	-
118	[Thr8]GpTx-1(1-34)	-	0.888	>10	0.009	-	-	99	>1111	-
119	[Asp10]GpTx-1(1-34)	-	2.45	>10	0.003	-	-	817	>3333	-
146	[Glu10]GpTx-1(1-34)	-	1.3	>10	0.002	-	-	650	>5000	-
90	[Asn10]GpTx-1(1-34)	-	0.749	>10	0.002	-	-	375	>5000	-
147	[Glu11]GpTx-1(1-34)	-	1.67	>10	0.002	-	-	835	>5000	-
163	[1-Nal13]GpTx-1(1-34)	-	0.291	7.33	0.002	-	-	146	3665	-
28	[Glu15]GpTx-1(1-34)	-	2.72	10	0.02	-	-	136	500	-
125	[2-Abu2,17]GpTx-1(1-34)	-	0.947	10	0.021	-	-	45	476	-
316	[2PAL18]GpTx-1(1-34)	-	1.57	13.7	0.003	-	-	523	4567	-
116	[Cit18]GpTx-1(1-34)	-	0.833	10	0.002	-	-	417	5000	-
49	[Lys18]GpTx-1(1-34)	-	0.58	16.4	0.002	-	-	290	8200	-
314	[K(Me2)18]GpTx-1(1-34)	-	0.774	10	0.005	-	-	155	2000	-

315	[SDMA18]GpTx-1(1-34)	-	0.593	10	0.006	-	-	99	1667	-
50	[Lys19]GpTx-1(1-34)	-	0.22	9.1	0.003	-	-	73	3033	-
331	[Tyr22]GpTx-1(1-34)	-	2.03	>10	0.018	-	-	113	>556	-
8	[Ala22]GpTx-1(1-34)	-	0.429	6.2	0.006	-	-	72	1033	-
334	[2PAL22]GpTx-1(1-34)	-	1.86	16	0.007	-	-	266	2286	-
117	[Cit25]GpTx-1(1-34)	-	1.86	>10	0.004	-	-	465	>2500	-
335	[K(Me2)25]GpTx-1(1-34)	-	0.764	13.3	0.008	-	-	96	1663	-
9	[Ala25]GpTx-1(1-34)	-	2.24	10	0.012	-	-	187	833	-
151	[Glu25]GpTx-1(1-34)	-	5.53	>10	0.028	-	-	198	>357	-
337	[His26]GpTx-1(1-34)	-	0.246	4.95	0.003	-	-	82	1650	-
350	[4CO2-F26]GpTx-1(1-34)	-	6.18	>10	0.065	-	-	95	>154	-
153	[Glu28]GpTx-1(1-34)	-	10.7	>10	0.026	-	-	412	>385	-
750	[Asp28]GpTx-1(1-34)	-	12.9	>10	0.015	-	-	860	>667	-
763	[Gln28]GpTx-1(1-34)	-	4.61	>10	0.004	-	-	1153	>2500	-

355	[K(Me2)28]GpTx-1(1-34)	-	1.43	8.74	0.011	-	-	130	795	-
79	[1-Nal29]GpTx-1(1-34)	-	5.92	>10	0.033	-	-	179	>303	-
129	[2-Nal29]GpTx-1(1-34)	-	7.37	>10	0.066	-	-	112	>152	-
384	[2PAL32]GpTx-1(1-34)	-	4.96	>10	0.035	-	-	142	>286	-
403	[4CO2-F33]GpTx-1(1-34)	-	0.742	>10	0.003	-	-	247	>3333	-
402	[2PAL33]GpTx-1(1-34)	-	0.277	3.46	0.01	-	-	28	346	-
696	[Ala5;Leu6]GpTx-1(1-34)	-	11.246	>10	0.03	-	-	375	>333	-
721	[Ala5;Nle6]GpTx-1(1-34)	-	2.828	>10	0.01	-	-	283	>1000	-
699	[Ala5;1'NMeW6]GpTx-1(1-34)	-	4.5	>10	0.051	-	-	88	>196	-
437	[Ala5;Glu29]GpTx-1(1-34)	-	>10	>10	>10	-	-	>1	>1	-
613	[3Pal5;Phe6]GpTx-1(1-34)	-	12.3	>10	0.063	-	-	195	>159	-
636	[2-Abu5;Leu6]GpTx-1(1-34)	-	3.211	>10	0.022	-	-	146	>455	-
635	[Aib5;Leu6]GpTx-1(1-34)	-	6.89	>10	0.02	-	-	345	>500	-
661	[Leu5,6]GpTx-1(1-34)	-	4.387	>10	0.011	-	-	399	>909	-

641	[Met5;Leu6]GpTx-1(1-34)	-	3.591	>10	0.27	-	-	13	>37	-
673	[NMeLeu5;Leu6]GpTx-1(1-34)	-	1.893	>10	0.012	-	-	158	>833	-
674	[NMePhe5;Leu6]GpTx-1(1-34)	-	1.232	11.26	0.012	-	-	103	938	-
672	[NMeVal5;Leu6]GpTx-1(1-34)	-	5.495	>10	0.05	-	-	110	>200	-
705	[Nva5;Glu28]GpTx-1(1-34)	-	>10	>10	0.056	-	-	>179	>179	-
637	[Nva5;Leu6]GpTx-1(1-34)	-	9.928	>10	0.083	-	-	120	>120	-
632	[Sar5;Phe6]GpTx-1(1-34)	-	2.4	>10	0.025	-	-	96	>400	-
617	[Ser5;Phe6]GpTx-1(1-34)	-	3.63	>10	0.024	-	-	151	>417	-
659	[Tle5;Leu6]GpTx-1(1-34)	-	5.862	>10	0.017	-	-	345	>588	-
644	[Val5;Leu6]GpTx-1(1-34)	-	6.666	>10	0.2	-	-	33	>50	-
692	[Ala5;1'NMeW32]GpTx-1(1-34)	-	2.81	>10	0.018	-	-	156	>556	-
694	[Arg4;Met5]GpTx-1(1-34)	-	1.127	13.222	0.029	-	-	39	456	-
620	[DiMeO-F5;Phe6]GpTx-1(1-34)	-	5.09	>10	0.033	-	-	154	>303	-

693	[Met5;1'NMeW32]GpTx-1(1-34)	-	1.43	14.799	0.007	-	-	204	2114	-
723	[Ala5;Leu6;Glu10]GpTx-1(1-34)	-	16.757	>10	0.03	-	-	559	>333	-
708	[Nva5;Leu6;Glu28]GpTx-1(1-34)	-	>10	>10	0.042	-	-	>238	>238	-
703	[Ala5;Phe6;Glu12]GpTx-1(1-34)	-	1.529	>10	0.028	-	-	55	>357	-
725	[Ala5;Nle6;Glu12]GpTx-1(1-34)	-	6.452	>10	0.023	-	-	281	>435	-
732	[Ala5,25;Phe6]GpTx-1(1-34)	-	7.788	>10	0.086	-	-	91	>116	-
809	[Ala5;Phe6;Arg28]GpTx-1(1-34)	-	3.29	>10	0.012	-	-	274	>833	-
810	[Ala5;Leu6;Arg28]GpTx-1(1-34)	-	6.89	>10	0.009	-	-	766	>1111	-
515	[Phe6; Atz(amino-PEG10)13]GpTx-1(1-34)	-	0.14	N.D.	0.003	-	-	47	-	-
516	[Phe6;Atz(amino-PEG10)22]GpTx-1(1-34)	-	0.422	N.D.	0.003	-	-	141	-	-
517	[Phe6;Atz(amino-PEG10)33]GpTx-1(1-34)	-	0.353	N.D.	0.027	-	-	13	-	-
526	[Phe6;Atz(amino-PEG10)15]GpTx-1(1-34)	-	0.179	N.D.	0.006	-	-	30	-	-
593	[Phe6,Atz(20kDa PEG)28]GpTx-1(1-34)	-	10	>10	0.733	-	-	14	>14	-

594	[Phe6,Atz(20kDa PEG)22]GpTx-1(1-34)	-	10	>10	0.728	-	-	14	>14	-
518	[Atz(amino-PEG10)1;Ala5;Phe6]GpTx-1(1-34)	-		N.D.	0.264	-	-	0	-	-
519	[Ala5;Phe6;Atz(amino-PEG10)12]GpTx-1(1-34)	-	0.463	N.D.	0.039	-	-	12	-	-
520	[Ala5;Phe6;Atz(amino-PEG10)13]GpTx-1(1-34)	-		N.D.	0.093	-	-	0	-	-
521	[Ala5;Phe6;Atz(amino-PEG10)33]GpTx-1(1-34)	-		N.D.	0.296	-	-	0	-	-
522	[Phe6;Atz(amino-PEG10)33;1-Nal34]GpTx-1(1-34)	-	0.097	N.D.	0.003	-	-	32	-	-
523	[Phe6;Leu26;Atz(amino-PEG10)33]GpTx-1(1-34)	-	0.209	N.D.	0.02	-	-	10	-	-
524	[Ala5;Phe6;Atz(amino-PEG10)15]GpTx-1(1-34)	-	0.85	N.D.	0.02	-	-	43	-	-
525	[Ala5;Phe6;Atz(amino-PEG10)22]GpTx-1(1-34)	-		N.D.	0.119	-	-	0	-	-
527	[Phe6;Atz(amino-PEG10)12;1-Nal34]GpTx-1(1-34)	-	0.108	N.D.	0.014	-	-	8	-	-
100	Ala-GpTx-1(1-34)	-	0.655	10	0.012	-	-	55	833	-
811	Gly-Ser-[Ala5;Phe6;Arg28]GpTx-1(1-34)	-	1.73	>10	0.011	-	-	157	>909	-

812	Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)	-	9.77	>10	0.012	-	-	814	>833	-
814	[Ala5;Leu6;Arg28]GpTx-1(1-34)-Trp-FreeAcid	-	>10	>10	0.05	-	-	>200	>200	-
817	Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-FreeAcid	-	7	>10	0.116	-	-	60	>86	-
819	Gly-Ser-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-FreeAcid	-	>7	>10	0.047	-	-	>149	>213	-
820	Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-FreeAcid	-	>10	>10	0.056	-	-	>179	>179	-
414	GpTx-1(1-34)-2PAL	-	1.01	>10	0.027	-	-	37	>370	-
435	[Ala5;Glu28]GpTx-1(1-34)	-	>10	>10	0.614	-	-	>16	>16	-
761	[Ala5;Guf28]GpTx-1(1-34)	-	5.08	>10	0.005	-	-	1016	>2000	-
762	[Ala5;Dab28]GpTx-1(1-34)	-	13.7	>10	0.013	-	-	1054	>769	-
744	[Ala5;hArg28]GpTx-1(1-34)	-	>10	>10	0.014	-	-	>714	>714	-
749	[Ala5;HCit28]GpTx-1(1-34)	-	>10	>10	0.025	-	-	>400	>400	-
737	[Ala5;His28]GpTx-1(1-34)	-	>10	>10	0.026	-	-	>385	>385	-

748	[Ala5;Cit28]GpTx-1(1-34)	-	>10	>10	0.03	-	-	>333	>333	-
739	[Ala5;Gln28]GpTx-1(1-34)	-	>10	>10	0.037	-	-	>270	>270	-
743	[Ala5;SDMA28]GpTx-1(1-34)	-	>10	>10	0.041	-	-	>244	>244	-
738	[Ala5;Ser28]GpTx-1(1-34)	-	>10	>10	0.045	-	-	>222	>222	-
745	[Ala5;R(Me)28]GpTx-1(1-34)	-	>10	>10	0.051	-	-	>196	>196	-
746	[Ala5;Orn28]GpTx-1(1-34)	-	>10	>10	0.059	-	-	>169	>169	-
753	[2-Abu5;Nle6]GpTx-1(1-34)	-	0.94	>10	0.001	-	-	940	>10000	-
700	[Ala5;Asp10]GpTx-1(1-34)	-	>10	>10	0.05	-	-	>200	>200	-
704	[Val5;Glu28]GpTx-1(1-34)	-	>10	>10	0.029	-	-	>345	>345	-
709	[Val5;Leu6;Glu28]GpTx-1(1-34)	-	>10	>10	0.086	-	-	>116	>116	-
701	[Ala5;Asp10;Glu12]GpTx-1(1-34)	-	>10	>10	0.554	-	-	>18	>18	-
710	[Val5;Asp10]GpTx-1(1-34)	-	>10	>10	0.174	-	-	>57	>57	-
711	[Val5;Glu12]GpTx-1(1-34)	-	11.96	>10	0.074	-	-	162	>135	-
712	[Val5;Asp10;Glu12]GpTx-1(1-34)	-	>10	>10	0.116	-	-	>86	>86	-

713	[Val5;Cit25]GpTx-1(1-34)	-	>10	>10	0.028	-	-	>357	>357	-
702	[Ala5;Phe6;Asp10]GpTx-1(1-34)	-	6.08	>10	0.04	-	-	152	>250	-
722	[Ala5;Nle6;Glu10]GpTx-1(1-34)	-	>10	>10	0.096	-	-	>104	>104	-
724	[Ala5;Phe6;Glu10]GpTx-1(1-34)	-	11.07	>10	0.079	-	-	140	>127	-
726	[Ala5;Leu6;Glu12]GpTx-1(1-34)	-	12.3	>10	0.021	-	-	586	>476	-
727	[Ala5;Nle6;Glu28]GpTx-1(1-34)	-	>10	>10	0.08	-	-	>125	>125	-
--	[Ala5,Phe6,Atz(2 kDa EtO-PEG*-{[Ala5,Phe6,Atz13*, Leu26,Arg28]GpTx-1(1-34)}13,Leu26,Arg28]GpTx-1(1-34); * = Et (Homodimeric Conjugate 3)	-	2.2	19.2	0.091	-	-	24	211	-
1029	Biotin[long chain]-[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34)	-	27.3	>10	0.011	-	-	2482	>909	-
1030	[Ala5;Phe6;Glu10;K(Biotin)13;Leu26;Arg28]GpTx-1(1-34)	-	7.13	>10	0.015	-	-	475	>667	-
--	Biotin-Ahx-[Ala5,Phe6,Atz(2 kDa EtO-PEG*-{Biotin}-Ahx-[Ala5,Phe6,Atz13*,L	-	3.43	>10	0.091	-	-	38	>110	-

	eu26,Arg28]GpTx-1(1-34)}}13,Leu26,Arg28]GpTx-1(1-34); * = Et (Homodimeric Conjugate 4)									
1032	DOTA-[Ala5]GpTx-1(1-34)	-	>10	>10	0.152	-	-	>66	>66	-
1033	[Ala5;Phe6;K(DOTA)13;Leu26;Arg28]GpTx-1(1-34)	-	13.1	>10	0.0275	-	-	476	>364	-
30	[Glu29]GpTx-1(1-34)	-	>10	>10	>10	-	-	-	-	-
22	[Ala5]GpTx-1(1-34)	-	10.426	>10	0.034	-	-	307	>294	-
22	[Ala5]GpTx-1(1-34)	-	10.392	>10	0.03	-	-	346	>333	-
153	[Glu28]GpTx-1	-	18.1	>10	0.0501	-	-	361	>200	-
809	[Ala5;Phe6;Arg28]GpTx-1(1-34)	-	3.29	>10	0.012	-	-	274	>833	-
810	[Ala5;Leu6;Arg28]GpTx-1(1-34)	-	6.89	>10	0.009	-	-	766	>1111	-
1034	[Ala5,Phe6,2-Abu13,Leu26,Arg28]GpTx-1(1-34)	-	7.26	>10	0.0047	-	-	1545	>2128	-
1035	[Ala5,Phe6,Glu10,2-Abu13,Leu26,Arg28]GpTx-1(1-34)	-	16.6	>10	0.0035	-	-	4743	>2857	-

1036	[Ala5,Leu6,2-Abu13,Leu26,Arg28]GpTx-1(1-34)	-	18	>10	0.0087	-	-	2069	>1149	-
640	[Ala5,Phe6,**Pra**13,Leu26,Arg28]GpTx-1(1-34)	-	4.029	>10	0.003	-	-	1343	>3333	-
798	[Ala5;Phe6;Glu10;**Pra**13;Leu26;Arg28]GpTx-1(1-34)	-	10.4	15.3	0.012	-	-	867	1275	-
796	[Ala5;Leu6,26;**Pra**13;Arg28]GpTx-1(1-34)	-	10.6	>10	0.009	-	-	1178	>1111	-
800	[Ala5;Leu6,26;Glu10;**Pra**13;Arg28]GpTx-1(1-34)	-	>10	>10	0.013	-	-	>769	>769	-
799	[2-Abu5;Leu6;K(Ac-Pra)13]GpTx-1(1-34)	-	4.66	>10	0.011	-	-	424	>909	-
801	[2-Abu5;Leu6;K(4-Pen)13;Arg28]GpTx-1(1-34)	-	5.71	>10	0.002	-	-	2855	>5000	-
807	4-Pen-[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34)	-	7.55	>10	0.003	-	-	2517	>3333	-
756	4-Pen-[Ala5;Phe6;2-Abu13;Arg28]GpTx-1(1-34)	-	3.34	>10	0.004	-	-	835	>2500	-
794	[Ala5;Phe6;**K(Ac-Pra)**13]GpTx-1(1-34)	-	1.46	>10	0.011	-	-	133	>909	-
1037	[Ala5,Phe6,Atz(PEG11-((2-hydroxyethyl)thio)acetamide)13,Leu26,Arg28]GpTx-1	-	5.07	>10	0.035	-	-	145	>286	-
1038	[Ala5,Phe6,Atz(**PEG 3**-(2-hydroxyethyl)thioacetamide)13,Leu26,Ar	-	1.8	>10	0.003	-	-	600	>3333	-

	g28]GpTx-1(1-34)								
1039	[Ala5;Phe6;**Glu10**;Atz(PEG11-((2-hydroxyethyl)thio)acetamide)13;Leu26;Arg28]GpTx-1(1-34)	-	>10	>10	0.021	-	-	>476	>476	-
1040	[Ala5;Phe6;**Glu10**;Atz(**PEG3**-((2-hydroxyethyl)thio)acetamide)13;Leu26;Arg28]GpTx-1(1-34)	-	5.95	>10	0.013	-	-	458	>769	-
1041	((2-Hydroxyethyl)thio)acetamide-NPEG11-triazole-[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34)	-	>10	>10	0.087	-	-	>115	>115	-
1042	[2-Abu5,Leu6,K(ethyl-triazole-PEG11-((2-hydroxyethyl)thio)acetamide)13,Arg28]GpTx-1(1-34)	-	9.88	>10	0.018	-	-	549	>556	-
1043	[Ala5;**Leu6**,26;Atz(PEG11-((2-hydroxyethyl)thio)acetamide)13;Arg28]GpTx-1(1-34)	-	>10	>10	0.021	-	-	>476	>476	-
1044	[Ala5;**Leu6**,26;**Glu10**;Atz(PEG11-((2-hydroxyethyl)thio)acetamide)13;Arg28]GpTx-1(1-34)	-	>10	>10	0.054	-	-	>185	>185	-
1045	((2-hydroxyethyl)thio)acetamide-NPEG11-triazole-	-	9.65	>10	0.074	-	-	130	>135	-

	[Ala5,Phe6,2-Abu13,Arg28]GpTx-1(1-34)									
--	Fc-peptide Conjugate 1	-	2.88	>10	0.002	-	-	1440	>5000	-
--	Fc-peptide Conjugate 2	-	13.7	>10	0.08	-	-	171	>125	-
--	Immunoglobulin-peptide Conjugate 1	-	>10	>10	0.565	-	-	>18	>18	-
--	Immunoglobulin-peptide Conjugate 2	-	6.73	>10	0.026	-	-	259	>385	-
--	Fc-peptide Conjugate 1	-	>10	>10	0.694	-	-	14	>14	-
--	Fc-peptide Conjugate 2	-	15.2	>10	0.169	-	-	90	>59	-
--	Immunoglobulin-peptide Conjugate 1	-	>10	>10	0.716	-	-	>14	>14	-
--	Immunoglobulin-peptide Conjugate 2	-	7.51	>10	0.079	-	-	95	>127	-
--	Fc-peptide Conjugate 3	-	>10	>10	1.45	-	-	>7	>7	-
--	Fc-peptide Conjugate 4	-	>10	>10	0.474	-	-	>21	>21	-
--	Immunoglobulin-peptide Conjugate 3	-	>10	>10	0.077	-	-	>130	>130	-
--	Immunoglobulin-peptide Conjugate 4	-	>10	>10	0.126	-	-	>79	>79	-

--	Fc-peptide Conjugate 5	-	>10	>10	1.46	-	-	>7	>7	-
--	Fc-peptide Conjugate 6	-	>10	>10	0.264	-	-	>38	>38	-
--	Immunoglobulin-peptide Conjugate 5	-	>10	>10	0.927	-	-	>11	>11	-
--	Immunoglobulin-peptide Conjugate 6	-	>10	>10	0.271	-	-	>37	>37	-
--	Fc-peptide Conjugate 7	-	N.D.	N.D.	1.034	-	-	-	-	-
--	Fc-peptide Conjugate 8	-	>10	>10	0.473	-	-	>21	>21	-
--	Immunoglobulin-peptide Conjugate 7	-	7.87	>10	0.456	-	-	17	>22	-
--	Immunoglobulin-peptide Conjugate 8	-	0.607	9.24	0.148	-	-	4	62	-

Table 31. Electrophysiology by IonWorks® Quattro: comparison of GpTx-1 peptide analog PEG conjugates.

SEQ ID NO:	Amino acid sequence	Designation	IWQ Use Nav1.7 (μM)	IWQ Use Nav1.5 (μM)	IWQ Use Nav1.4 (μM)	IWQ Use Nav1.3 (μM)	Nav1.4/Nav 1.7	Nav1.4/Nav 1.3	Nav1.7/Nav 1.3
532	{H}-[Atz(amino-PEG10)]DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	Atz(amino-PEG10)-[Phe6]GpTx1(1-34)	0.084	4.95	0.95	0.034	11.3	27.7	2.4
533	{H}-[Atz(amino-PEG10)]CLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Atz(amino-PEG10)1;Phe6]GpTx1(1-34)	0.041	6.91	0.25	0.019	6.1	12.9	2.1
534	{H}-DCLG[Atz(amino-PEG10)]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Atz(amino-PEG10)5;Phe6]GpTx1(1-34)	16.257	14.9	8.9	16.793	0.5	0.5	1.0
535	{H}-DCLGF[Atz(amino-PEG10)]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Atz(amino-PEG10)6]GpTx1(1-34)	5.4	6.15	20.26	6.7	3.7	3.0	0.8
536	{H}-DCLGFFRKC[Atz(amino-PEG10)]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Phe6;Atz(amino-PEG10)10]GpTx1(1-34)	0.039	7.95	0.32	0.013	8.3	24.6	3.0
537	{H}-DCLGFFRKCI[Atz(amino-PEG10)]DNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Phe6;Atz(amino-PEG10)11]GpTx1(1-34)	0.136	8.02	1.10	0.056	8.1	19.6	2.4
538	{H}-DCLGFFRKCIP[Atz(amino-PEG10)]NDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Phe6;Atz(amino-PEG10)12]GpTx1(1-34)	0.050	6.31	0.16	0.016	3.2	9.8	3.1
515	{H}-DCLGFFRKCIPD[Atz(amino-PEG10)]DKCCRPNLVCSRTHKWCKYVF-{Amide}	[Phe6;Atz(amino-PEG10)13]GpTx1(1-34)	0.025	4.710	0.400	0.010	16.2	39.5	2.4
526	{H}-DCLGFFRKCIPDND[Atz(amino-PEG10)]CCRPNLVCSRTHKWCKYVF-{Amide}	[Phe6;Atz(amino-PEG10)15]GpTx1(1-34)	0.046	>5	1.177	0.024	25.8	50.1	1.9
539	{H}-DCLGFFRKCIPDNDKCCRP[Atz(amino-PEG10)]LVCSRTHKWCKYVF-{Amide}	[Phe6;Atz(amino-PEG10)20]GpTx1(1-34)	0.538	8.9	5.6	0.250	10.4	22.4	2.1
540	{H}-DCLGFFRKCIPDNDKCCRPN[Atz(amino-PEG10)]VCSRTHKWCKYVF-{Amide}	[Phe6;Atz(amino-PEG10)21]GpTx1(1-34)	0.763	11.4	12.0	0.587	15.8	20.5	1.3
516	{H}-DCLGFFRKCIPDNDKCCRPNL[Atz(amino-PEG10)]CSRTHKWCKYVF-{Amide}	[Phe6;Atz(amino-PEG10)22]GpTx1(1-34)	0.111	7.9	1.1	0.059	10.1	19.1	1.9

541	{H}-DCLGFFRKCIPDNDKCCRPNLVC[Atz(amino-PEG10)]RTHKWCKYVF-{Amide}	[Phe6;Atz(amino-PEG10)24]GpTx1(1-34)	1.738	6.2	8.9	0.701	5.1	12.7	2.5
542	{H}-DCLGFFRKCIPDNDKCCRPNLVCS[Atz(amino-PEG10)]THKWCKYVF-{Amide}	[Phe6;Atz(amino-PEG10)25]GpTx1(1-34)	0.304	10.2	4.0	0.206	13.1	19.3	1.5
543	{H}-DCLGFFRKCIPDNDKCCRPNLVCSR[Atz(amino-PEG10)]HKWCKYVF-{Amide}	[Phe6;Atz(amino-PEG10)26]GpTx1(1-34)	0.631	8.0	9.4	0.478	14.9	19.6	1.3
544	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRT[Atz(amino-PEG10)]KWCKYVF-{Amide}	[Phe6;Atz(amino-PEG10)27]GpTx1(1-34)	2.6	>5	>5	3.7	######	########	0.7
545	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTH[Atz(amino-PEG10)]WCKYVF-{Amide}	[Phe6;Atz(amino-PEG10)28]GpTx1(1-34)	0.049	5.9	22.3	0.036	453.4	625.5	1.4
546	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHK[Atz(amino-PEG10)]CKYVF-{Amide}	[Phe6;Atz(amino-PEG10)29]GpTx1(1-34)	0.31	>5	>5	1.1	######	########	0.3
547	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCK[Atz(amino-PEG10)]VF-{Amide}	[Phe6;Atz(amino-PEG10)32]GpTx1(1-34)	5.0	>5	>5	>5	######	########	######
517	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKY[Atz(amino-PEG10)]F-{Amide}	[Phe6;Atz(amino-PEG10)33]GpTx1(1-34)	0.10	>5	1.1	0.032	10.3	33.5	3.3
548	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYV[Atz(amino-PEG10)]-{Amide}	[Phe6;Atz(amino-PEG10)34]GpTx1(1-34)	5.0	>5	>5	1.6	######	########	3.2
549	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYVF[Atz(amino-PEG10)]-{Amide}	[Phe6]GpTx1(1-34)-Atz(amino-PEG10)	0.36	>5	>5	0.12	######	########	3.0
550	{H}-[Atz(amino-PEG10)]DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{Amide}	Atz(amino-PEG10)-[Phe6;1-Nal34]GpTx1(1-34)	0.029	6.80	0.15	0.004			
551	{H}-[Atz(amino-PEG10)]CLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{Amide}	[Atz(amino-PEG10)1;Phe6;1-Nal34]GpTx1(1-34)	0.039	4.3	0.36	0.014	9.2	24.9	2.7
552	{H}-DCLG[Atz(amino-PEG10)]FRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{Amide}	[Atz(amino-PEG10)5;Phe6;1-Nal34]GpTx1(1-34)	4.6	>5	>5	2.5	######	########	1.8
553	{H}-DCLGF[Atz(amino-PEG10)]RKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal34]GpTx1(1-34)	[Atz(amino-PEG10)6;1-Nal34]GpTx1(1-34)	4.1	>5	>5	>5	######	########	######

	Nal]-{Amide}								
554	{H}-DCLGFFRKC[Atz(amino-PEG10)]PDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{Amide}	[Phe6;Atz(amino-PEG10)10;1-Nal34]GpTx1(1-34)	0.058	8.61	0.14	0.015			
527	{H}-DCLGFFRKCIP[Atz(amino-PEG10)]NDKCCRPNLVCSRTHKWCKYV[1-Nal]-{Amide}	[Phe6;Atz(amino-PEG10)12;1-Nal34]GpTx1(1-34)	0.015	1.6	0.11	0.012	7.1	8.9	1.3
555	{H}-DCLGFFRKCIPDNDKCCRPNLVC[Atz(amino-PEG10)]RTHKWCKYV[1-Nal]-{Amide}	[Phe6;Atz(amino-PEG10)24;1-Nal34]GpTx1(1-34)	0.57	>5	>5	0.35	#####	#######	1.6
556	{H}-DCLGFFRKCIPDNDKCCRPNLVCSR[Atz(amino-PEG10)]HKWCKYV[1-Nal]-{Amide}	[Phe6;Atz(amino-PEG10)26;1-Nal34]GpTx1(1-34)	0.32	>5	>5	0.32	#####	#######	1.0
557	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRT[Atz(amino-PEG10)]KWCKYV[1-Nal]-{Amide}	[Phe6;Atz(amino-PEG10)27;1-Nal34]GpTx1(1-34)	0.90	>5	>5	0.82	#####	#######	1.1
558	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHK[Atz(amino-PEG10)]CKYV[1-Nal]-{Amide}	[Phe6;Atz(amino-PEG10)29;1-Nal34]GpTx1(1-34)	0.093	>5	>5	0.14	#####	#######	0.7
559	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCK[Atz(amino-PEG10)]V[1-Nal]-{Amide}	[Phe6;Atz(amino-PEG10)32;1-Nal34]GpTx1(1-34)	5.0	>5	>5	2.2	#####	#######	2.3
522	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKY[Atz(amino-PEG10)][1-Nal]-{Amide}	[Phe6;Atz(amino-PEG10)33;1-Nal34]GpTx1(1-34)	0.032	>5	0.39	0.014	12.0	27.3	2.3
560	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal][Atz(amino-PEG10)]-{Amide}	[Phe6;1-Nal34]GpTx1(1-34)-Atz(amino-PEG10)	0.12	>5	2.2	0.037	18.3	58.3	3.2
561	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{Amide}	[Phe6;1-Nal34]GpTx1(1-34)	0.011	2.2	0.17	0.007	14.7	23.5	1.6
562	{H}-[Atz(amino-PEG10)]DCLGAFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	Atz(amino-PEG10)-[Ala5;Phe6]GpTx1(1-34)	0.24	>5	2.8	0.14	11.9	20.7	1.7
518	{H}-[Atz(amino-PEG10)]CLGAFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Atz(amino-PEG10)1;Ala5;Phe6]GpTx1(1-34)	0.36	>5	>5	0.14	#####	#######	2.5
563	{H}-DC[Atz(amino-	[Atz(amino-	0.20	>5	>5	0.072	#####	#######	2.7

	PEG10)]GAFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	PEG10)3;Ala5;Phe6]GpTx1(1-34)									
	{H}-DCL[Atz(amino-PEG10)]AFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Atz(amino-PEG10)4;Ala5;Phe6]GpTx1(1-34)									
564			2.8	>5	>5	1.4	######	########			2.0
565	{H}-DCLGA[Atz(amino-PEG10)]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Atz(amino-PEG10)6]GpTx1(1-34)	5.0	>5	>5	>5	######	########			######
566	{H}-DCLGAF[Atz(amino-PEG10)]KCIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)7]GpTx1(1-34)	5.0	>5	>5	>5	######	########			######
567	{H}-DCLGAFR[Atz(amino-PEG10)]CIPDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)8]GpTx1(1-34)	2.3	>5	>5	1.4	######	########			1.6
568	{H}-DCLGAFRKC[Atz(amino-PEG10)]PDNDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)10]GpTx1(1-34)	0.26	>5	>5	0.076	######	########			3.5
519	{H}-DCLGAFRKCIP[Atz(amino-PEG10)]NDKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)12]GpTx1(1-34)	0.17	>5	1.5	0.088	8.7	16.8			1.9
520	{H}-DCLGAFRKCIPD[Atz(amino-PEG10)]DKCCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)13]GpTx1(1-34)	0.27	>5	>5	0.11	######	########			2.5
524	{H}-DCLGAFRKCIPDND[Atz(amino-PEG10)]CCRPNLVCSRTHKWCKYVF-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)15]GpTx1(1-34)	0.21	>5	3.7	0.089	17.5	41.2			2.3
569	{H}-DCLGAFRKCIPDNDKCC[Atz(amino-PEG10)]PNLVCSRTHKWCKYVF-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)18]GpTx1(1-34)	0.23	>5	>5	0.11	######	########			2.2
570	{H}-DCLGAFRKCIPDNDKCCR[Atz(amino-PEG10)]NLVCSRTHKWCKYVF-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)19]GpTx1(1-34)	0.64	>5	>5	0.52	######	########			1.2
571	{H}-DCLGAFRKCIPDNDKCCRP[Atz(amino-PEG10)]LVCSRTHKWCKYVF-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)20]GpTx1(1-34)	5.0	>5	>5	4.0	######	########			1.3
572	{H}-DCLGAFRKCIPDNDKCCRPN[Atz(amino-PEG10)]VCSRTHKWCKYVF-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)21]GpTx1(1-34)	5.0	>5	>5	1.8	######	########			2.8
525	{H}-DCLGAFRKCIPDNDKCCRPNL[Atz(amino-PEG10)]CSRTHKWCKYVF-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)22]GpTx1(1-34)	0.66	>5	>5	0.23	######	########			2.9
573	{H}-DCLGAFRKCIPDNDKCCRPNLVC[Atz(amino-PEG10)]RTHKWCKYVF-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)24]GpTx1(1-34)	5.0	>5	>5	>5	######	########			######
574	{H}-DCLGAFRKCIPDNDKCCRPNLVCS[Atz(amino-PEG10)]THKWCKYVF-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)25]GpTx1(1-34)	0.90	>5	>5	1.6	######	########			0.6
575	{H}-	[Ala5;Phe6;Atz(amino-	5.0	>5	>5	>5	######	########			######

	DCLGAFRKCIPDNDKCCRPNLVCSRT[Atz(amino-PEG10)]KWCKYVF-{Amide}	PEG10)27]GpTx1(1-34)									
576	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTH[Atz(amino-PEG10)]WCKYVF-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)28]GpTx1(1-34)	1.7	>5	>5	1.7	######	########			1.0
577	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHK[Atz(amino-PEG10)]CKYVF-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)29]GpTx1(1-34)	5.0	>5	>5	>5	######	########			######
578	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHKWCK[Atz(amino-PEG10)]VF-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)32]GpTx1(1-34)	5.0	>5	>5	>5	######	########			######
521	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHKWCKY[Atz(amino-PEG10)]F-{Amide}	[Ala5;Phe6;Atz(amino-PEG10)33]GpTx1(1-34)	1.5	>5	>5	0.41	######	########			3.7
579	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHKWCKYVF[Atz(amino-PEG10)]-{Amide}	[Ala5;Phe6]GpTx1(1-34)-Atz(amino-PEG10)	5.0	>5	>5	>5	######	########			######
580	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHKWCKYVFW[Atz(amino-PEG10)]-{Amide}	[Ala5;Phe6]GpTx1(1-34)-Trp-Atz(amino-PEG10)	1.2	>5	>5	0.77	######	########			1.6
581	{H}-[Atz(amino-PEG10)]CLGFFRKCIPDNDKCCRPNLVCSRLHKWCKYVF-{Amide}	[Atz(amino-PEG10)1;Phe6;Leu26]GpTx1(1-34)	0.025	6.22	0.29	0.018					
582	{H}-DCLG[Atz(amino-PEG10)]FRKCIPDNDKCCRPNLVCSRLHKWCKYVF-{Amide}	[Atz(amino-PEG10)5;Phe6;Leu26]GpTx1(1-34)	7.9	8.08	17.21	4.0					
583	{H}-DCLGF[Atz(amino-PEG10)]RKCIPDNDKCCRPNLVCSRLHKWCKYVF-{Amide}	[Atz(amino-PEG10)6;Leu26]GpTx1(1-34)	7.4	8.36	20.91	5.8					
523	{H}-DCLGFFRKC[Atz(amino-PEG10)]PDNDKCCRPNLVCSRLHKWCKYVF-{Amide}	[Phe6;Atz(amino-PEG10)10;Leu26]GpTx1(1-34)	0.027	7.19	0.50	0.014					
584	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRLHK[Atz(amino-PEG10)]CKYVF-{Amide}	[Phe6;Leu26;Atz(amino-PEG10)29]GpTx1(1-34)	0.76	>5	>5	1.6	######	########			0.5

585	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRLHKWCK[Atz(amino-PEG10)]VF-{Amide}	[Phe6;Leu26;Atz(amino-PEG10)32]GpTx1(1-34)	5.0	>5	>5	>5	#####	########	######
586	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRLHKWCKY[Atz(amino-PEG10)]F-{Amide}	[Phe6;Leu26;Atz(amino-PEG10)33]GpTx1(1-34)	0.055	>5	1.8	0.026	33.1	69.6	2.1
587	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRLHKWCKYV[Atz(amino-PEG10)]-{Amide}	[Phe6;Leu26;Atz(amino-PEG10)34]GpTx1(1-34)	1.4	>5	>5	1.1	#####	########	1.2
588	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRLHKWCKYVF[Atz(amino-PEG10)]-{Amide}	[Phe6;Leu26]GpTx1(1-34)-Atz(amino-PEG10)	0.43	>5	>5	0.13	#####	########	3.3

Table 32. Nav1.7 Use IC50 of conjugated GpTx-1 peptide analogs by PatchXpress®.

SEQ ID NO:	Designation	Nav1.7 Use IC50 (μM)
1	GpTx-1(1-34)	0.005
515	[Phe6;Atz(amino-PEG10)13]GpTx1(1-34)	0.022
515	[Phe6;Atz(amino-PEG10)13]GpTx1(1-34)	0.003
516	[Phe6;Atz(amino-PEG10)22]GpTx1(1-34)	0.003
517	[Phe6;Atz(amino-PEG10)33]GpTx1(1-34)	0.027
518	[Atz(amino-PEG10)1;Ala5;Phe6]GpTx1(1-34)	0.264
519	[Ala5;Phe6;Atz(amino-PEG10)12]GpTx1(1-34)	0.039
520	[Ala5;Phe6;Atz(amino-PEG10)13]GpTx1(1-34)	0.093
521	[Ala5;Phe6;Atz(amino-PEG10)33]GpTx1(1-34)	0.296
522	[Phe6;Atz(amino-PEG10)33;1-Nal34]GpTx1(1-34)	0.003
523	[Phe6;Leu26;Atz(amino-PEG10)33]GpTx1(1-34)	0.020
524	[Ala5;Phe6;Atz(amino-PEG10)15]GpTx1(1-34)	0.020
525	[Ala5;Phe6;Atz(amino-PEG10)22]GpTx1(1-34)	0.119
526	[Phe6;Atz(amino-PEG10)15]GpTx1(1-34)	0.006
527	[Phe6;Atz(amino-PEG10)12;1-Nal34]GpTx1(1-34)	0.014

[00469] Example 4: Plasma stability studies

[00470] The stability of GpTx-1 peptide and GpTx-1 peptide analogs were studied in human, rat and mouse plasmas. Peptide stock solutions were made from GpTx-1 peptide and GpTx-1 peptide analog reference standards in 50/50 (v/v) methanol/water and stored at -20 °C. 1 mg/mL peptide stock solutions were used to prepare 20 μg/mL peptide working solutions in HPLC grade water. The peptide working solutions were stored in a refrigerator at 2 to 8°C prior to use.

[00471] Stability samples were prepared by adding 225 μl plasma into the vials containing 25μl of 20 μg/mL peptide working solutions and were incubated at 37°C. The initial concentration was 2 μg/mL for each peptide in human, rat, or mouse plasma. 25 μl plasma samples at five time points (0, 2, 4, 8 and 24 hours) were aliquoted into the appropriate well of a 96-well plate, followed by the addition of 25 μl of internal standard solution (100 ng/mL, NAV peptide analog made in 50/50 methanol/water) and 100 μL of 0.1% formic acid and the samples were vortex mixed. An Oasis HLB μElution 96-well solid phase extraction plate was used to extract GpTx-1 or GpTx- peptide analog peptides from the pretreated plasma samples and the extracts were injected (10 μL) onto the LC-MS/MS system for analysis.

[00472] The LC-MS/MS consisted of an Acquity UPLC system (Waters, Milford, MA) coupled to a 5500 QTRAP mass spectrometer (AB Sciex, Toronto, Canada) with a Turbo IonSpray® ionization source. The analytical column was an Acquity UPLC BEH C_{18} 2.1 mm × 50 mm column. The mobile phases were 0.1% formic acid in acetonitrile/water (5/95, v/v, mobile phase A) and 0.1% formic acid in acetonitrile/water (95/5, v/v, mobile phase B). Data was collected and processed using AB Sciex Analyst® software (version 1.5).

[00473] The plasma stability of the tested peptides were derived from the peak area ratios corresponding to peptides and internal standard obtained from the LC-MS/MS analysis, all data were normalized to the value at 0-hr time point. Results are shown in Table 33, Table 34, and Table 35, below. GpTx-1 and GpTx-1 peptide analogs tested showed remarkable stability in human, mouse, and rat plasma, likely due to their compact, disulfide-stabilized structure.

Table 33. Stability of GpTx-1 and GpTx-1 peptide analogs in human plasma.

	% peptide remaining				
incubation time (hr)	GpTx-1(1-34); SEQ ID NO:1	[1-Nal10]GpTx-1(1-34); SEQ ID NO:78	[Ala5]GpTx-1(1-34); SEQ ID NO:22	GpTx-1(2-34); SEQ ID NO:108	Ac-GpTx-1(1-34); SEQ ID NO:132
0	100	100	100	100	100
2	102	99	105	107	100
4	101	93	99	92	104
8	98	97	101	91	101
24	93	82	105	82	97

Table 34. Stability of GpTx-1 and GpTx-1 peptide analogs in mouse plasma.

	% peptide remaining				
incubation time (hr)	GpTx-1(1-34); SEQ ID NO:1	[1-Nal10]GpTx-1(1-34); SEQ ID NO:78	[Ala5]GpTx-1(1-34); SEQ ID NO:22	GpTx-1(2-34); SEQ ID NO:108	Ac-GpTx-1(1-34); SEQ ID NO:132
0	100	100	100	100	100
2	103	98	106	100	105
4	105	92	107	95	103
8	97	92	105	87	103
24	93	88	99	81	106

Table 35. Stability of GpTx-1 and GpTx-1 peptide analogs in rat plasma.

	% peptide remaining	
incubation time (hr)	GpTx-1(1-34); SEQ ID NO:1	[1-Nal10]GpTx-1(1-34); SEQ ID NO:78
0	100	100
2	110	104
4	109	106
6	100	108
8	111	112
24	91	89

[00474] Example 5: PEGylated conjugates of GpTx-1 peptide analogs studies

[00475] To identify sites with GpTx-1 that could be modified with a half-life extending moiety, a set of positional analogs was prepared containing propargylglycine at each non-cysteine position. After folding, the alkyne-containing peptide was subjected to copper catalyzed 1,3-dipolar cycloaddition with a ~500 Da MW azido PEG to obtain the site-specifically PEGylated peptides with a triazole linkage, thus converting the propargylglycine or Pra residue in the sequence to a 3-(1,2,3-triazol-4-yl)alanine or Atz residue. Electrophysiological screening of this series of analogs (Table 30, Table 31, and Table 32, above) identified several positions within GpTx-1, including the N-terminus and positions 1, 10, 12, 13, 15, 22, 28, and 33 of SEQ ID NO:1, where a large chemical moiety could be introduced without significantly reducing potency at $Na_V1.7$ or $Na_V1.3$. In general, these locations tend to be on the hydrophilic surface of GpTx-1, away from or around the periphery the hydrophobic binding face. Having identified these positions, larger MW conjugates (20 kDa PEG; SEQ ID NO:590) and homodimeric constructs of [Phe6; Atz13]GpTx-1(1-34) (SEQ ID NO:591) or [Ala5;Phe6;Atz13]GpTx-1(1-34) (SEQ ID NO:1028) or Biotin-Ahx--[Ala5,Phe6,Atz13,Leu26,Arg28]GpTx-1(1-34) (SEQ ID NO:1031) were prepared (See, Figure 81A) and tested (See, Table 30, and Figures 46-58). Four of these homodimers, with different sized PEG linkers covalently linked to each of the two peptides at position 13 relative to the native GpTx-1 sequence (SEQ ID NO:1), were designated as follows (* = ethyl):

[00476] [Phe6,Atz(2 kDa EtO-PEG*-{[Phe6,Atz13*]GpTx-1(1-34)})13]GpTx-1(1-34) ("Homodimeric Conjugate 1") (See, Figure 81A);

[00477] [Phe6,Atz(500 Da EtO-PEG*-{[Phe6,Atz13*]GpTx-1(1-34)})13]GpTx-1(1-34) ("Homodimeric Conjugate 2");

[00478] [Ala5,Phe6,Atz(2 kDa EtO-PEG*-{[Ala5,Phe6,Atz13*,Leu26,Arg28]GpTx-1(1-34)})13,Leu26,Arg28]GpTx-1(1-34) ("Homodimeric Conjugate 3");

[00479] Biotin-Ahx-[Ala5,Phe6,Atz(2 kDa EtO-PEG*-{Biotin-Ahx-[Ala5,Phe6,Atz13*,Leu26,Arg28]GpTx-1(1-34)})13,Leu26,Arg28]GpTx-1(1-34) ("Homodimeric Conjugate 4").

[00480] Example 6: NMR structure determination of GpTx-1

[00481] The structure of GpTx-1 was obtained by high resolution NMR spectroscopy in water, pH ~3 and T=298 K. The data were collected on a Bruker Avance III 800 MHz spectrometer using standard 2D experiments. (See Wutchrich, NMR of Proteins and Nucleic Acids, John Wiley & Sons, Canada, (1986)). The structure was calculated from 500 NOE constraints (216 long-range), 45 dihedral angles constraints, 11 hydrogen-bond constraints and 3 disulfide-bond constraints, using Cyana 2.1 software. The final RMSD for the backbone atoms was 0.1±0.05 A and for all heavy atoms 0.74 ± 0.12 A. (See Figure 7 for the overlay of the 20 lowest energy conformations of the peptide backbone, Figure 8 for the overlay of the heavy atoms from the 20 lowest energy conformations of the peptide, and Figure 9 for a ribbon representation of the peptide backbone). The structure confirms the disulfide connectivity of the six cysteine residues as C_2—C_{17}, C_9—C_{23}, and C_{16}—C_{30} or a C1—C4, C2—C5, C3—C6 pattern, making GpTx-1 a member of the inhibitory cystine knot (ICK) family of peptides.

[00482] The folded structure of GpTx-1 (SEQ ID NO:1) is amphipathic in nature with a flat hydrophobic face on one side of the molecule and a hydrophilic (mostly cationic) face on the opposite side. The systematic analoging of GpTx-1, in particular the positional scanning with alanine and glutamic acid, identifies several residues as being critical for activity at $Na_V1.7$ and $Na_V1.3$. These residues, namely Phe5, Met6, His27, Trp29, Lys31, Tyr32, and Phe34, releative to SEQ ID NO:1, are clustered on the one face of GpTx-1. Residues 27 through 34 of SEQ ID NO:1 form a C-terminal β-strand, while Phe5 and Met6 are adjacent to that strand and form the remainder of this hydrophobic face. Since changes that alter the nature of this face disrupt activity against $Na_V1.7$ and $Na_V1.3$, this may be the portion of the molecule that interacts with the VGSCs at the binding interface. (See Figure10 and Figure 11).

[00483] Example 7: Preliminary pharmacokinetic determination in mice

[00484] Pharmacokinetic studies. Preliminary pharmacokinetic (PK) studies were conducted. One PK study was conducted with 7 week-old male CD-1 mice from Charles River Laboratories. The mice had catheters placed in the carotid artery by the vendor. [Ala5]GpTx-1 (SEQ ID NO:22) was dosed intravenously to 3 mice and subcutaneously to 3 mice. GpTx-1 (SEQ ID NO:1) was dosed subcutaneously to 3 mice. All doses were at 1 mg/kg and i.v. injections were made via the lateral tail vein. Blood samples for i.v.-dosed animals were taken at 3, 15, 30 min and 1, 2, 4, 6, 8, and 24 hours post dose, blood samples for s.c.-dose animals were

taken at 15, 30 min and 1, 2, 4, 6, 8, and 24 hours post dose. For each sample 15 μL of blood was collected via the carotid artery catheter and mixed in 35 μL of 0.1 M citrate buffer. Samples were then frozen at -80˚C until analysis.

[00485] Another PK study was conducted with 7 week-old unmodified male CD-1 mice from Taconic. [Ala5]GpTx-1 (SEQ ID NO:22) was dosed to 12 mice at 1 mg/kg subcutaneously and to 12 mice at 1 mg/kg intravenously via the lateral tail vein. At 0.5, 1, 2, 4, 8 and 24 hours post-dose, 2 mice from each dose route were euthanized and blood samples and brains were collected. Brains were weighed and frozen at -80˚C immediately. Blood samples were collected in EDTA-treated microtainers and centrifuged at 13000 rpm for 5 minutes, after which plasma was extracted and frozen at -80˚C in a 96-well plate.

[00486] Another PK study was conducted with 7 week-old unmodified CD-1 mice from Taconic. [Ala5]GpTx-1 (SEQ ID NO:22) was dosed to 21 mice at 5 mg/kg subcutaneously. At 0.5, 1, 1.25, 1.5, 2, 3, and 4 hours post-dose, 3 mice were euthanized and blood samples and brains were collected. Brains were weighed and frozen at -80˚C immediately. Blood samples were collected in EDTA-treated microtainers and centrifuged at 13000 rpm for 5 minutes, after which plasma was extracted and frozen at -80˚C in a 96-well plate.

[00487] LC-MS/MS Analytical Procedure. Peptide stock solutions (1 mg/mL) were made from peptide reference standards in 50/50 (v/v) methanol/water and stored at -20 °C. 1 mg/mL peptide stock solutions were used to prepare 100 μg/mL peptide working solution in 50/50 (v/v) methanol/water. The peptide working solutions were stored in a refrigerator at 2 to 8°C.

[00488] Standard samples were prepared in citrate-buffered mouse blood (blood/0.1M citrate buffer, 30/70, v/v). Standards concentrations of 5, 10, 25, 50, 100, 250, 500 and 1000 ng/mL were prepared by serial dilution of a freshly prepared 5000 ng/mL solution in citrate-buffered mouse blood using the 100 μg/mL peptide working solution. 25 μl blood samples were aliquoted into the appropriate well of a 96-well plate, followed by the addition of 50 μl of internal standard solution (100 ng/mL, peptide analog made in 50/50 methanol/water) and 150 μL of 0.1M $ZnSO_4$ and the samples were vortex mixed for 5 min, then centrifuge for 10 min at 4000 rpm. Supernatant was then extracted using an Oasis HLB μElution 96-well solid phase extraction plate to extract peptides and the extracts were injected (10 μL) onto the LC-MS/MS system for analysis.

[00489] The LC-MS/MS consisted of an Acquity UPLC system (Waters, Milford, MA) coupled to a 5500 QTRAP mass spectrometer (AB Sciex, Toronto, Canada) with a Turbo IonSpray® ionization source. The analytical column was an Acquity UPLC BEH C_{18}

2.1 mm × 50 mm column. The mobile phases were 0.1% formic acid in acetonitrile/water (5/95, v/v, mobile phase A) and 0.1% formic acid in acetonitrile/water (95/5, v/v, mobile phase B). Data was collected and processed using AB Sciex Analyst® software (version 1.5).

[00490] The calibration curve was derived from the peak area ratios (peptide /internal standard) using $1/x^2$ weighted linear least-squares regression of the area ratio versus the concentration of the corresponding peptide standard. The regression equation from the calibration standards was used to back calculate the measured concentration for each standard and blood samples.

[00491] Results. In the pharmacokinetic studies, GpTx-1 (SEQ ID NO:1) was found to be lethal to the mice at 1 mg/kg and 0.5 mg/kg i.v. doses. A 1 mg/kg s.c. dose of GpTx-1 (SEQ ID NO:1) to mice was tolerated and showed measureable plasma concentrations for 1 h. (See, Figure 16). A 1 mg/kg i.v. dose of [Ala5]GpTx-1 (SEQ ID NO:22) was tolerated in mice with an approximate in vivo half-life of 15 min. (See, Figure 17A and Figure 17B). A 1 mg/kg s.c. dose of [Ala5]GpTx-1 (SEQ ID NO:22) also gave measurable exposure in blood. (See, Figure 17B). In another study, a 5 mg/kg s.c. dose yielded peptide concentrations in the plasma that were sustained at about 0.6 μM, 40-fold over the in vitro Nav1.7 IC_{50} by PatchXpress® (PX), for 3 h with a calculated t1/2 = 0.6 h, higher than the 1 mg/kg s.c. and i.v. doses and suitable for further in vivo testing. (See, Figure 17B).

[00492] Example 8: Ion channel counterscreens

[00493] Cardiac ion channel counterscreens (hERG and hNav1.5).

[00494] Cardiac ion channel counterscreens (hERG and hNav1.5) were conducted as described below, for which representative results are shown in Figures 18 and 19A-B.

[00495] Counterscreen against the cloned human Nav1.5 sodium channel using the PatchXpress® system.

[00496] Cell line. HEK293 cells stable transfected with human hNav1.5 were purchased from Cytomyx, Inc.

[00497] The extracellular (HB-PS) recording solution contained 70 mM NaCl, 67 mM N-methyl-D-glucamine, 4 mM KCl, 1.8 mM $CaCl_2$, 1 mM $MgCl_2$, 10 mM HEPES, 10 mM Glucose adjusted to pH 7.4 with HCl. The internal recording solution contained 130 mM CsF, 10 mM NaCl, 10 mM EGTA, 2 mM $MgCl_2$, 10 mM HEPES adjusted to pH 7.20 with CsOH. Stock solutions of reference standard or test articles were diluted into HB-PS prior to application. Test articles included either peptides or peptide conjugates described herein. A standardized step protocol was used to elicit ionic current through the hNav1.5 sodium channel. Cells are held at −80 mV. Onset and steady state block of hNav1.5 sodium current due to Test Article was measured using a pulse pattern with fixed amplitudes (conditioning prepulse: −120 mV for 50 ms; depolarizing test step to –30 mV for 20 ms) repeated at 10-s intervals. Currents were acquired at 10 kHz and filtered at 3 kHz, in episodic mode. When whole cell configuration was established, cells were washed for 3 minutes, followed by applying control vehicle for 5 minutes. The DataStable_PC function of the PatchXpress scripting utility with then allow the experiment to begin only when the baseline current was stable or an additional 5 minutes had elapsed. Then control and each concentration of test article was applied for 5 minutes. There were 3 additions for each concentration with 1-minute interval. To determine IC_{50}, Test Article at 1 μM, 3 μM, 10 μM and 30 μM was applied to cells cumulatively (without washout between test article concentrations; $n \geq 3$ where n = number of cells). Electrophysiological data acquisition was performed using PatchXpress Commander v1.4 (Molecular Devices, Sunnyvale, CA) and analyses was performed using DataXpress v2.04 (Molecular Devices, Sunnyvale, CA). The three peak inward currents before and after test article application were used to calculate the percentage of current inhibition at each concentration. Acceptance criteria for a good recording include: (1) seal resistance > 200 MΩ, (2) access resistance < 10 MΩ, (3) peak tail current > 200 pA, (4) leakage current < 25% of the peak tail current, (5) rundown < 2.5%/minute in control vehicle.

[00498] Counterscreens against the human IKr (hERG) potassium channel using the PatchXpress® system.

[00499] Cell culture. HEK293 cells stably expressing human ERG (hERG) potassium channel were purchased from Millipore (Cat. # CYL3039). Growth media for the HEK-hERG cells contains DMEM/F12 (Invitrogen # 11320), 1X Non Essential Amino Acid (Gibco # 11140), 10% Fetal Bovine Serum (Gibco # 16000) and 400 μg/ml geneticin (Gibco # 10131-027). Cells were maintained in culture at 37°C in a humidified 95% air, 5% CO_2 environment. Seeding density for a T75 Corning flask is four million cells, and a subcultivation ratio of 1:3 is performed twice weekly or whenever the cell density reaches 80% confluency. Cells are lifted from a T75 flask on the day of PatchXpress 7000A® experiments by using 0.05% trypsin-EDTA (Sigma) for 3 minutes at 37°C. They are then re-suspended in growth media for at least thirty minutes at 37°C in a humidified 95% air, 5% CO_2 atmosphere before loading onto the SealChip recording chambers (AVIVA Biosciences).

[00500] Electrophysiology Recording by PatchXpress® 7000A (Molecular Devices). The intracellular solution for whole cell patch clamp recordings contained (in mM) potassium chloride (70), potassium fluoride (60), magnesium chloride (2), ethylene glycol tetraacetic acid (EGTA, 11), magnesium adenosine triphosphate (5) and HEPES (10). The pH was adjusted to 7.2 with KOH, and the final osmolarity was set at 295 mOsm. The extracellular solution contains (in mM) sodium chloride (135), potassium chloride (4), magnesium chloride (1), calcium chloride (1.8), HEPES (10) and glucose (10). pH is adjusted to 7.4 with NaOH, and the final somolarity was set at 305 mOsm.

[00501] After achieving whole cell recording mode, cells are held at a holding potential of -80 mV. A voltage step to -50 mV from holding voltage of -80 mV for 500 msec is used to establish a baseline or reference point for the peak outward tail current measurement. This is followed by a depolarizing step to +30 mV for 2s to drive the channels to the inactivated state. A step back to -50 mV for 2s removes inactivation and thereby revealing the maximum peak outward tail current. Voltage steps are repeated once every 10 sec. Total hERG outward tail current is determined by the difference between the peak outward tail current at the repolarizing -50 mV step and the first baseline current at -50 mV prior to channel activation.

[00502] Test sample preparation. Test compounds (up to 10 μM), which included the peptides and peptide conjugates described herein, were serially diluted into the extracellular recording buffer containing 0.1% w/v bovine serum albumin (BSA) and subsequently transferred to glass perfusion reservoirs. Three μL of the serial dilutions were then transferred to nine hundred μL of assay buffer containing 0.1% w/v BSA in assay buffer.

[00503] PatchXpress® Procedure. Cumulative concentration response curve is generated from 4 concentrations (0.3, 1, 3, and 10 μM) for drug potency measurement. Each concentration of the test compound is added 3 times separated by 60 sec to ensure complete exchange of assay buffer in the recording chamber. There is a three minute wait time between subsequent additions. Prior to test compound addition, two glass vials containing assay buffer and vehicle control (0.3% DMSO) are used as controls (i.e., 1 x assay buffer, 1 x 0.3% DMSO, and 4 escalating concentrations of test compound).

[00504] Data Analysis. Outward hERG tail current from every successful whole cell recording must be visually inspected for quality. The general criteria for good quality recordings are: 1) holding current at -80 mV must not exceed 300 pA during the drug addition procedure, 2) peak outward tail current must be greater than 300 pA and 3) peak outward tail current does not change by greater than 2.5%/min during the eight minute control period in 0.3% DMSO. Potency estimates are generated by Protocol Engine (Amgen) using nonlinear mixed models to quantify the consistency of the assay from cell to cell and to provide an accurate measurement of drug potency over the population of the same cell type (Miu *et al.*, 2006, JALA 11:195).

[00505] Results of counterscreen for GpTx-1 (SEQ ID NO:1) and [Ala5]GpTx-1 (SEQ ID NO:22) against hERG are shown in Figure 18. Results of counterscreen for GpTx-1 (SEQ ID NO:1) and [Ala5]GpTx-1 (SEQ ID NO:22) against hNav1.5 are shown in Figures 19A and 19B.

[00506] Example 9: In vivo pain models

[00507] The compositions of the present invention can be tested in any relevant in vivo pain models. Examples include:

[00508] Tactile Allodynia- Von Frey Test. Von Frey filaments are used to assess mechanical sensitivity in rodents. Mice are placed on a wire mesh floor, enclosed in an individual testing chamber and allowed to acclimate until calm. Calibrated filaments of various bending forces are then applied to the paw of a mouse to measure the response to a non-noxious tactile (e.g., touch) stimulus. The pattern of responses and non-responses to the series of filaments determines the animal's mechanical threshold. This threshold is used as the endpoint of the assay.

[00509] Rat Neuropathic Pain Model. Male Sprague-Dawley rats (200 g) are anesthetized with isoflurane inhalant anesthesia and the left lumbar spinal nerves at the level of L5 and L6 are

tightly ligated (4-0 silk suture) distal to the dorsal root ganglion and prior to entrance into the sciatic nerve, as first described by Kim and Chung (An experimental model for peripheral neuropathy produced by segmental spinal nerve ligation in the rat. Pain 50:355-363, (1992)). The incisions are closed and the rats are allowed to recover. This procedure results in mechanical (tactile) allodynia in the left hind paw as assessed by recording the pressure at which the affected paw (ipsilateral to the site of nerve injury) is withdrawn from graded stimuli (von Frey filaments ranging from 4.0 to 148.1 mN) applied perpendicularly to the plantar surface of the paw (between the footpads) through wire-mesh observation cages. A paw withdrawal threshold (PWT) is determined by sequentially increasing and decreasing the stimulus strength and analyzing withdrawal data using a Dixon non-parametric test, as described by Chaplan, S.R., et al. (Quantitative assessment of tactile allodynia in the rat paw. J. Neurosci. Meth, 53:55-63 (1994)).

[00510] Rat CFA Inflammatory Pain Model. Male Sprague-Dawley rats (200 g) are injected in the left hindpaw with complete Freund's adjuvant (CFA). This procedure results in mechanical (tactile) and themal allodynia in the left hind paw as assessed by recording the pressure at which the affected paw is withdrawn from graded stimuli (von Frey filaments ranging from 4.0 to 148.1 mN) applied perpendicularly to the plantar surface of the paw (between the footpads) through wire-mesh observation cages or by applying radiant heat. PWT is determined by sequentially increasing and decreasing the stimulus strength and analyzing withdrawal data using a Dixon non-parametric test, as described by Chaplan et al. (1994). Rats are included in the study only if they do not exhibit motor dysfunction (e.g., paw dragging or dropping) or broken skin and their PWT is below 39.2 mN (equivalent to 4.0 g). At appropriate times after CFA injection rats are treated with test peptides and/or test vehicle-conjugated peptides (usually a screening dose of 60 mg/kg) or control solution (PBS or other vehicle) once by s.c. injection and PWT is determined. Average paw withdrawal threshold (PWT) was converted to percent of maximum possible effect (%MPE) using the following formula: %MPE = 100 * (PWT of treated rats – PWT of control rats)/(15-PWT of control rats). Thus, the cutoff value of 15 g (148.1 mN for mechanical allodynia) is equivalent to 100% of the MPE and the control response is equivalent to 0% MPE.

[00511] Preferred molecules of the present invention are expected to produce an antinociceptive effect with a PDwith appropriate exposures compared to IC_{50} on the target.

[00512] Mouse Formalin Pain Model Experimental Procedure. Formalin injection into a rodent paw evokes a well-studied form of pain quantitated by the number of times the animal flinches its paw. The pain following formalin injection comes in two characteristic phases: a first

phase lasts approximately ten minutes and likely corresponds to the immediate pain mediated by peripheral neurons. The second phase, beginning approximately ten minutes after formalin injection and lasting for another 30 to 40 minutes, corresponds to sensitization of neurons in the spinal cord and hyperactivity of peripheral pain-sensing neurons. Compounds represented in this application were tested to see if they reduce the number of flinches in phase II of the formalin response and so are potential analgesic drugs (Bregman H et al., "Identification of a potent, state-dependent inhibitor of Nav1.7 with oral efficacy in the formalin model of persistent pain." J Med Chem 54(13):4427-4445, 2011).

[00513] Male CD-1 mice (8-12 weeks of age, Harlan Laboratories, Frederick, MD) were used for all in vivo efficacy experiments. Animal subjects had free access to food (Teklad Global Soy Protein-Free Extruded Rodent Diet 2020X) and water and were maintained on a 12-h light/dark cycle for the entire duration of the study. All animals were housed on standard solid-bottomed caging with corn cob bedding in groups of 4 animals per cage. The animal colony was maintained at approximately 21°C and 60% humidity. All experiments were conducted in accordance with the International Association for the Study of Pain guidelines.

[00514] On test day, during or before acclimation, the animals were dosed with either an investigational compound or vehicle. Following dose administration, all mice (n=12) were conditioned to behavioral analysis chambers (dimensions: 10cm diameter, 14cm tall cylinder with lid on top of elevated glass) for 5 minutes prior to the formalin injection. Video cameras were set underneath for recording the mouse behavior (5 minute acclimation and 40 minute test session). At test time, mice were lightly restrained in a cloth glove and injected with 20uL of a 2% formalin solution into the dorsal surface of the left hind paw using an insulin syringe (U100, 0.3cc, 28-30G). Immediately following the formalin injection, animals were returned to the chamber and observed for 40 minutes. Paw lifting/licking behavior was recorded in 5 minute intervals after which ipsilateral and contralateral paw widths were measured. After study completion animals were immediately euthanized.

[00515] In the first mouse formalin pain model study, [Ala5]GpTx-1(1-34) (SEQ ID NO:22) was dosed at 5 mg/kg s.c. 1-hour pre-treatment with morphine at 1 mg/kg s.c. 30-min pre-treatment as the positive control. (See, Figure 59). The peptide had no effect in the first or acute phase (0-5 minutes post formalin injection). (See, Figure 60). The peptide significantly reduced the time spent lifting and/or licking the affected paw during the second phase (5-40 minutes post formalin injection) compared to vehicle (PBS). (See, Figure 61). In this experiment the 1 mg/kg s.c. dose of morphine used as a positive control did not significantly reduce pain response in the animals, and it was increased to 3 mg/kg in the following studies.

The terminal plasma exposure (peptide plasma concentrations at 45 min post formalin injection) for the peptide was 0.80 ± 0.21 μM. Neither the peptide nor the morphine positive control significantly reduced the paw edema caused by formalin injection relative to the vehicle (PBS). (See, Figure 62).

[00516] The mouse formalin pain model was repeated with 1-hour pre-treatment doses of 5, 1.67, and 0.5 mg/kg s.c. to determine the dose response of [Ala5]GpTx-1(1-34) (SEQ ID NO:22). (See, Figure 63). The peptide had no effect at any dose in the first phase (0-5 minutes post formalin injection). (See, Figure 64). The positive control, a 3 mg/kg s.c. dose of morphine, did significantly reduce the time spent lifting/licking the affected paw in the first phase. The 5 mg/kg s.c. dose of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) demonstrated a significant reduction of the time spent lifting/licking in the second phase of the study, as did the morphine positive control. (See, Figure 65). However, the lower peptide doses (1.67 and 0.5 mg/ kg s.c.) had no significant effect relative to the vehicle in the second phase. Terminal exposures (peptide plasma concentrations at 45 min post formalin injection) were0.58 ± 0.26 μM, 0.15 ± 0.05 μM, and 0.04 ± 0.2 μM for the 5.0, 1.67, and 0.5 mg/kg doses, respectively. Neither the peptide nor the morphine positive control significantly reduced the paw edema caused by formalin injection relative to the vehicle (PBS). (See, Figure 66). In the first two mouse formalin experiments, [Ala5]GpTx-1(1-34) (SEQ ID NO:22) demonstrated a significant reproducible reduction in paw lifting/licking at plasma concentratons between 0.60-0.80 μM. One other peptide was tested in the formalin pain model, [Glu29]GpTx-1(1-34) (SEQ ID NO:30). The substitution of glutamic acid for tryptophan at position 29 greatly reduces potency against Nav1.7, so [Glu29]GpTx-1 was prepared and tested as a negative control. A 5 mg/kg s.c. dose of [Glu29]GpTx-1 had no significant effect on the time spent lifting/licking in the formalin pain model in mice with a terminal mean peptide plasma concentration of 0.502 ± 0.271 μM, demonstrating that peptide Nav1.7 potency correlates with efficacy in the formalin pain model. (See, Figures 95-98).

[00517] The mouse formalin pain model was repeated with 1-hour pre-treatment doses of 5, 3, and 1 mg/kg s.c. to further investigate the dose response of [Ala5]GpTx-1(1-34) (SEQ ID NO:22). (See, Figure 67). The peptide had no effect at any dose in the first phase (0-5 minutes post formalin injection). (See, Figure 68). The 5 mg/kg s.c. dose of peptide demonstrated a significant reduction of the time spent lifting/licking in the second phase of the study, as did the morphine positive control. However, the lower peptide doses did not show a reduction in lifting/licking behavior relative to the vehicle control in the second phase. The 1 mg/kg s.c. group was not significantly different from the vehicle control whereas the 3 mg/kg s.c. group appeared to significantly increase time spent lifting/licking. (See, Figure 69). Terminal

exposures (peptide plasma concentrations at 45 min post formalin injection) were 1.84 ± 0.18 μM, 0.53 ± 0.23 μM, and 0.20 ± 0.05 μM for the 5, 3, and 1 mg/kg doses, respectively. Neither the peptide nor the morphine positive control significantly reduced the paw edema caused by formalin injection relative to the vehicle (PBS). (See, Figure 70).

[00518] Mouse Open Field Analysis Experimental Protocol. To verify that efficacy in the formalin model produced by a test compound is not due to sedation or damage to the animal, compounds were also tested for their effects on the overall movement of animals (open-field testing). Naïve animals are administered test compound and placed in a novel environment, and the movements the animal undergoes during exploration of the novel environment are automatically recorded. Reductions in movement of 50% or more mean that efficacy in the formalin test cannot be ascribed to true analgesia.

[00519] Male CD-1 mice (8-12 weeks of age, Harlan Laboratories, Frederick, MD) were used for all in vivo efficacy experiments. Animal subjects had free access to food (Teklad Global Soy Protein-Free Extruded Rodent Diet 2020X) and water and were maintained on a 12-h light/dark cycle for the entire duration of the study. All animals were housed on standard solid-bottomed caging with corn cob bedding in groups of 4 animals per cage. The animal colony was maintained at approximately 21°C and 60% humidity. All experiments were conducted in accordance with the International Association for the Study of Pain guidelines.

[00520] On test day, animals were dosed with either an investigational compound or vehicle and given at least 30 minutes to acclimate to the testing room. Mice (N=8) were placed in a clean open field chamber (Kinder Scientific Photobeam Activity System) at the appropriate time after dose administration. The changes in overall animal movement were recorded on the system for 60 minutes under lights off conditions. The following parameters were evaluated: total basic movement, total rearing, total time rearing, and total fine movement.

[00521] Results of the open field analysis. [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at 3 mg/kg s.c. dose with a 1-hour pre-treatment time had no effect on the total basic movement, total fine movement, total rearing, or total time rearing in CD-1 mice. No doses of peptide significantly decreased exploratory behavior in relation to the vehicle control. However, at a 5 mg/kg s.c. dose with a 1-hour pre-treatment the peptide significantly reduced the total fine movement and total time rearing components of locomotor activity in CD-1 mice relative to the vehicle. Total basic movement and total rearing were also reduced. (See, Figures 71-74). Terminal exposures (peptide plasma concentrations at 2 h post peptide injection) were 1.79 ± 0.38 μM and 0.89 ± 0.33 μM for the 5 and 3 mg/kg s.c. doses, respectively. In this experiment, the 3 mg/kg dose, which had no significant effect on locomotor activity, resulted in a peptide

plasma concentration equivalent to those that had demonstrated reproducible efficacy in the formalin pain model. Higher peptide plasma concentrations (> 1.5 μM) resulted in significant effects on locomotor activity, as was demonstrated by a repeat open field analysis of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at a 5 mg/kg dose with a terminal exposure of 2.1 ± 0.47 μM. (See, Figures 99-102). Three other peptides were tested in the open field analysis: [Glu29]GpTx-1(1-34) (SEQ ID NO:30), [Glu28]GpTx-1(1-34) (SEQ ID NO:153), and [Ala5,Phe6,Glu10,2-Abu13,Leu26,Arg28]GpTx-1 (SEQ ID NO:1035). The substitution of glutamic acid for tryptophan at position 29 greatly reduces potency against Nav1.7, so [Glu29]GpTx-1 (SEQ ID NO:30) was prepared and tested as a negative control. A 5 mg/kg s.c. dose of [Glu29]GpTx-1 had no significant effect on the locomotor activity of mice in the open field analysis with a terminal mean peptide plasma concentration of 0.771 ± 0.272 μM. (See, Figures 103-106). A 5 mg/kg dose of [Glu28]GpTx-1(1-34) (SEQ ID NO:153) significantly reduced locomotor activity in the open field analysis with a terminal mean peptide plasma concentration of 1.28 ± 0.403 μM, similar to the result with the 5 mg/kg dose of [Ala5]GpTx-1 (SEQ ID NO:22). (See, Figures 107-110). A 5 mg/kg dose of [Ala5,Phe6,Glu10,2-Abu13,Leu26,Arg28]GpTx-1 (SEQ ID NO:1035) in the open field analysis resulted in moribund behavior or lethality in animals at a terminal mean peptide plasma concentraiton of 1.72 ± 0.313 μM.

[00522] Mouse Veratridine Pain Model Experimental Protocol. Veratridine is a nonselective activator of voltage-gated sodium ion channels (Hille B, Ion Channels of Excitable Membranes, Sinauer Associates, Sunderland MA 2001) that causes a painful flinching (paw licking and lifting or guarding) response when injected into the rodent paw. Accordingly, testing compounds like those of the present invention that are sodium channel inhibitors quantifies not only their effect on pain, but on pain caused by sodium channel activation. That is, effects of a test compound on veratridine-induced paw lifting and licking not only measures analgesic efficacy but the in vivo receptor occupancy of sodium channels.

[00523] Male CD-1 mice (8-12 weeks of age, Harlan Laboratories, Frederick, MD) were used for all in vivo efficacy experiments. Animal subjects had free access to food (Teklad Global Soy Protein-Free Extruded Rodent Diet 2020X) and water and were maintained on a 12-h light/dark cycle for the entire duration of the study. All animals were housed on standard solid-bottomed caging with corn cob bedding in groups of 4 animals per cage. The animal colony was maintained at approximately 21°C and 60% humidity. All experiments were conducted in accordance with the International Association for the Study of Pain guidelines.

[00524] On test day, during or before acclimation, the animals were dosed with either an investigational compound or vehicle. Following dose administration, all mice (n=12) were conditioned to behavioral analysis chambers (dimensions: 10cm diameter, 14cm tall cylinder with lid on top of elevated glass) for 5 minutes prior to the veratridine injection. Video cameras were set underneath for recording the mouse behavior (5 minute acclimation and 20 minute test session). At test time, mice were lightly restrained in a cloth glove and injected with 20uL of 1μg of veratridine (Sigma-Aldrich #V109) in 1% ethanol in phosphate buffered saline suspension into the dorsal surface of the left hind paw using an insulin syringe (U100, 0.3cc, 28-30G). Immediately following the veratridine injection, animals were returned to the chamber and observed for 20 minutes. Paw lifting/licking behavior was recorded in 5 minute intervals after which ipsilateral and contralateral paw widths were measured. After study completion animals were immediately euthanized.

[00525] In the first mouse veratridine pain model, [Ala5]GpTx-1(1-34) (SEQ ID NO:22) was dosed at 5 mg/kg s.c. with a 1-hour pre-treatment time, and mexiletine was dosed at a 30 mg/kg intraperitoneal ("i.p.") dose with a 30 minute pre-treatment time as a control. The anti-nociceptive effect was measured on the veratridine-induced (1 μg injection in the dorsal paw) spontaneous nociceptive behaviors in CD-1 mice. Overall there was a good paw lifting response from the vehicle group that was significantly reversed with mexiletine. At 5 mg/kg, [Ala5]GpTx-1(1-34) (SEQ ID NO:22) was unable to significantly reduce the lifting behavior. (See, Figure 75). There is no reduction of paw edema across all groups. (See, Figure 76). However, in examining the time course of the experiment the peptide did appear to have some effect during the 10-15 and 15-20 minute time bins. (See, Figure 77). Terminal exposure (peptide plasma concentration at 1.5 h post peptide injection) was 0.70 ± 0.10 μM for the 5 mg/kg dose.

[00526] In the repeat of the mouse veratridine pain model, [Ala5]GpTx-1(1-34) (SEQ ID NO:22) was dosed at 1 and 5 mg/kg s.c. with a 1-hour pre-treatment time, and mexiletine was dosed at a 30 mg/kg i.p. dose with a 30 minute pre-treatment time as a control. There was a robust paw lifting response from the vehicle group that was significantly reversed with mexiletine. At 1 and 5 mg/kg, [Ala5]GpTx-1(1-34) (SEQ ID NO:22) had no effect of the lifting behavior. (See, Figure 78). There was no reduction of paw edema in any of the groups. (See, Figure 79). The peptide doses had no significant effect throughout the time course of the experiment. (See, Figure 80). Terminal exposures (peptide plasma concentration at 1.5 h post peptide injection) were 0.72 ± 0.13 μM and 0.09 ± 0.05 μM for the 5 and 1 mg/kg doses, respectively.

[00527] The foregoing example of in vivo pain models for the screen of therapeutic embodiments of the inventive molecules are non-limiting. The skilled practitioner is aware of other relevant pain models.

[00528] Example 10: Preliminary Cardiac Safety Assessment

[00529] Isolated Perfused Rabbit Heart (Langendorff Preparation). The effects of [Ala5]GpTx-1(1-34) (SEQ ID NO:22) in the isolated perfused rabbit heart (Langendorff preparation) assay were determined as described below, for which results are shown below in Table 36 and Table 37.

Table 36. Effects of 1 μM [Ala5]GpTx-1(1-34) (SEQ ID NO:22) on electrocardiography intervals in the isolated perfused rabbit heart assay (Langendorff preparation). The peptide had no delaying effects on ventricular repolarization (QTc or JTc intervals). The peptide had no effects on heart rate (HR). The peptide also had no effects on ventricular depolarization and conduction (QRS and PR intervals). (Abbreviations: **HR**, heart rate; **PR** interval, time interval from onset of atrial depolarization (P wave) to onset of ventricular depolarization (QRS complex); **QRS** duration, time interval from onset to end of QRS complex, which is the duration of ventricular depolarization; **QT** interval, time interval from onset of QRS complex to end of T wave, which is the duration of ventricular depolarization and repolarization; **QTc** interval, QT interval corrected with HR; **JT** interval, the difference between QT interval and QRS duration (JT = QT – QRS), which is the duration of ventricular repolarization; and **JTc** interval, JT interval corrected with HR.)

STATISTICS (NORMALIZED VALUES), %							
Mean							
Treatment	HR	PR	QRS	QT	QTcF	JT	JTcF
1% BSA	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1uM SEQ ID NO:22	-0.18	-3.52	-1.55	-4.19	-4.22	-4.57	-4.60
Standard Deviation							
Treatment	HR	PR	QRS	QT	QTcF	JT	JTcF
1% BSA	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1uM SEQ ID NO:22	1.87	2.19	2.66	2.48	2.10	3.12	2.75

Table 37. Effects of 1 μM [Ala5]GpTx-1(1-34) (SEQ ID NO:22) on hemodynamic parameters in the isolated perfused rabbit heart assay (Langendorff preparation). The peptide had no effects on LV contractility (dP/dt+) and no effects on coronary blood flow (CF). The peptide had no direct effects on coronary vasculature. (Abbreviations: **LVSP**, left ventricular systolic pressure; **LVDP**, left ventricular diastolic pressure; **dP/dt+**, maximal rate of increase in LV pressure; **dP/dt-**, minimal rate of decrease in LV pressure; **LVDevP**, LV developed pressure, LVDevP = LVSP-LVDP; and **CF**, Coronary flow.)

LVP - Normalized Values (%)							
uM	LVSP, mean	LVDP, mean	dP/dt+, mean	dP/dt-, mean	Flow, mean	LVDevP	N
Baseline	1.64	0.02	1.72	2.63	0.04	1.69	4
1uM SEQ ID NO:22	-3.81	-3.16	-6.55	-2.93	0.29	-7.22	4
LVP Standard Deviation							
uM	LVSP, SD	LVDP, SD	dP/dt+, SD	dP/dt-, SD	Flow SD	LVDevP, SD	N
Baseline	2.13	0.40	1.61	3.65	0.45	2.51	4
1uM SEQ ID NO:22	1.41	7.15	2.72	0.93	7.99	1.10	4

[00530] Acquisition and Acclimatization. Six female New Zealand White rabbits, 14 – 22 weeks old and 2.5 – 3.5 kg were obtained from Harlan Laboratories. Upon receipt, rabbits were examined by veterinary personnel to ensure acceptable health status. Veterinary care was provided by the veterinarians and staff. Rabbits were acclimated for at least 7 days prior to use. Unhealthy rabbits were not used for the study.

[00531] Method of Identification. Each rabbit was assigned an identification number by the supplier. An ear tag containing the identification number was affixed to each rabbit by the supplier. This identification number was displayed on a cage card, along with the rabbit's date of arrival, date of birth, source, and sex. The identification numbers of the rabbits used in the study and their final weights were recorded in notebooks.Composition of Perfusion Medium. The perfusion medium consists of modified oxygenated Krebs-Henseleit buffer (37°C at the heart) composed of (mM): NaCl (120), KCl (4.7), $MgSO_4$ (1.2), KH_2PO_4 (1.2), d-glucose (11.1), $CaCl_2$ (1.8), $NaHCO_3$ (25), and Na-pyruvate (2.0). This perfusion

medium is constantly bubbled with 95% O_2/5% CO_2. For testing [Ala5]GpTx-1(1-34) (SEQ ID NO:22), 1% BSA was added in the buffer.

Anesthesia and Heart Removal. Each rabbit was anaesthetized with pentobarbital (50 mg/kg, IV; ear vein). Complete suppression of pain was assessed by pinching a paw (pedal withdrawal reflex). Rabbits were restrained in a rabbit cage restrainer while anesthesia induction was taking place to avoid injury to the animal and the investigator.

[00532] Exposing the heart: Once the animal was anesthetised the heart was excised. The diaphragm was accessed by a transabdominal incision and cut carefully to expose the thoracic cavity. The thorax was opened by a bilateral incision along the lower margin of the last to first ribs, the thoracic cage was then reflected over the animals head, exposing the heart. To remove the heart, the organ was cradled gently between the fingers to avoid injury and lifted slightly before incising the aorta, vena cava and pulmonary vessels.

[00533] Isolated Heart Preparation Perfused by Langendorff Apparatus. Hearts were rapidly removed, mounted on a Langendorff apparatus, and perfused with oxygenated Krebs-Henseleit buffer under constant pressure. Spontaneously beating (unpaced) hearts were included in the study if they exhibited acceptable and stable baseline values for each parameter (mechanical, heart rate, cardiac interval, etc) during the equilibration period. Perfusion buffer temperature was maintained ~ 37°C throughout the study period.

[00534] Experimental Plan. Each individual heart (N = 4 total) was equilibrated for approximately 30 to 60 minutes. Following this equilibration period, baseline measurements were collected for approximately 10 minutes in 1% BSA. After this period, hearts were exposed to [Ala5]GpTx-1(1-34) (SEQ ID NO:22) at 1 μM for 20 minutes. Cardiac parameters were measured continuously during the study using a computerized data acquisition system. (See Qu et al., BeKm-1, A Peptide Inhibitor of hERG potassium currents, prolongs QTc intervals in isolated rabbit heart, J. Pharmacol. Exp. Ther. (337):2-8 (2011) for details and validation studies.)

[00535] Electrocardiographic Measurements. Simultaneous 2-lead surface-contacted electrocardiograms were recorded with flexible unipolar electrodes placed on the heart, one over the epicardium of ventricles and the other over the epicardium of the left atria.

[00536] Hemodynamic Measurements. The latex balloon in the left ventricle (LV) was expanded with water to achieve a LVEDP of approximately 5-10 mmHg. The balloon was connected with tubing to a pressure transducer to measure LVEDP and LVSP. Coronary perfusion pressure (CPP) was measured with a pressure transducer connected to a side-arm port of the aortic block.

[00537] Data Analysis. For analysis, left ventricular pressure (LVP) and CPP were automatically performed with Notocord. Measurements from the final 30 sec of the equilibration period and each dose exposure period were evaluated and used to determine effects. Electrocardiograms (ECGs) were analyzed with EMKA ecgAUTO software (EMKA Technologies, Paris, France) and 1 minute consecutive ECG waveforms (30 seconds before the next event marker) were analyzed for HR, PR, QRS and QT intervals. Values from each individual heart were pooled to determine an average for each variable at individual concentrations. Average percent change of each variable between baseline and each concentration were also determined. For HR correction of QT intervals, Fridericia's equation was used ($QTcF=QT/RR^{1/3}$). Data are presented as average percent change of each variable between baseline and each concentration. A $\geq$ 10% change in HR, PR, QRS, QTc, and JTc and a $\geq$ 15% change in +dP/dt and CF are considered drug-related. All values are presented as mean ± S.D.

[00538] Results. At a 1 μM concentration, [Ala5]GpTx-1(1-34) (SEQ ID NO:22), had no effects in the isolated perfused rabbit heart assay (Langendorff preparation). The peptide had no delaying effects on ventricular repolarization (QTc or JTc intervals) and had no effects on heart rate. The peptide also had no effects on ventricular depolarization and conduction (QRS and PR intervals). The peptide had no effects on LV contractility (dP/dt+) and no effects on coronary blood flow (CF). The peptide had no direct effects on coronary vasculature.

Example 11: Site specific peptide conjugation

[00539] The following protocol was used to site-specifically conjugate toxin peptide analogs (see, Table 5A and Table 5B for toxin peptide analog amino acid sequences) to either a human immunoglobulin at a linkage site on the heavy chain (C273 of SEQ ID NO:3087) or on a human immunoglobulin Fc domain (at C52 of SEQ ID NO:3089).

[00540] Preparation of peptide-linker constructs. Alkyne-containing peptides were subjected to copper catalyzed 1,3-dipolar cycloaddition with azido-PEG bromoacetamides of two differing lengths to obtain the site-specifically PEGylated peptides with a triazole linkage, thus converting a propargylglycine or Pra residue in the sequence to a 3-(1,2,3-triazol-4-yl)alanine or Atz residue. (See, Figure 81B). Peptide containing either propargylglycine (Pra) at position 13 or 4-pentynoyl (4-Pen) at the N-terminus (7.4 mM in 6.7 mL water), azido-PEG11-bromoacetamide (150 mM, 0.964 mL in water), tris((1-benzyl-1H-1,2,3-triazol-4-

yl)methyl)amine (TBTA, 10 mM, 2.2 mL in DMSO), sodium ascorbate (50 mM, 10.1 mL in water), and copper (II) sulfate (35 mM, 2.9 mL in water) solutions were prepared fresh. Peptide and reagents were added in the following order to a 50 mL centrifuge tube to achieve the following final concentrations. Peptide stock solution (6.7 mL) was added for a final concentration of 3.7 mM, followed by addition of azido-PEG11-bromoacetamide (0.402 mL) for a final concentration of 4.5 mM. TBTA (0.603 mL) was added for a final concentration of 0.45 mM and mixed thoroughly. Sodium ascorbate (4.522 mL) was then added for a final concentration of 16.9 mM and mixed thoroughly. $CuSO_4$ (1.292 mL) was added for a final concentration of 3.4 mM. The solution was allowed to stand for 1 h at which time it was judged to be complete by LC-MS. To a 25mL SPE filter tube was added SP Sepharose High Performance as a slurry (8 mL) with a pipette. The gel was conditioned with wash buffer (50 mL 20 mM NaOAc, pH = 4.0), loaded with the peptide solution, washed (50 mL, 20 mM NaOAc, pH = 4.0 and 50 mL, 20 mM NaOAc, pH = 4.0, 0.1M NaCl), and eluted with 45 ml 1M NaCl, 20 mM NaOAc, pH = 4.0) into a 50 mL centrifuge tube. The product mixture was purified by loading onto a preparative HPLC column (Phenomenex Luna 5u C18(2) 100A AXIA, 250 x 30mm) at 30 mL/min using an Agilent prep loading pump. The column was was flushed for 10 min with 10% B. The column was attached to a prep HPLC (Agilent), and the peptide was eluted with a 10-40% B gradient over 60 min, followed by a 10 min flush and a 10 min equilibration. The fractions were analyzed by LC-MS, pooled, and lyophilized to afford pure peptide-linker construct for conjugation to IgG or Fc domain.

[00541] Antibody Preparation/Reduction. Anti-DNP mAb (E273C, hIgG1) (kappa/IgG1z) was concentrated to ~5mg/ml in reaction buffer (20mM sodium phosphate pH 6.8, 2mM EDTA).

[00542] The amino acid sequence of the human IgG heavy chain monomer that was used was the following (variable region is underlined; C273 linkage site is italicized and underlined):

[00543] QVQLVESGGGVVQPGRSLRLSCAASGFTFSSYGMHWVRQAP GKGLEWVAVIWYDGSNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVYYC ARYNFNYGMDVWGQGTTVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDY FPEPVTVSWNSGALTSGVHTFPAVLQSSGLYSLSSVVTVPSSSLGTQTYI CNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKD TLMISRTPEVTCVVVDVSHEDPCVKFNWYVDGVEVHNAKTKPREEQYNST YRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVY TLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLD

SDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK//SEQ ID NO.: 3087.

[00544] The amino acid sequence of the human IgG kappa light chain monomer that was used was the following (variable region is underlined):

[00545] DIQMTQSPSSVSASVGDRVTITCRASQGISRRLAWYQQKPGKAPKLLIYAA SSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQANSFPFTFGPGTKVDIKRTVAAP SVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNSQESVTEQDSKDST YSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC// SEQ ID NO.: 3088.

[00546] The amino acid sequence of the human IgG1z Fc domain monomer that was used was the following (C52 linkage site is italicized and underlined):

[00547] DKTHTCPPCPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVV DVSHEDP*C*VKFNWYVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEY KCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIA VEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHN HYTQKSLSLSPGK//SEQ ID NO.: 3089.

Table 38. Immunoglobulin-peptide conjugates and Fc domain-peptide conjugates made. "Monovalent" conjugate molecules had one toxin peptide (i.e., peptide covalently conjugated via linker to one HC or Fc domain monomer in the molecule, but not to the other HC or Fc domain monomer) in the molecule; "Bivalent" conjugate molecules had two toxin peptides (i.e., one peptide covalently conjugated via linker to each HC or Fc domain monomer in the molecule). SEQ ID NOS:1046, 1047, and 1048 are as set forth in Table 5A.

Designation	SEQ ID NO of toxin peptide	Linker and residue position of linkage on toxin peptide	SEQ ID NOS of immunoglobulin monomers in conjugated molecule	Monovalent or Bivalent
Fc-peptide Conjugate 1	1046	PEG11-(acetamidomethyl) linker at residue 13 sidechain	3089; 3089	Monovalent
Fc-peptide Conjugate 2	1046	PEG11-(acetamidomethyl) linker at residue 13 sidechain	3089; 3089	Bivalent
Immunoglobulin-peptide Conjugate 1	1046	PEG11-(acetamidomethyl) linker at residue 13 sidechain	3087; 3088; 3087; 3088	Monovalent
Immunoglobulin-peptide Conjugate 2	1046	PEG11-(acetamidomethyl) linker at residue 13 sidechain	3087; 3088; 3087; 3088	Bivalent
Fc-peptide Conjugate 3	1047	PEG11-(acetamidomethyl)	3089; 3089	Monovalent

		linker at residue 13 sidechain		
Fc-peptide Conjugate 4	1047	PEG11-(acetamidomethyl) linker at residue 13 sidechain	3089; 3089	Bivalent
Immunoglobulin-peptide Conjugate 3	1047	PEG11-(acetamidomethyl) linker at residue 13 sidechain	3087; 3088; 3087; 3088	Monovalent
Immunoglobulin-peptide Conjugate 4	1047	PEG11-(acetamidomethyl) linker at residue 13 sidechain	3087; 3088; 3087; 3088	Bivalent
Fc-peptide Conjugate 5	1048	acetamidomethyl-NPEG11-triazole linker at N-terminal	3089; 3089	Monovalent
Fc-peptide Conjugate 6	1048	acetamidomethyl-NPEG11-triazole linker at N-terminal	3089; 3089	Bivalent
Immunoglobulin-peptide Conjugate 5	1048	acetamidomethyl-NPEG11-triazole linker at N-terminal	3087; 3088; 3087; 3088	Monovalent
Immunoglobulin-peptide Conjugate 6	1048	acetamidomethyl-NPEG11-triazole linker at N-terminal	3087; 3088; 3087; 3088	Bivalent
Fc-peptide Conjugate 7	1046	PEG3-(acetamidomethyl) linker at residue 13 sidechain	3089; 3089	Monovalent
Fc-peptide Conjugate 8	1046	PEG3-(acetamidomethyl) linker at residue 13 sidechain	3089; 3089	Bivalent

Immunoglobulin-peptide Conjugate 7	1046	PEG3-(acetamidomethyl) linker at residue 13 sidechain	3087; 3088; 3087; 3088	Monovalent
Immunoglobulin-peptide Conjugate 8	1046	PEG3-(acetamidomethyl) linker at residue 13 sidechain	3087; 3088; 3087; 3088	Bivalent

[00548] Reduction of engineered cysteines was done by incubating mAb with a 1:1 molar ratio of TCEP to cysteine (2:1 TECP to mAb) at room temperature for 30 minutes. TCEP was removed using a Zeba spin desalting column (≥ 7 kD Pierce) equilibrated with reaction buffer. Large scale preps were concentrated to appropriate volume prior to loading using amicon ultra (10,000-30,000MWCO) centrifugal concentrators.

[00549] Peptide preparation. Lyophilized peptide-linker containing a bromoacetamide functionality was resuspended in water at 20mg/ml immediately prior to conjugation reaction.

[00550] Conjugation reaction. Peptide and reduced mAb were mixed at a 2.5:1 molar ratio of peptide to cysteine (5:1 peptide to mAb) in reaction buffer at mAb concentration of 5 mg/ml and incubated for 12-16 hours at 4°C. The engineered free cysteines in the immunoglobulin react with the bromoacetamide functionality in peptide-linker to form a site-specific immunoglobulin-peptide conjugate with a stable thioacetamide linkage. (See, Figure 81B and Figure 82). If one cysteine reacts, then the result is a monovalent immunoglobulin-peptide conjugate, and if both cysteines react, then the result is a bivalent immunoglobulin-peptide conjugate

[00551] Purification of conjugates. Following incubation, conjugation reaction was desalted to removed excess free peptide and loaded onto a HiTrap SP-HP column (GE Healthcare; 1ml column for preps <10mg, 5ml column for preps >10mg). Column was rinsed in 5 column volumes of 90% buffer A (10mM sodium phosphate pH 6.5, 5% ethanol) 10% buffer B (10mM sodium phosphate pH 6.5, 5% ethanol, 1M NaCl). Conjugates (see, Table 38) were eluted over a 20 column volume gradient from 10% buffer B to 70% buffer B. Unmodified mAb elutes first followed by monvalent imunoglobulin-peptide conjugate (1 peptide per mAb), followed by bivalent imunoglobulin-peptide conjugate (2 peptides per mAb). Higher order conjugates resulting from over reduction of the mAb elute later. (See, Figure 83 for mAb immunoglobulin-peptide conjugates and Figure 84 for Fc domain-peptide conjugates).

Following purification, conjugates were formulated into A5SU storage buffer (10 mM sodium acetate pH 5.0, 9% sucrose) and concentrated to 10mg/ml to be stored at -80°C.

[00552] Analysis of conjugates. Conjugates were run on reducing SDS-PAGE to confirm conjugation to heavy chain (increase in size by ~5kD) and non-reducing SDS-PAGE to confirm internal disulfides remained intact. (See, Figure 83 for mAb imunoglobulin-peptide conjugates and Figure 84 for Fc domain-peptide conjugates). Conjugates were run on analytical SEC to determine if aggregation was present (Superdex-200 10/300 column in 100mM sodium phosphate, 250mM NaCl, pH 6.8 with isocratic elution –1 ml/min for 35 min). (See, Figure 85).

[00553] LC-MS-TOF analysis of conjugates. LC/MS spectrometry of peptide conjugates was recorded using an Agilent 6224 TOF LC/MS spectrometer with a non-reduced method. After calibration, a 5 µg intact sample was loaded onto a Zorbax 300SB C6 column (1 x 50 mm, 3.5 µm, Agilent Technologies) operation at 75°C with a flow rate of 50 µl/min. Peptide-conjugate was eluted from the column using a gradient of 90% n-propanol with 0.1% TFA (Buffer B) and 0.1% TFA in water (Buffer A). The gradient condition was 20% to 90 % buffer B in 14 min. (See, Figure 86 for bivalent mAb-peptide conjugate and Figure 87 for bivalent Fc domain-peptide conjugate). The MS spectra indicate the addition of two peptides to the immunoglobulin and immunoglobulin Fc domain, respectively. The presence of multiple peaks is due to the different glycosylation isoforms.

[00554] Specific Reaction Results. From 100 mg of Anti-DNP mAb (E273C, hIgG1) and 15 mg of peptide-linker contruct (SEQ ID NO:1062) were obtained 22 mg of bivalent conjugate (Immunoglobulin-Peptide Conjugate 2) and 11 mg of monovalent conjugate (Immunoglobulin-peptide Conjugate 1). Samples were concentrated to 10 mg/mL in A5SU buffer and stored as aliquots at -80°C.

[00555] Models of Peptide Conjugates. For illustrative purposes only, models of Fc-peptide Conjugate 1, Fc-peptide Conjugate 2, Immunoglobulin-peptide Conjugate 1, and Immunoglobulin-peptide Conjugate 2 were created (MOE; Chemical Computing Group: Montreal, Quebec, Canada, 2010). (See, Figures 88-91). A homology model of the anti-DNP mAb (E273C) hIgG1 (comprising immunoglobulin monomers SEQ ID NO:3087; SEQ ID NO:3088; SEQ ID NO:3087; SEQ ID NO:3088) and anti-DNP mAb (E52C) hIgG1 Fc domain (homodimer of SEQ ID NO:3089) was constructed from an immunoglobulin crystal structure (1HZH.pdb) using the program MOE (MOE; Chemical Computing Group: Montreal, Quebec, Canada, 2010). The sites of conjugation, Cys273 in the immunoglobulin and Cys52 in the immunoglobulin Fc domain, are indicated. The PEG11 linkers are depicted in an arbitrary conformation connecting the appropriate cysteine residue(s) in the immunoglobulin and immunoglobulin Fc domain to the

Atz13 residue(s) in the peptide(s). A homology model of the peptide (SEQ ID NO:1046) was constructed from the NMR structure of GpTx-1 (MOE; Chemical Computing Group: Montreal, Quebec, Canada, 2010) and is displayed in an arbitrary relative orientation to the immunoglobulin and immunoglobulin Fc domain. One or two peptides are shown to reflect the monovalent or bivalent nature of each peptide conjugate.

[00556] Example 12: Preliminary pharmacokinetics of peptide conjugates in mice

[00557] Pharmacokinetic (PK) studies of toxin peptide conjugates. A preliminary PK study was conducted with 7-week-old unmodified CD-1 mice from Taconic. Fc-P2 (Fc-Peptide Conjugate 2) or its control Fc (SEQ ID NO:1062) were dosed subcutaneously at 1 mg/kg or 10 mg/kg to four separate groups of twelve mice. In a separate cohort, Ab-P2 (Immunoglobulin-peptide Conjugate 2) or its control Ab (anti-DNP mAb (E273C, hIgG1; comprising immunoglobulin monomers SEQ ID NO:3087; SEQ ID NO:3088; SEQ ID NO:3087; SEQ ID NO:3088) were dosed subcutaneously at 1 mg/kg or 10 mg/kg to four separate groups of twelve mice. Subcutaneous injections were delivered at the nape of the neck. At 0.5, 1, 2, 4, 8 and 24 hours post-dose, 2 mice from each of the four dose routes were euthanized and blood samples and brains were collected. Brains were weighed and frozen at -80˚C immediately. Blood samples were collected in EDTA-treated microtainers and centrifuged at 13000 rpm for 5 minutes, after which plasma was extracted and frozen at -80˚C in a 96-well plate.

[00558] LC-MS/MS Analytical Procedure. Peptide conjugate (Immunoglobulin-Peptide Conjugate 2 or Fc-Peptide Conjugate 2) stock solutions (100 μg/mL) were made from conjugate reference standards in DPBS with 1% BSA and stored at -20 °C. Standard samples were prepared in mouse serum. Standards concentrations of 25, 50, 100, 250, 500, 1000, 2500, 5000 and 10,000 ng/mL were prepared by serial dilution of a freshly prepared 10,000 ng/mL solution in mouse serum using the 100 μg/mL peptide conjugate stock solutions. 25 μl serum samples were aliquoted into the appropriate well of a 96-well plate, followed by the addition of 25 μl of internal standard solution (1μg/mL, αDA-IgG2 uniformly labeled with [^{15}N, $^{13}C_6$]-Leu made in DPBS with 1% BSA). Plasma samples were then processed by immunoaffinity capture in 96-well plate format using magnetic beads immobilized with anti-human Fc mouse antibody, followed by trypsin digestion and solid phase extraction using an Oasis HLB μElution 96-well solid phase extraction plate to extract tryptic peptides, the extracts were injected (10 μL) onto the LC-MS/MS system for analysis.

[00559] The LC-MS/MS consisted of an Acquity UPLC system (Waters, Milford, MA) coupled to a 5500 QTRAP mass spectrometer (AB Sciex, Toronto, Canada) with a Turbo IonSpray® ionization source. The analytical column was an Acquity UPLC BEH C_{18} (100 x 2.1 mm, 1.7 um). The mobile phases were 0.1% formic acid in acetonitrile/water (5/95, v/v, mobile phase A) and 0.1% formic acid in acetonitrile/water (95/5, v/v, mobile phase B). N-terminal DCLGAFR (SEQ ID NO:1050) from peptide SEQ ID NO:1062 was used as surrogate peptide for peptide conjugate (Immunoglobulin-Peptide Conjugate 2 or Fc-Peptide Conjugate 2) quantitative analysis.

[00560] Data was collected and processed using AB Sciex Analyst® software (version 1.5).

[00561] The calibration curve was derived from the peak area ratios (peptide /internal standard) using $1/x^2$ weighted linear least-squares regression of the area ratio versus the concentration of the corresponding peptide conjugate standard. The regression equation from the calibration standards was used to back calculate the measured concentration for each standard and mouse serum samples.

[00562] Results of the preliminary PK studies showed that exposures for the peptide conjugates were slightly lower than for the unmodified IgG and Fc, respectively. (See, Figure 88 and Figure 89). In both cases, a 10 mg/kg s.c. dose resulted in plasma concentrations at or near the in vitro Nav1.7 IC_{50} of the respective peptide conjugates at 24 h. C_{max} for (Fc-Peptide Conjugate 2) was reached between 8 and 24 h, but Cmax for (Immunoglobulin-Peptide Conjugate 2) occurred at or after 24 h. An accurate n vivo $t_{1/2}$ was not able to be calculated due to the brevity of the experiment. Immunoglobulin-Peptide Conjugate 2 and Fc-Peptide Conjugate 2 were both tested in the open field analysis in mice at a 10 mg/kg s.c. dose with a 24 h pre-treatment time and had no significant effect on the locomotor activity of the animals. (See, Figures 111-114). Immunoglobulin-Peptide Conjugate 2 and Fc-Peptide Conjugate 2 were both tested in the formalin pain model in mice at a 10 mg/kg s.c. dose with a 24 h pre-treatment time and had no significant effect on the spent lifting/licked the affected paw during either the first or second phase of the study. (See, Figures 115-117). It is likely that the dose was not sufficient to cover the target in vivo and observe efficacy.

Abbreviations

Abbreviations used throughout this specification are as defined below, unless otherwise defined in specific circumstances.

Ac	acetyl (used to refer to acetylated residues)
AcBpa	acetylated p-benzoyl-L-phenylalanine
ACN	acetonitrile
AcOH	acetic acid
ADCC	antibody-dependent cellular cytotoxicity
Aib	aminoisobutyric acid
bA	beta-alanine
Bpa	p-benzoyl-L-phenylalanine
BrAc	bromoacetyl ($BrCH_2C(O)$
BSA	Bovine serum albumin
Bzl	Benzyl
Cap	Caproic acid
CBC	complete blood count
CNS	central nervous system
COPD	Chronic obstructive pulmonary disease
CTL	Cytotoxic T lymphocytes
DCC	Dicylcohexylcarbodiimide
Dde	1-(4,4-dimethyl-2,6-dioxo-cyclohexylidene)ethyl
DOPC	1,2-Dioleoyl-sn-Glycero-3-phosphocholine
DOPE	1,2-Dioleoyl-sn-Glycero-3-phosphoethanolamine
DPPC	1,2-Dipalmitoyl-sn-Glycero-3-phosphocholine
DRG	dorsal root ganglion
DSPC	1,2-Distearoyl-sn-Glycero-3-phosphocholine
DTT	Dithiothreitol
EAE	experimental autoimmune encephalomyelitis
ECL	enhanced chemiluminescence
ESI-MS	Electron spray ionization mass spectrometry
Et	ethyl
FACS	fluorescence-activated cell sorting
Fmoc	fluorenylmethoxycarbonyl
HOBt	1-Hydroxybenzotriazole
HPLC	high performance liquid chromatography
HSL	homoserine lactone
IB	inclusion bodies

IWQ	IonWorks® Quattro
KCa	calcium-activated potassium channel (including IKCa, BKCa, SKCa)
KLH	Keyhole Limpet Hemocyanin
Kv	voltage-gated potassium channel
Lau	Lauric acid
LPS	lipopolysaccharide
LYMPH	lymphocytes
MALDI-MS	Matrix-assisted laser desorption ionization mass spectrometry
Me	methyl
MeO	methoxy
MeOH	methanol
MHC	major histocompatibility complex
MMP	matrix metalloproteinase
MW	Molecular Weight
MWCO	Molecular Weight Cut Off
1-Nap	1-napthylalanine
Nav, Na_V	voltage-gated sodium channel
NEUT	neutrophils
Nle	norleucine
NMP	N-methyl-2-pyrrolidinone
OAc	acetate
PAGE	polyacrylamide gel electrophoresis
PBMC	peripheral blood mononuclear cell
PBS	Phosphate-buffered saline
Pbf	2,2,4,6,7-pendamethyldihydrobenzofuran-5-sulfonyl
PCR	polymerase chain reaction
PD	pharmacodynamic
Pec	pipecolic acid
PEG	Poly(ethylene glycol)
Pic	picolinic acid
PK	pharmacokinetic
PNS	peripheral nervous system
PX	PatchXpress®
pY	phosphotyrosine
RBS	ribosome binding site
RT	room temperature (25 °C)

Sar	sarcosine
SDS	sodium dodecyl sulfate
STK	serine-threonine kinases
t-Boc	tert-Butoxycarbonyl
tBu	tert-Butyl
TCR	T cell receptor
TFA	trifluoroacetic acid
TG	trigeminal ganglion
THF	thymic humoral factor
Trt	trityl
TTX	tetrodotoxin

CLAIMS

What is claimed:

1. A composition of matter comprising an isolated polypeptide comprising the amino acid sequence of the formula:

$X_{aa}{}^{1}X_{aa}{}^{2}\ X_{aa}{}^{3}X_{aa}{}^{4}X_{aa}{}^{5}X_{aa}{}^{6}X_{aa}{}^{7}X_{aa}{}^{8}X_{aa}{}^{9}X_{aa}{}^{10}X_{aa}{}^{11}X_{aa}{}^{12}X_{aa}{}^{13}X_{aa}{}^{14}Asp^{15}\ X_{aa}{}^{16}\ X_{aa}{}^{17}$

$X_{aa}{}^{18}X_{aa}{}^{19}\ X_{aa}{}^{20}\ X_{aa}{}^{21}X_{aa}{}^{22}X_{aa}{}^{23}\ X_{aa}{}^{24}X_{aa}{}^{25}\ X_{aa}{}^{26}X_{aa}{}^{27}X_{aa}{}^{28}X_{aa}{}^{29}X_{aa}{}^{30}$

$X_{aa}{}^{31}Lys^{32}X_{aa}{}^{33}X_{aa}{}^{34}X_{aa}{}^{35}\ X_{aa}{}^{36}X_{aa}{}^{37}X_{aa}{}^{38}$//SEQ ID NO:475

or a pharmaceutically acceptable salt thereof,

wherein:

$X_{aa}{}^{1}X_{aa}{}^{2}$ is absent; or $X_{aa}{}^{1}$ is any amino acid residue and $X_{aa}{}^{2}$ is any amino acid residue; or $X_{aa}{}^{1}$ is absent and $X_{aa}{}^{2}$ is any amino acid residue;

$X_{aa}{}^{3}$ is Cys, if $X_{aa}{}^{18}$ is Cys; or $X_{aa}{}^{3}$ is SeCys, if $X_{aa}{}^{18}$ is SeCys; or $X_{aa}{}^{3}$ is an alkyl amino acid residue, if $X_{aa}{}^{18}$ is an alkyl amino acid residue;

$X_{aa}{}^{4}$ is an acidic, hydrophobic, basic, or neutral hydrophilic amino acid residue;

$X_{aa}{}^{5}$ is a Gly, Ala, hydrophobic, or basic amino acid residue;

$X_{aa}{}^{6}$ is a Gly, Ala, 2-Abu, Nle, Nva, or hydrophobic amino acid residue;

$X_{aa}{}^{7}$ is a Gly, Ala, aromatic, or hydrophobic amino acid residue;

$X_{aa}{}^{8}$ is a basic, acidic, or neutral hydrophilic amino acid residue, or an Ala residue;

$X_{aa}{}^{9}$ is a basic or neutral hydrophilic amino acid residue;

$X_{aa}{}^{10}$ is Cys if $X_{aa}{}^{24}$ is Cys; or $X_{aa}{}^{10}$ is SeCys if $X_{aa}{}^{24}$ is SeCys;

$X_{aa}{}^{11}$ is any amino acid residue;

$X_{aa}{}^{12}$ is a Pro, acidic, neutral, or hydrophobic amino acid residue;

$X_{aa}{}^{13}$ is any amino acid residue;

$X_{aa}{}^{14}$ is any amino acid residue;

$X_{aa}{}^{16}$ is a basic, neutral hydrophilic, or acidic amino acid residue, or an Ala residue;

$X_{aa}{}^{17}$ is a Cys if $X_{aa}{}^{31}$ is Cys; or $X_{aa}{}^{17}$ is a SeCys if $X_{aa}{}^{31}$ is SeCys;

$X_{aa}{}^{18}$ is a Cys, SeCys, or an alkyl amino acid residue;

$X_{aa}{}^{19}$ is any amino acid residue;

$X_{aa}{}^{20}$ is a Pro, Gly, basic, or neutral hydrophilic residue;

$X_{aa}{}^{21}$ is a basic, hydrophobic, or neutral hydrophilic amino acid residue;

$X_{aa}{}^{22}$ is a hydrophobic or basic amino acid residue;

$X_{aa}{}^{23}$ is a hydrophobic, basic, or neutral hydrophilic amino acid residue;

$X_{aa}{}^{24}$ is a Cys or SeCys residue;

X_{aa}^{25} is a Ser, Ala, or a neutral hydrophilic amino acid residue;

X_{aa}^{26} is an Ala, acidic, basic, or neutral hydrophilic amino acid residue;

X_{aa}^{27} is an acidic, basic, neutral hydrophilic or hydrophobic residue;

X_{aa}^{28} is an aromatic or basic amino acid residue;

X_{aa}^{29} is an acidic, basic, or neutral hydrophilic amino acid residue;

X_{aa}^{30} is a Trp, 5-bromoTrp, 6-bromoTrp, 5-chloroTrp, 6-chloroTrp, 1-Nal, 2-Nal, or thioTrp residue;

X_{aa}^{31} is a Cys or SeCys;

X_{aa}^{33} is a hydrophobic or aromatic amino acid residue;

X_{aa}^{34} is any amino acid residue;

X_{aa}^{35} is a hydrophobic amino acid residue;

each of X_{aa}^{36}, X_{aa}^{37}, and X_{aa}^{38} is independently absent or is independently a neutral, basic, or hydrophobic amino acid residue;

and wherein:

if X_{aa}^{3} and X_{aa}^{18} are both Cys residues, there is a disulfide bond between residue X_{aa}^{3} and residue X_{aa}^{18}; or if X_{aa}^{3} and X_{aa}^{18} are both SeCys residues, there is a diselenide bond between residue X_{aa}^{3} and residue X_{aa}^{18};

if X_{aa}^{10} and X_{aa}^{24} are both Cys residues, there is a disulfide bond between residue X_{aa}^{10} and residue X_{aa}^{24}; or if X_{aa}^{10} and X_{aa}^{24} are both SeCys residues, there is a diselenide bond between residue X_{aa}^{10} and residue X_{aa}^{24};

if X_{aa}^{17} and X_{aa}^{31} are both Cys residues, there is a disulfide bond between residue X_{aa}^{17} and residue X_{aa}^{31}; or if X_{aa}^{17} and X_{aa}^{31} are both SeCys residues, there is a diselenide bond between residue X_{aa}^{17} and residue X_{aa}^{31};

the amino-terminal residue is optionally acetylated, biotinylated, or 4-pentynoylated, or PEGylated; and

the carboxy-terminal residue is optionally amidated.

2. The composition of matter of Claim 1 wherein X_{aa}^{4} is selected from Ala, Glu, Asp, Phe, Pro, Ile, Leu, Met, Val, Trp, Tyr, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, cyclohexylglycine (Chg), cyclohexylalanine (Cha), glycine, norleucine, norvaline, 1-Nal, 2-Nal, 4-phenyl-phenylalanine (Bip), Gln, Asn, Ser, Thr, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, and Cit residues.

3. The composition of matter of Claim 1, wherein X_{aa}^5 is selected from Ala, Phe, Ile, Leu, Met, Val, Trp, Tyr, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, glycine, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues.

4. The composition of matter of Claim 1, wherein X_{aa}^6 is selected from Ala, Gly, 2-Abu, Phe, Ile, Leu, Met, Val, Trp, Tyr, proline, thiaproline, methionine, glycine, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclopentylglycine (Cpg), phenylglycine, N-methylleucine, N-methylphenylalanine, N-methylvaline, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 2-chloro-phenylalanine, 4-chloro-phenylalanine, 3,4-dichlorophenylalanine, 4-trifluoromethyl-phenylalanine, and 4-phenyl-phenylalanine (Bip) residues.

5. The composition of matter of Claim 1, wherein X_{aa}^7 is selected from Gly, Ala, Phe, Ile, Leu, Met, Val, Trp, Tyr, norleucine, norvaline, Pro, 2-pyridinylalanine, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 2-chloro-phenylalanine, 4-chloro-phenylalanine, 3,4-dichlorophenylalanine, 4-trifluoromethyl-phenylalanine, and 4-phenyl-phenylalanine (Bip) residues.

6. The composition of matter of Claim 1, wherein X_{aa}^8 is selected from Ala, Arg, Lys, His, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, Ser, Thr, Asn, Gln, Cit, Asp, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, and Glu residues.

7. The composition of matter of Claim 1, wherein X_{aa}^9 is selected from Ala, Pro, Met, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, Gln, Asn, Ser, Thr, and Cit residues.

8. The composition of matter of Claim 1, wherein X_{aa}^{11} is selected from Ala, Asp, Glu, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, Pra, Atz,

homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues.

9. The composition of matter of Claim 1, wherein X_{aa}^{12} is selected from alanine, valine, leucine, isoleucine, proline, serine, threonine, aspartic acid, glutamatic acid, glycine, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, Cha, and 4-phenyl-phenylalanine (Bip), cyclohexylglycine (Chg), cyclohexylalanine (Cha), asparagine, glutamine, methionine, hydroxyproline, phenylalanine, tryptophan, and tyrosine.

10. The composition of matter of Claim 1, wherein X_{aa}^{13} is selected from Ala, Asp, Glu, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, Pra, Atz, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues.

11. The composition of matter of Claim 1, wherein X_{aa}^{14} is selected from Ala, Asp, Glu, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, Pra, Atz, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues.

12. The composition of matter of Claim 1, wherein X_{aa}^{16} is selected from Ala, Pro, Met, Arg, Lys, His, Pra, Atz, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, Gln, Asn, Ser, Thr, Cit, Asp, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, and Glu residues.

13. The composition of matter of Claim 1, wherein X_{aa}^{19} is selected from Ala, Asp, Glu, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, homolysine,

ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues.

14. The composition of matter of Claim 1, wherein X_{aa}^{20} is selected from Ala, Gly, Pro, Met, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, Gln, Asn, Ser, Thr, and Cit residues.

15. The composition of matter of Claim 1, wherein X_{aa}^{21} is selected from Ala, Phe, Pro, Ile, Leu, Met, Val, Trp, Tyr, Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, cyclohexylglycine (Chg), cyclohexylalanine (Cha), glycine, norleucine, norvaline, 1-Nal, 2-Nal, 4-phenyl-phenylalanine (Bip), Gln, Asn, Ser, Thr, and Cit residues.

16. The composition of matter of Claim 1, wherein X_{aa}^{22} is selected from Ala, Phe, Ile, Leu, Met, Val, Trp, Tyr, Arg, Lys, His, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, glycine, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues.

17. The composition of matter of Claim 1, wherein X_{aa}^{23} is selected from Ala, Phe, Pro, Ile, Leu, Met, Val, Trp, Tyr, Arg, Lys, His, Pra, Atz, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, cyclohexylglycine (Chg), cyclohexylalanine (Cha), glycine, norleucine, norvaline, 1-Nal, 2-Nal, 4-phenyl-phenylalanine (Bip), Gln, Asn, Ser, Thr, and Cit residues.

18. The composition of matter of Claim 1, wherein X_{aa}^{25} is selected from Ala, Gly Pro, Met, Gln, Asn, Ser, Thr, and Cit residues.

19. The composition of matter of Claim 1, wherein X_{aa}^{26} is selected from Ala, Pro, Met, Arg, Lys, His, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, glycine, Glu, Asp, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, Gln, Asn, Ser, Thr, and Cit residues.

20. The composition of matter of Claim 1, wherein X_{aa}^{27} is selected from Thr, Leu, Ile, Val, Ser, Met, Gln, Asn, Phe, Tyr, Trp, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 4-phenyl-phenylalanine (Bip), Arg, Lys, His, homolysine, ornithine, arginine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, Asp, Glu, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, and Gly residues.

21. The composition of matter of Claim 1, wherein X_{aa}^{28} is selected from Phe, Trp, Tyr, Arg, Lys, His, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, 1-Nal, 2-Nal, 2-pyridyl-alanine, 3-pyridyl-alanine, 4-pyridyl-alanine, 4-piperidinyl-alanine, and 4-phenyl-phenylalanine (Bip) residues.

22. The composition of matter of Claim 1, wherein X_{aa}^{29} is selected from Ala, Asp, Glu, phosphoserine, phosphotyrosine, gamma-carboxyglutamic acid, Phe, Gly, His, Lys, Asn, Pro, Gln, Arg, Ser, Thr, Tyr, Pra, Atz, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, and Dab residues.

23. The composition of matter of Claim 1, wherein X_{aa}^{33} is selected from Phe, Ile, Leu, Met, Val, Trp, Tyr, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 2-chloro-phenylalanine, 4-chloro-phenylalanine, 3,4-dichlorophenylalanine, 4-trifluoromethyl-phenylalanine, 2-pyridyl-alanine, 3-pyridyl-alanine, 4-pyridyl-alanine, 4-piperidinyl-alanine, and 4-phenyl-phenylalanine (Bip) residues.

24. The composition of matter of Claim 1, wherein X_{aa}^{34} is selected from Ala, Asp, Glu, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, Pra, Atz,

homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 2-chloro-phenylalanine, 4-chloro-phenylalanine, 3,4-dichlorophenylalanine, 4-trifluoromethyl-phenylalanine, 2-pyridyl-alanine, 3-pyridyl-alanine, 4-carboxy-phenylalanine, and 4-phenyl-phenylalanine (Bip) residues.

25. The composition of matter of Claim 1, wherein X_{aa}^{35} is selected from Phe, Ile, Leu, Met, Val, Trp, Tyr, norleucine, norvaline, 1-Nal, 2-Nal, 1'NMe-Trp, cyclohexylglycine (Chg), cyclohexylalanine (Cha), 2-chloro-phenylalanine, 4-chloro-phenylalanine, 3,4-dichlorophenylalanine, 4-trifluoromethyl-phenylalanine, and 4-phenyl-phenylalanine (Bip) residues.

26. The composition of matter of Claim 1, wherein each of X_{aa}^{36}, X_{aa}^{37}, and X_{aa}^{38} is independently absent or is independently selected from Ala, Phe, Gly, His, Ile, Lys, Leu, Met, Asn, Pro, Gln, Arg, Ser, Thr, Val, Trp, Tyr, homolysine, ornithine, N-methyl-arginine, ω-aminoarginine, ω-methyl-arginine, 1-methyl-histidine, 3-methyl-histidine, homoarginine, N-methyl-lysine, N-ε-methyl lysine, Dab, norleucine, norvaline, 1-Nal, 2-Nal, cyclohexylglycine (Chg), cyclohexylalanine (Cha), and 4-phenyl-phenylalanine (Bip) residues.

27. The composition of matter of Claim 1, wherein $X_{aa}^{3}$and X_{aa}^{18} are alkyl residues.

28. The composition of matter of Claim 27, wherein $X_{aa}^{3}$and X_{aa}^{18} are, independently, Ala or 2-Abu residues.

29. The composition of matter of Claim 1, wherein the carboxy-terminal residue is amidated.

30. The composition of matter of Claim 1, wherein the isolated polypeptide comprises the amino acid sequence of the formula:

$X_{aa}^{1}X_{aa}^{2}$ $Cys^{3}X_{aa}^{4}$ $X_{aa}^{5}Ala^{6}$ $X_{aa}^{7}X_{aa}^{8}X_{aa}^{9}Cys^{10}X_{aa}^{11}X_{aa}^{12}X_{aa}^{13}X_{aa}^{14}Asp^{15}$ X_{aa}^{16}
$Cys^{17}Cys^{18}X_{aa}^{19}$ X_{aa}^{20} $X_{aa}^{21}X_{aa}^{22}X_{aa}^{23}$ $Cys^{24}X_{aa}^{25}$ $X_{aa}^{26}X_{aa}^{27}X_{aa}^{28}X_{aa}^{29}X_{aa}^{30}$
$Cys^{31}Lys^{32}X_{aa}^{33}X_{aa}^{34}X_{aa}^{35}$ $X_{aa}^{36}X_{aa}^{37}X_{aa}^{38}$// SEQ ID NO:476.

31. The composition of matter of Claim 1, wherein X_{aa}^{6} is Ala.

32. The composition of matter of Claim 31, wherein X_{aa}^{27} is Glu.

33. The composition of matter of Claim 31, wherein X_{aa}^{29} is Asp, Glu, or Gln.

34. The composition of matter of Claim 31, comprising an amino acid sequence selected from SEQ ID NOS: 22, 252-263, 419-439, 518-521, 524, 525, 562-580, 602, 691, 692, 696-703, 715, 721-735, 737-749, 756, 757, 761, 762, 764-771, 787-796, 798, 800, 802, 803, 809-812, 1028, 1030-1040, 1043-1047, 1062-1065, and 1068-1070.

35. The composition of matter of Claim 31, comprising an amino acid sequence selected from SEQ ID NOS: 1082, 1096, 1110, 1124, 1135, 1146, 1157, 1165, 1173, 1181, 1192, 1203, 1214, 1222, 1230, 1238, 1249, 1260, 1271, 1279, 1287, 1295, 1306, 1317, 1328, 1336, 1344, 1352, 1360, 1368, 1376, 1384, 1392, 1400, 1408, 1416, 1424, 1432, 1440, 1448, 1456, 1464, 1472, 1480, 1488, 1496, 1504, 1512, 1520, 1528, 1536, 1544, 1552, 1560, 1568, 1576, 1584, 1592, 1600, 1608, 1616, 1624, 1632, 1640, 1658, 1672, 1686, 1700, 1711, 1722, 1733, 1741, 1749, 1757, 1768, 1779, 1790, 1798, 1806, 1814, 1825, 1836, 1847, 1855, 1863, 1871, 1882, 1893, 1904, 1912, 1920, 1928, 1936, 1944, 1952, 1960, 1968, 1976, 1984, 1992, 2000, 2008, 2016, 2024, 2032, 2040, 2048, 2056, 2064, 2072, 2080, 2088, 2096, 2104, 2112, 2120, 2128, 2136, 2144, 2152, 2160, 2168, 2176, 2184, 2192, 2200, 2208, 2216, 2234, 2248, 2262, 2276, 2287, 2298, 2309, 2317, 2325, 2333, 2344, 2355, 2366, 2374, 2382, 2390, 2401, 2412, 2423, 2431, 2439, 2447, 2458, 2469, 2480, 2488, 2496, 2504, 2512, 2520, 2528, 2536, 2544, 2552, 2560, 2568, 2576, 2584, 2592, 2600, 2608, 2616, 2624, 2632, 2640, 2648, 2656, 2664, 2672, 2680, 2688, 2696, 2704, 2712, 2720, 2728, 2736, 2744, 2752, 2760, 2768, 2776, 2784, 2792, 2808, 2822, 2833, 2844, 2855, 2863, 2871, 2879, 2890, 2901, 2912, 2920, 2928, 2936, 2944, 2952, 2960, 2968, 2976, 2984, 2992, 3000, 3008, 3016, 3024, 3032, 3040, 3048, 3056, 3064, 3072, and 3080.

36. The composition of matter of Claim 31, comprising an amino acid sequence selected from SEQ ID NOS: 597-601 and 813-1027.

37. The composition of matter of Claim 1, wherein X_{aa}^{6} is Gly.

38. The composition of matter of Claim 37, wherein X_{aa}^{27} is Glu.

39. The composition of matter of Claim 37, wherein X_{aa}^{29} is Asp, Glu, or Gln.

40. The composition of matter of Claim 37, comprising an amino acid sequence selected from SEQ ID NOS: 265, 751, 752, 754, 755, 1081, 1095, 1109, 1123, 1134, 1145, 1156, 1164, 1172, 1180, 1191, 1202, 1213, 1221, 1229, 1237, 1248, 1259, 1270, 1278, 1286, 1294, 1305, 1316, 1327, 1335, 1343, 1351, 1359, 1367, 1375, 1383, 1391, 1399, 1407, 1415, 1423, 1431, 1439, 1447, 1455, 1463, 1471, 1479, 1487, 1495, 1503, 1511, 1519, 1527, 1535, 1543, 1551, 1559, 1567, 1575, 1583, 1591, 1599, 1607, 1615, 1623, 1631, 1639, 1657, 1671, 1685, 1699, 1710, 1721, 1732, 1740, 1748, 1756, 1767, 1778, 1789, 1797, 1805, 1813, 1824, 1835, 1846, 1854, 1862, 1870, 1881, 1892, 1903, 1911, 1919, 1927, 1935, 1943, 1951, 1959, 1967, 1975, 1983, 1991, 1999, 2007, 2015, 2023, 2031, 2039, 2047, 2055, 2063, 2071, 2079, 2087, 2095, 2103, 2111, 2119, 2127, 2135, 2143, 2151, 2159, 2167, 2175, 2183, 2191, 2199, 2207, 2215, 2233, 2247, 2261, 2275, 2286, 2297, 2308, 2316, 2324, 2332, 2343, 2354, 2365, 2373, 2381, 2389, 2400, 2411, 2422, 2430, 2438, 2446, 2457, 2468, 2479, 2487, 2495, 2503, 2511, 2519, 2527, 2535, 2543, 2551, 2559, 2567, 2575, 2583, 2591, 2599, 2607, 2615, 2623, 2631, 2639, 2647, 2655, 2663, 2671, 2679, 2687, 2695, 2703, 2711, 2719, 2727, 2735, 2743, 2751, 2759, 2767, 2775, 2783, 2791, 2807, 2821, 2832, 2843, 2854, 2862, 2870, 2878, 2889, 2900, 2911, 2919, 2927, 2935, 2943, 2951, 2959, 2967, 2975, 2983, 2991, 2999, 3007, 3015, 3023, 3031, 3039, 3047, 3055, 3063, 3071, and 3079.

41. The composition of matter of Claim 1, wherein X_{aa}^{6} is 2-Abu.

42. The composition of matter of Claim 41, wherein X_{aa}^{27} is Glu.

43. The composition of matter of Claim 41, wherein X_{aa}^{29} is Asp, Glu, or Gln.

44. The composition of matter of Claim 41, comprising an amino acid sequence selected from SEQ ID NOS: 605, 636, 649, 706, 707, 718, 753, 758, 797, 799, 801, 804, 807, 808, 1029, 1041, 1042, 1048, 1066, 1067, 1083, 1097, 1111, 1125, 1136, 1147, 1158, 1166, 1174, 1182, 1193, 1204, 1215, 1223, 1231, 1239, 1250, 1261, 1272, 1280, 1288, 1296, 1307, 1318, 1329, 1337, 1345, 1353, 1361, 1369, 1377, 1385, 1393, 1401, 1409, 1417, 1425, 1433,

1441, 1449, 1457, 1465, 1473, 1481, 1489, 1497, 1505, 1513, 1521, 1529, 1537, 1545, 1553, 1561, 1569, 1577, 1585, 1593, 1601, 1609, 1617, 1625, 1633, 1641, 1659, 1673, 1687, 1701, 1712, 1723, 1734, 1742, 1750, 1758, 1769, 1780, 1791, 1799, 1807, 1815, 1826, 1837, 1848, 1856, 1864, 1872, 1883, 1894, 1905, 1913, 1921, 1929, 1937, 1945, 1953, 1961, 1969, 1977, 1985, 1993, 2001, 2009, 2017, 2025, 2033, 2041, 2049, 2057, 2065, 2073, 2081, 2089, 2097, 2105, 2113, 2121, 2129, 2137, 2145, 2153, 2161, 2169, 2177, 2185, 2193, 2201, 2209, 2217, 2235, 2249, 2263, 2277, 2288, 2299, 2310, 2318, 2326, 2334, 2345, 2356, 2367, 2375, 2383, 2391, 2402, 2413, 2424, 2432, 2440, 2448, 2459, 2470, 2481, 2489, 2497, 2505, 2513, 2521, 2529, 2537, 2545, 2553, 2561, 2569, 2577, 2585, 2593, 2601, 2609, 2617, 2625, 2633, 2641, 2649, 2657, 2665, 2673, 2681, 2689, 2697, 2705, 2713, 2721, 2729, 2737, 2745, 2753, 2761, 2769, 2777, 2785, 2793, 2809, 2823, 2834, 2845, 2856, 2864, 2872, 2880, 2891, 2902, 2913, 2921, 2929, 2937, 2945, 2953, 2961, 2969, 2977, 2985, 2993, 3001, 3009, 3017, 3025, 3033, 3041, 3049, 3057, 3065, 3073, and 3081.

45. The composition of matter of Claim 1, wherein X_{aa}^{6} is Nle.

46. The composition of matter of Claim 45, wherein X_{aa}^{27} is Glu.

47. The composition of matter of Claim 45, wherein X_{aa}^{29} is Asp, Glu, or Gln.

48. The composition of matter of Claim 45, comprising an amino acid sequence selected from SEQ ID NOS: 607, 638, 651, 1085, 1099, 1113, 1127, 1138, 1149, 1160, 1168, 1176, 1184, 1195, 1206, 1217, 1225, 1233, 1241, 1252, 1263, 1274, 1282, 1290, 1298, 1309, 1320, 1331, 1339, 1347, 1355, 1363, 1371, 1379, 1387, 1395, 1403, 1411, 1419, 1427, 1435, 1443, 1451, 1459, 1467, 1475, 1483, 1491, 1499, 1507, 1515, 1523, 1531, 1539, 1547, 1555, 1563, 1571, 1579, 1587, 1595, 1603, 1611, 1619, 1627, 1635, 1643, 1661, 1675, 1689, 1703, 1714, 1725, 1736, 1744, 1752, 1760, 1771, 1782, 1793, 1801, 1809, 1817, 1828, 1839, 1850, 1858, 1866, 1874, 1885, 1896, 1907, 1915, 1923, 1931, 1939, 1947, 1955, 1963, 1971, 1979, 1987, 1995, 2003, 2011, 2019, 2027, 2035, 2043, 2051, 2059, 2067, 2075, 2083, 2091, 2099, 2107, 2115, 2123, 2131, 2139, 2147, 2155, 2163, 2171, 2179, 2187, 2195, 2203, 2211, 2219, 2237, 2251, 2265, 2279, 2290, 2301, 2312, 2320, 2328, 2336, 2347, 2358, 2369, 2377, 2385, 2393, 2404, 2415, 2426, 2434, 2442, 2450, 2461, 2472, 2483, 2491, 2499, 2507, 2515, 2523, 2531, 2539, 2547, 2555, 2563, 2571, 2579, 2587, 2595, 2603, 2611, 2619, 2627, 2635, 2643, 2651, 2659, 2667, 2675, 2683, 2691, 2699, 2707, 2715, 2723, 2731, 2739, 2747, 2755, 2763,

2771, 2779, 2787, 2795, 2811, 2825, 2836, 2847, 2858, 2866, 2874, 2882, 2893, 2904, 2915, 2923, 2931, 2939, 2947, 2955, 2963, 2971, 2979, 2987, 2995, 3003, 3011, 3019, 3027, 3035, 3043, 3051, 3059, 3067, 3075, and 3083.

49. The composition of matter of Claim 1, wherein X_{aa}^{6} is Nva.

50. The composition of matter of Claim 49, wherein X_{aa}^{27} is Glu.

51. The composition of matter of Claim 49, wherein X_{aa}^{29} is Asp, Glu, or Gln.

52. The composition of matter of Claim 49, comprising an amino acid sequence selected from SEQ ID NOS: 606, 637, 650, 705, 708, 717, 759, 760, 805, 806, 1084, 1098, 1112, 1126, 1137, 1148, 1159, 1167, 1175, 1183, 1194, 1205, 1216, 1224, 1232, 1240, 1251, 1262, 1273, 1281, 1289, 1297, 1308, 1319, 1330, 1338, 1346, 1354, 1362, 1370, 1378, 1386, 1394, 1402, 1410, 1418, 1426, 1434, 1442, 1450, 1458, 1466, 1474, 1482, 1490, 1498, 1506, 1514, 1522, 1530, 1538, 1546, 1554, 1562, 1570, 1578, 1586, 1594, 1602, 1610, 1618, 1626, 1634, 1642, 1660, 1674, 1688, 1702, 1713, 1724, 1735, 1743, 1751, 1759, 1770, 1781, 1792, 1800, 1808, 1816, 1827, 1838, 1849, 1857, 1865, 1873, 1884, 1895, 1906, 1914, 1922, 1930, 1938, 1946, 1954, 1962, 1970, 1978, 1986, 1994, 2002, 2010, 2018, 2026, 2034, 2042, 2050, 2058, 2066, 2074, 2082, 2090, 2098, 2106, 2114, 2122, 2130, 2138, 2146, 2154, 2162, 2170, 2178, 2186, 2194, 2202, 2210, 2218, 2236, 2250, 2264, 2278, 2289, 2300, 2311, 2319, 2327, 2335, 2346, 2357, 2368, 2376, 2384, 2392, 2403, 2414, 2425, 2433, 2441, 2449, 2460, 2471, 2482, 2490, 2498, 2506, 2514, 2522, 2530, 2538, 2546, 2554, 2562, 2570, 2578, 2586, 2594, 2602, 2610, 2618, 2626, 2634, 2642, 2650, 2658, 2666, 2674, 2682, 2690, 2698, 2706, 2714, 2722, 2730, 2738, 2746, 2754, 2762, 2770, 2778, 2786, 2794, 2810, 2824, 2835, 2846, 2857, 2865, 2873, 2881, 2892, 2903, 2914, 2922, 2930, 2938, 2946, 2954, 2962, 2970, 2978, 2986, 2994, 3002, 3010, 3018, 3026, 3034, 3042, 3050, 3058, 3066, 3074, and 3082.

53. The composition of matter of Claim 1, comprising an amino acid sequence selected from SEQ ID NOS: 3-30, 32-72, 74-134, 136-178, 180-211, 218-239, 241-305, 307-363, 366-386, 388-432, 434-474, 515-527, 532-588, 590, 591, 593-775, 777, 778, 780-788, 790-1049, and 1062-3086.

54. A composition of matter, comprising an amino acid sequence selected from SEQ ID NOS: 3-134, 136-305, 307-386, 388-474, 515-527, 532-588, 590, 591, 593-1049, and 1062-3086.

55. An isolated nucleic acid encoding any of SEQ ID NOS: 3-134, 136-305, 307-386, 388-474, 515-527, 532-588, 590, 591, 593-1049, or 1062-3086 that does not include a non-canonical amino acid.

56. An expression vector comprising the nucleic acid of Claim 55.

57. A recombinant host cell comprising the expression vector of Claim 56.

58. The composition of matter of any of Claims 1, 30, 31, 37, 41, 45, 49, 53, or 54, further comprising an optional linker moiety and a pharmaceutically acceptable, covalently linked half-life extending moiety.

59. The composition of matter of Claim 58, wherein the half-life extending moiety is polyethylene glycol of molecular weight of about 1000 Da to about 100000 Da, an IgG Fc domain, a transthyretin, or a human serum albumin.

60. The composition of matter of Claim 58, wherein the half-life extending moiety comprises a human immunoglobulin or a human immunoglobulin Fc domain, or both.

61. The composition of matter of Claim 60 having a configuration as set forth in any of Figures 12A-N, or Figures 88-91.

62. The composition of matter of Claim 60, wherein the composition comprises a monovalent immunoglobulin-peptide or Fc-peptide conjugate.

63. The composition of matter of Claim 60, wherein the composition comprises a bivalent immunoglobulin-peptide or Fc-peptide conjugate.

64. A pharmaceutical composition, comprising the composition of matter of any of Claims 1, 30, 31, 37, 41, 45, 49, 53, 54, or 59-63, and a pharmaceutically acceptable carrier.

65. A method of preventing pain, comprising administering a prophylactically effective amount of the composition of matter of any of Claims 1, 30, 31, 37, 41, 45, 49, 53, 54, or 59-63.

66. A method of treating pain, comprising administering a therapeutically effective amount of the composition of matter of any of Claims 1, 30, 31, 37, 41, 45, 49, 53, 54, or 59-63.

67. The method of Claim 66, wherein the pain is chronic pain, acute pain, or persistent pain.

68. The method of Claim 67, wherein the chronic pain is associated with cancer, chemotherapy, osteoarthritis, fibromyalgia, primary erythromelalgia, post-herpetic neuralgia, painful diabetic neuropathy, idiopathic painful neuropathy, neuromas, paroxysmal extreme pain disorder, migraine, trigeminal neuralgia, orofacial pain, cluster headaches, complex regional pain syndrome (CRPS), failed back surgery syndrome, sciatica, interstitial cystitis, pelvic pain, lower back pain, inflammation-induced pain, or joint pain.

69. The method of Claim 67, wherein the acute or persistent pain is associated with trauma, burn, or surgery.

70. The composition of matter of Claim 1 or 30, wherein X_{aa}^{29} is an acidic or neutral hydrophilic residue.

71. The composition of matter of Claim 70, wherein X_{aa}^{29} is selected from Ala, Asp, Glu, Gly, Asn, Gln, Ser, Thr, phosphoserine, phosphotyrosine, and gamma-carboxyglutamic acid residues.

72. The composition of matter of Claim 70, comprising an amino acid sequence selected from SEQ ID NOS: 1071-2798.

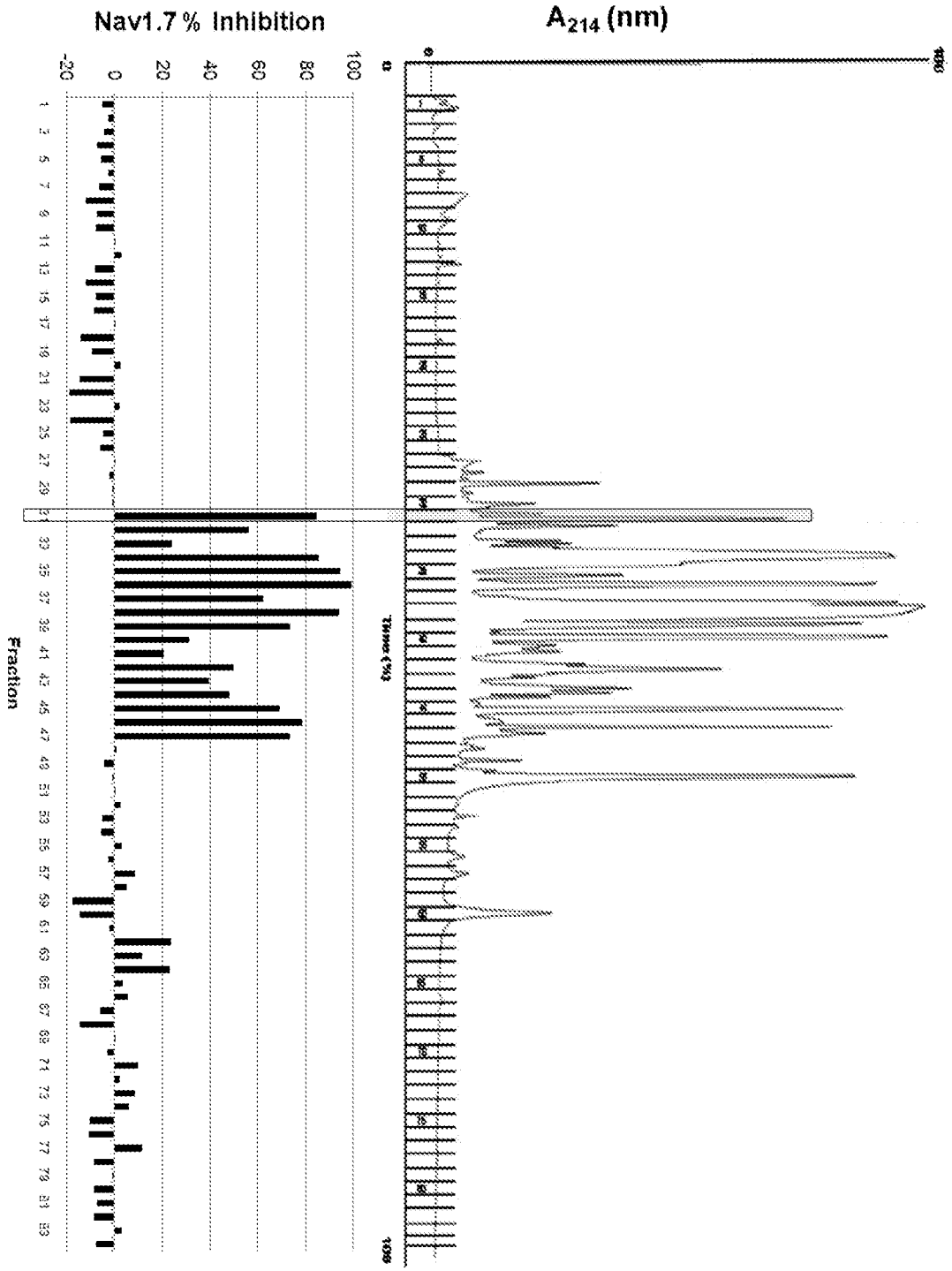

Nav1.7 % Inhibition
-20
0
20
40
60
80
100
Fraction
A_{214} (nm)
0
1000
Time (%)

FIG.1

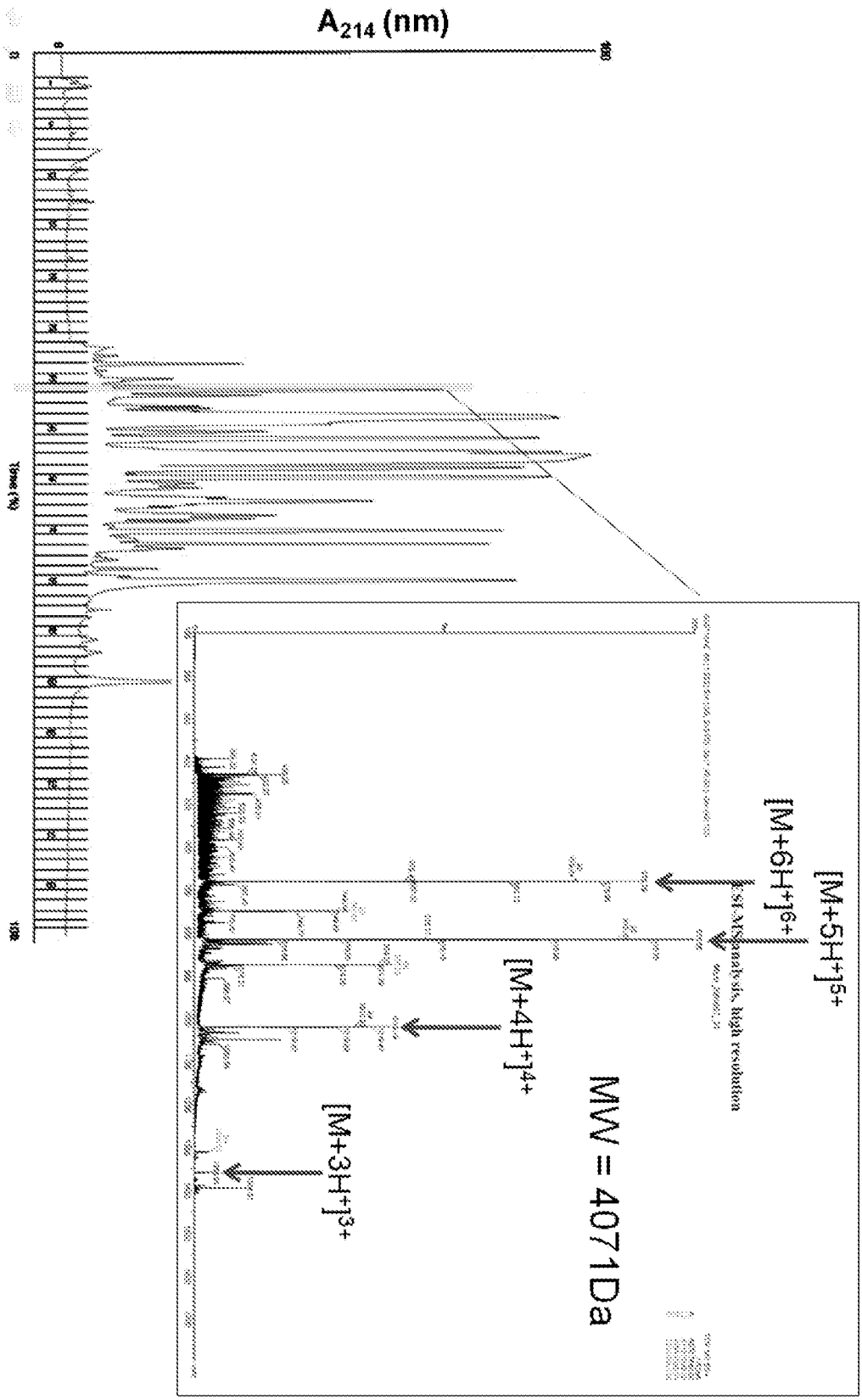


FIG. 2

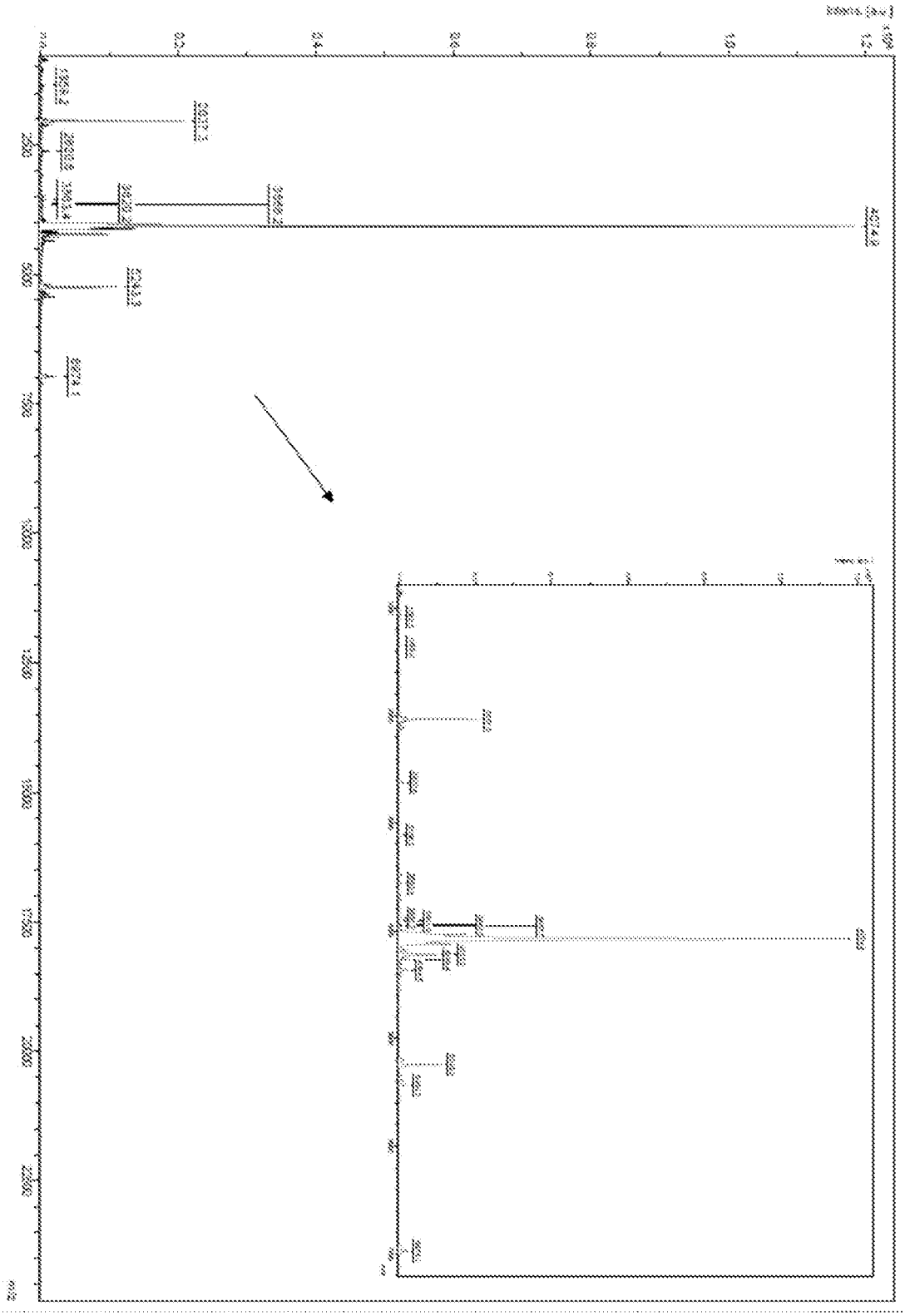


FIG. 3

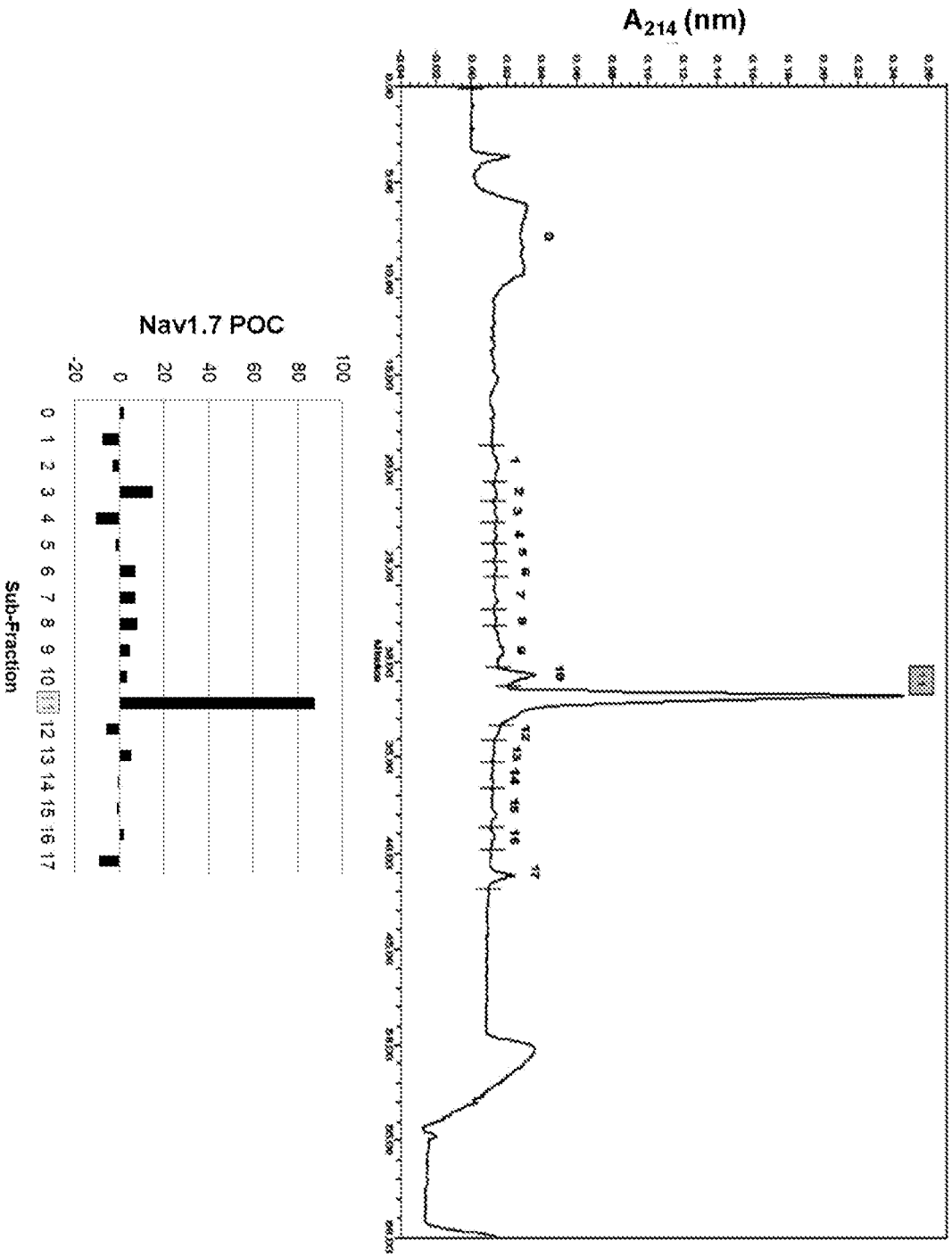

A214 (nm)
Nav1.7 POC
-20
0
20
40
60
80
100
0 1 2 3 4 5 6 7 8 9 10 12 13 14 15 16 17
Sub-Fraction

FIG.4

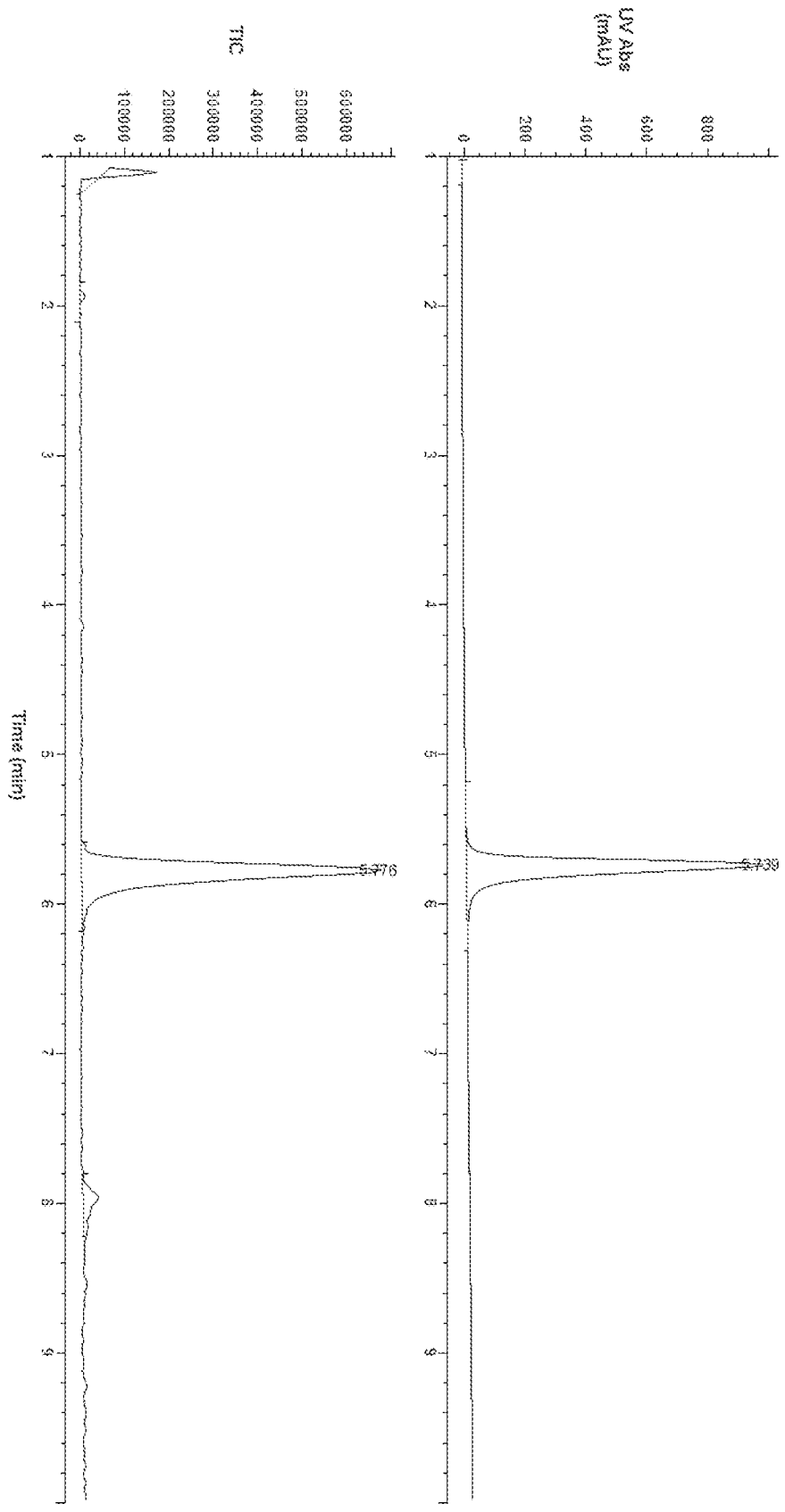


FIG. 5

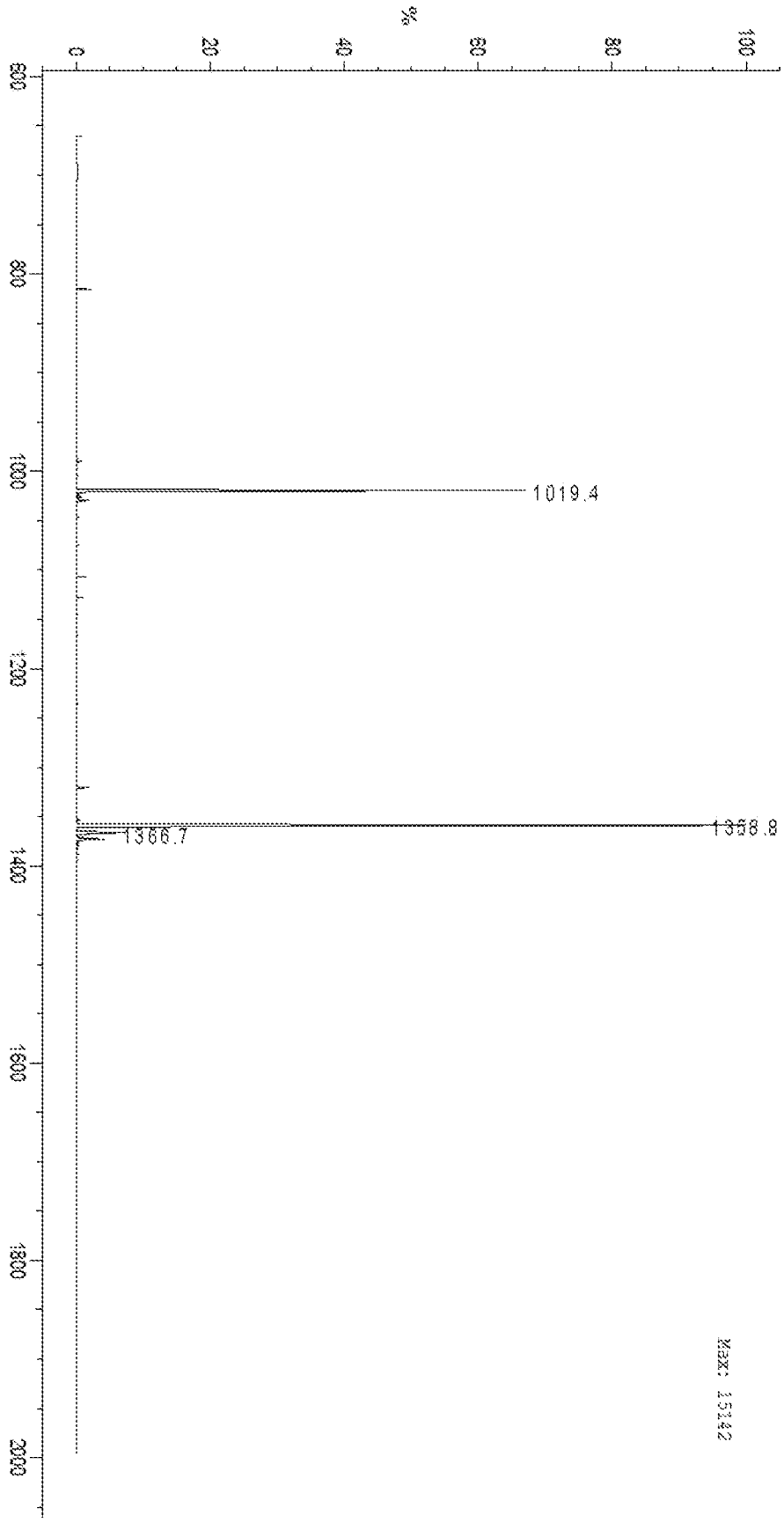

%
0
20
40
60
80
100
800
1000
1200
1400
1600
1800
2000
(m/z)
1019.4
1366.7
1368.8
Max: 15142

FIG. 6

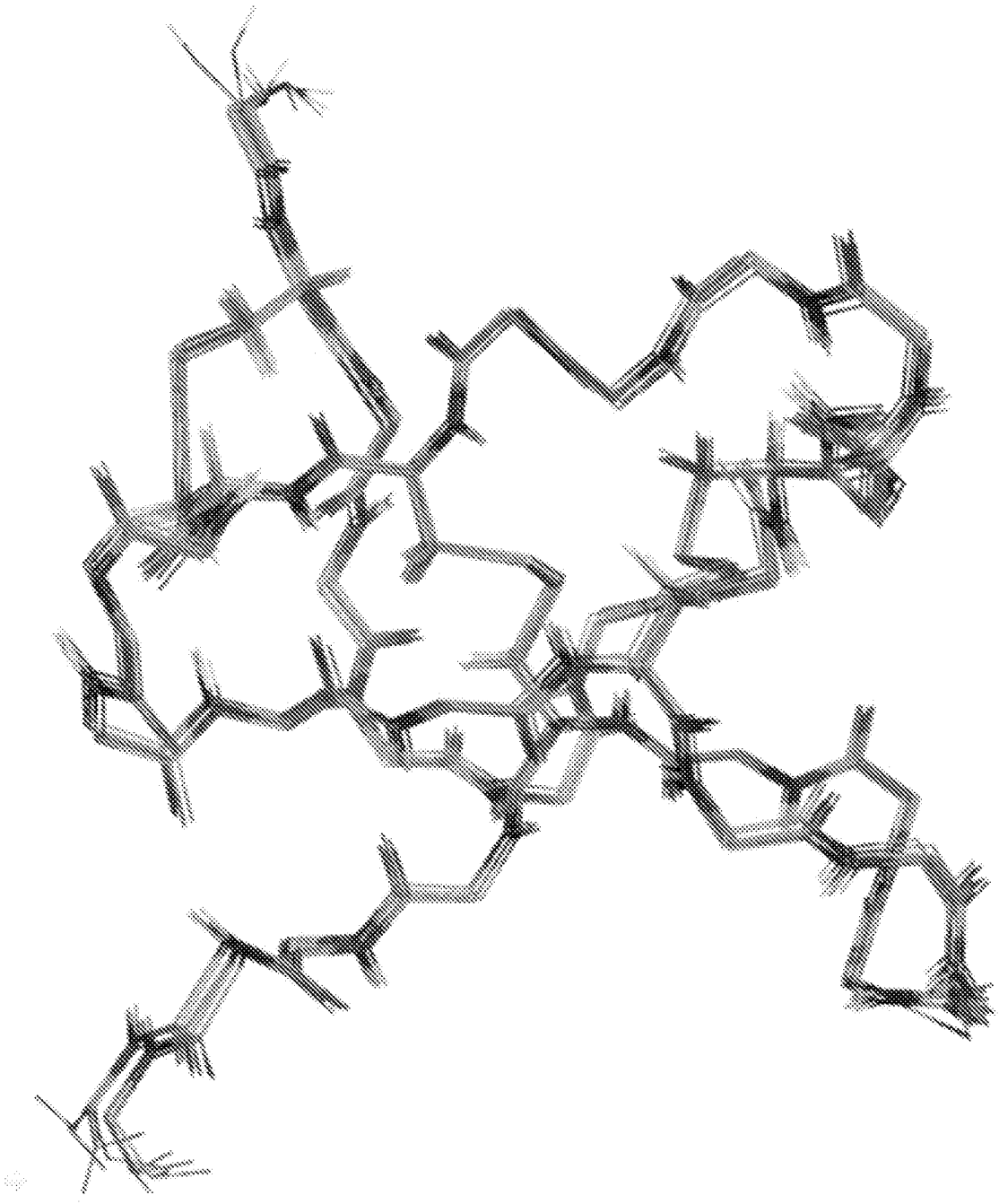


FIG. 7

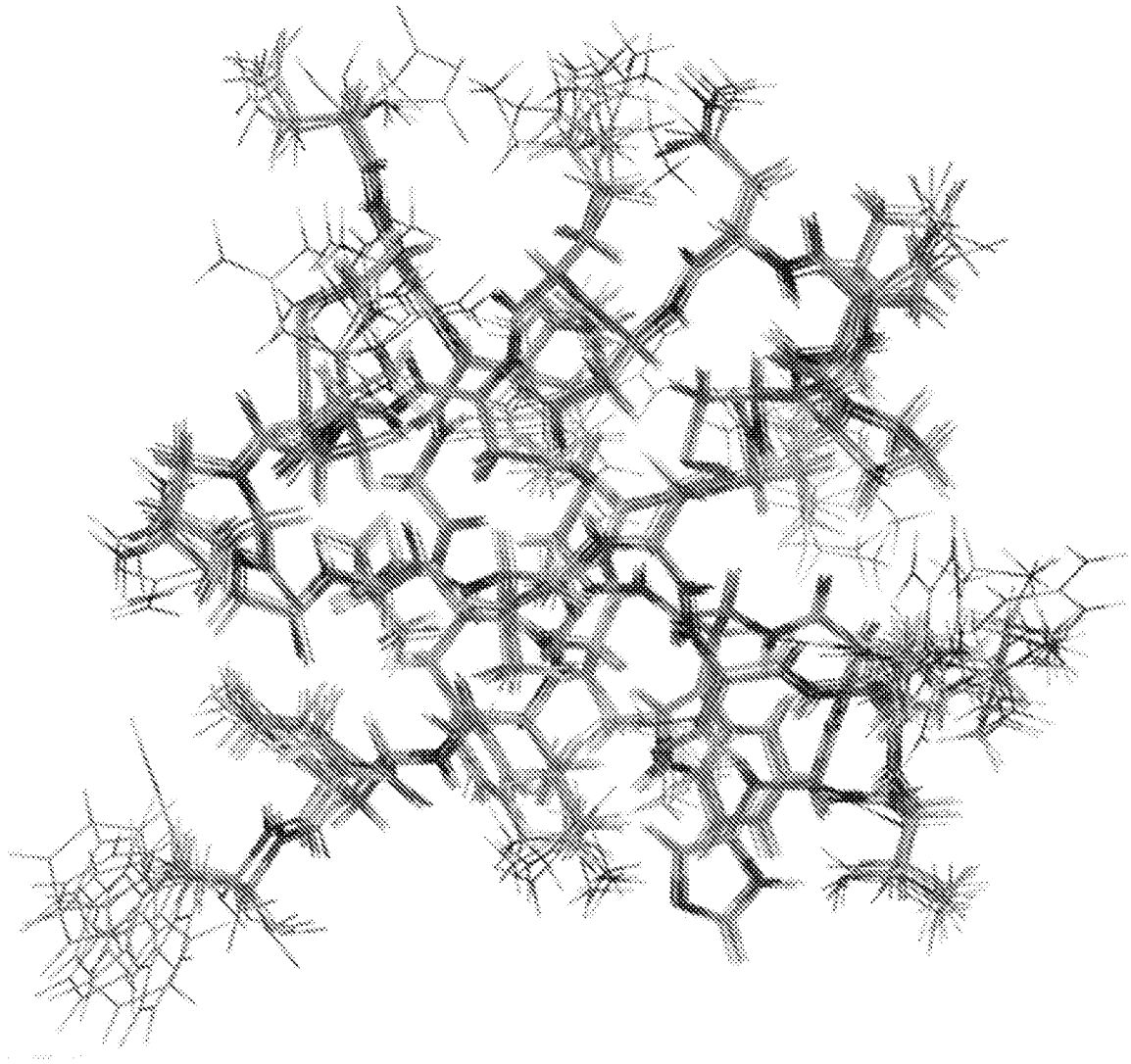


FIG. 8

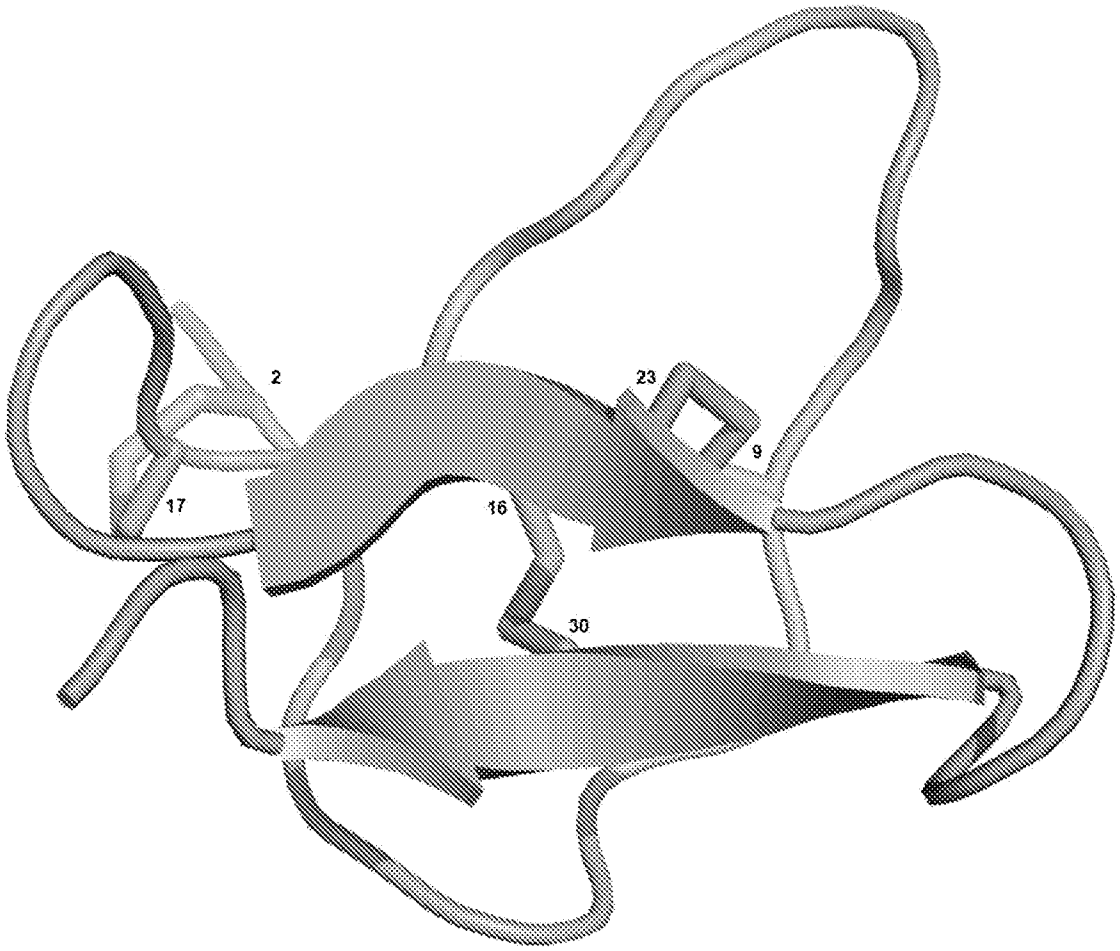


FIG. 9

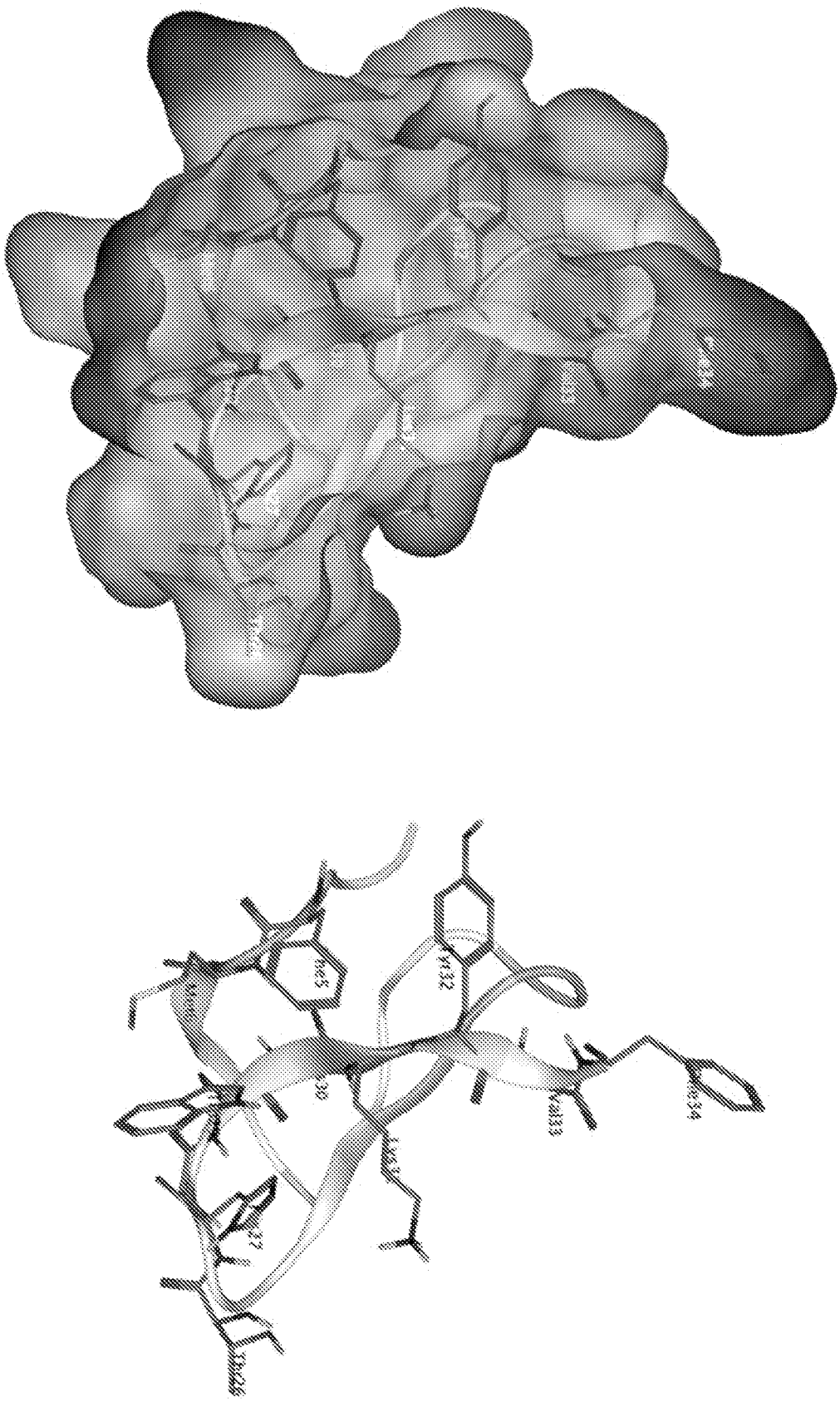


FIG. 10

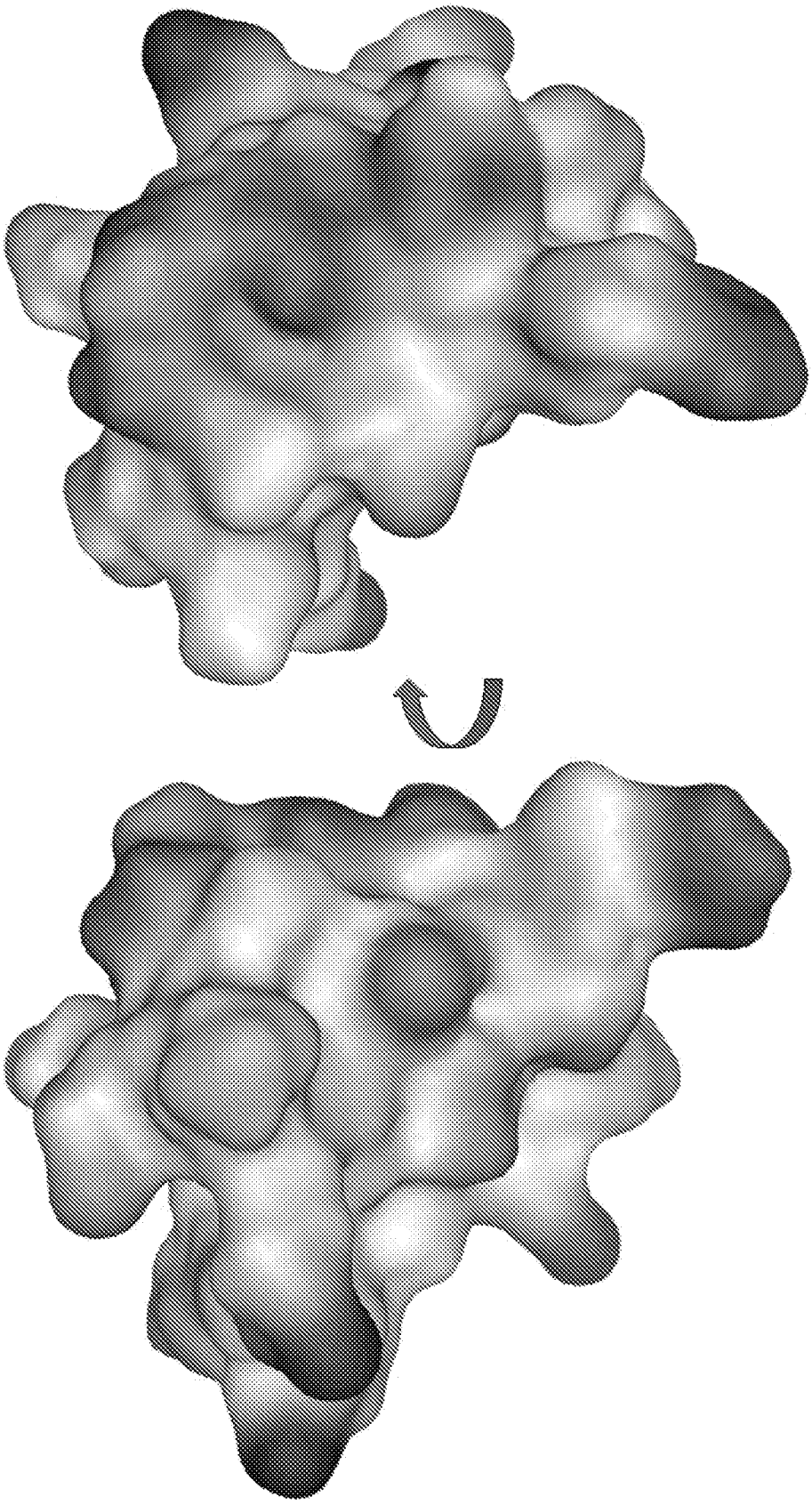


FIG. 11

FIG. 12A

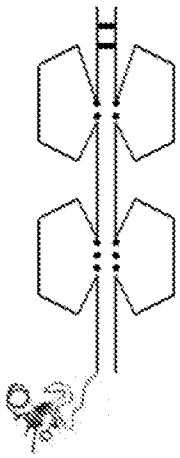


FIG. 12B

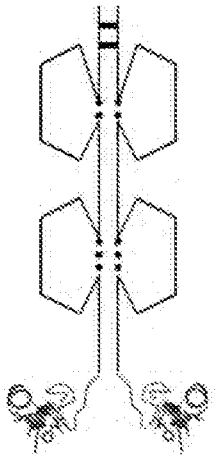


FIG. 12C

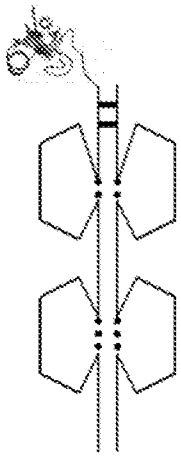


FIG. 12D

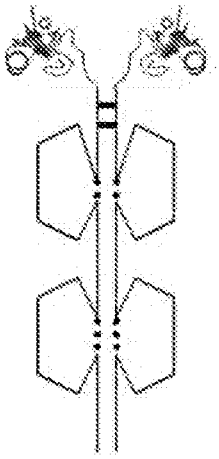


FIG. 12E

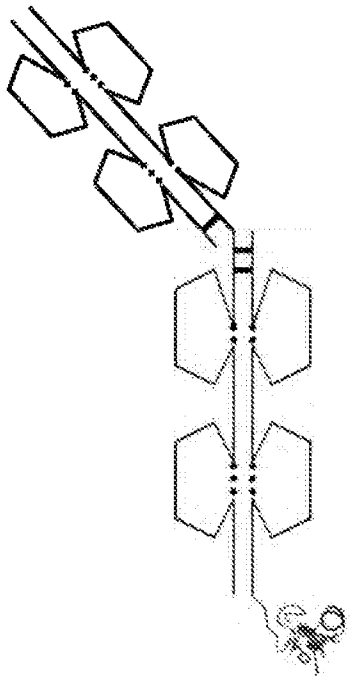


FIG. 12F

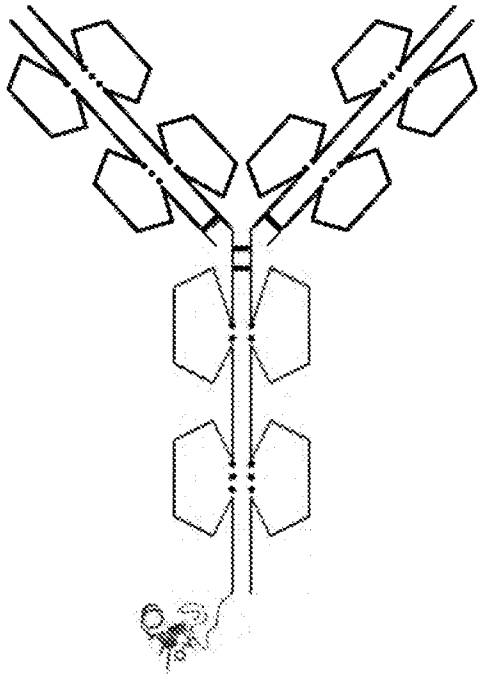


FIG. 12G

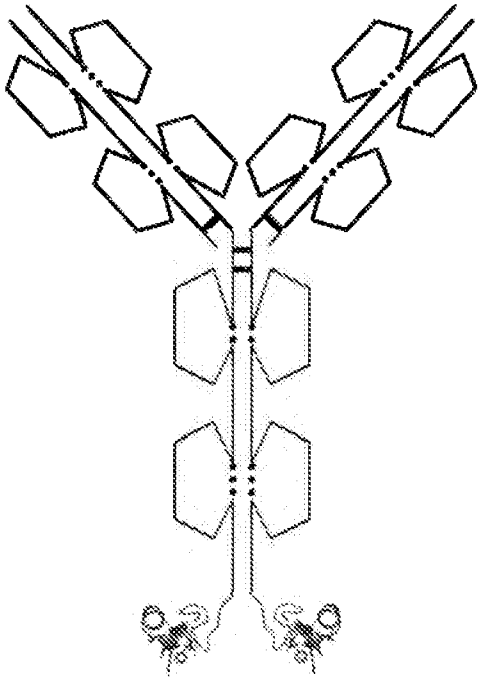


FIG. 12H

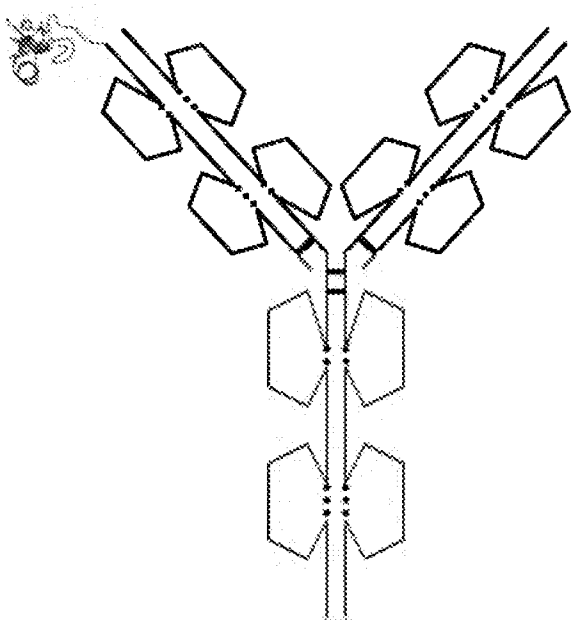


FIG. 12I

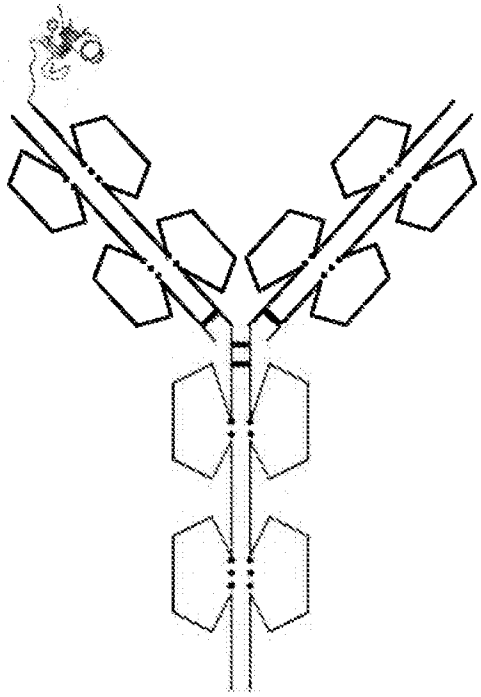


FIG. 12J

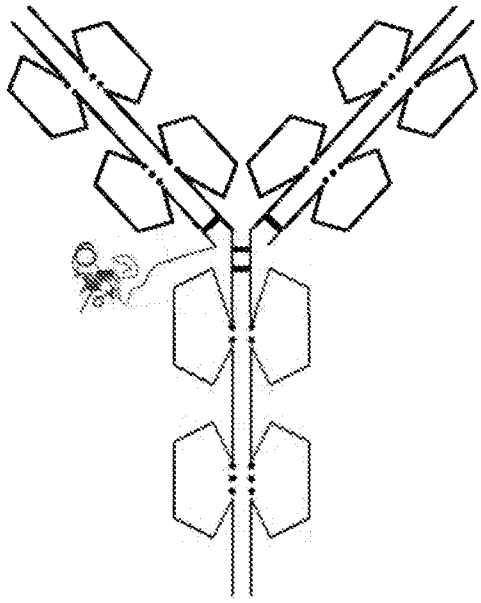


FIG. 12K

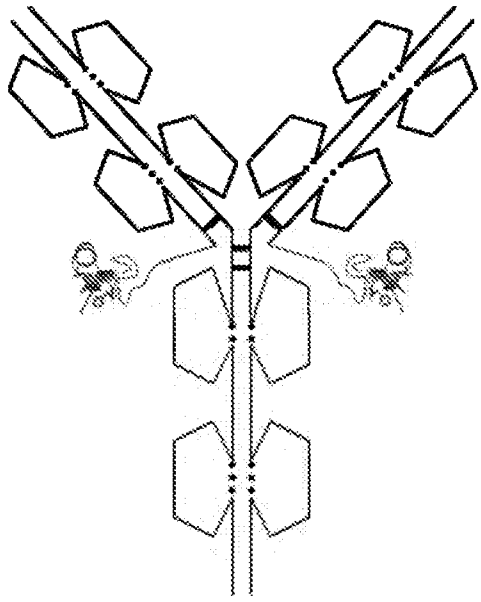


FIG. 12L

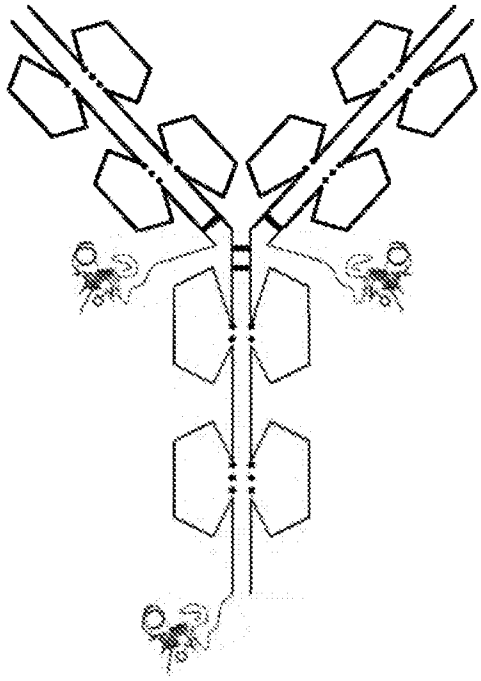


FIG. 12M

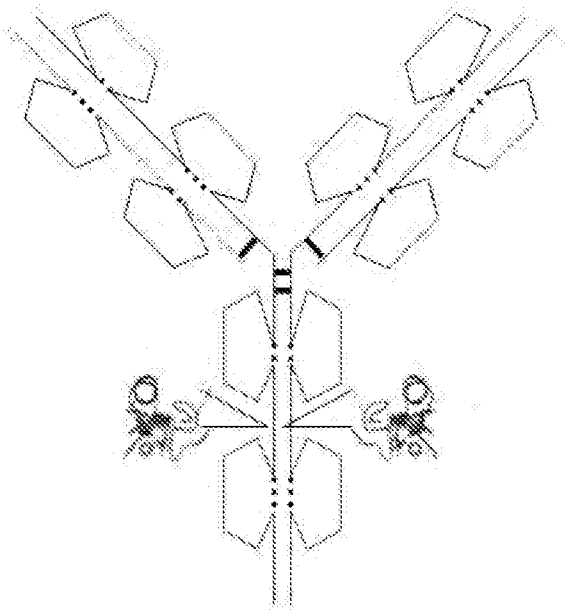
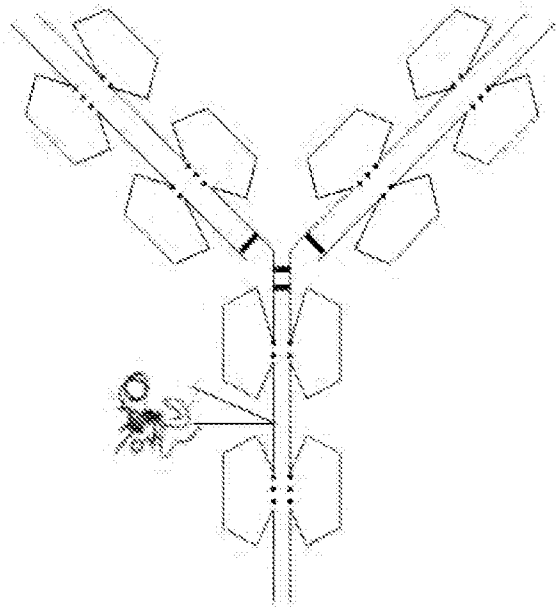


FIG. 12N



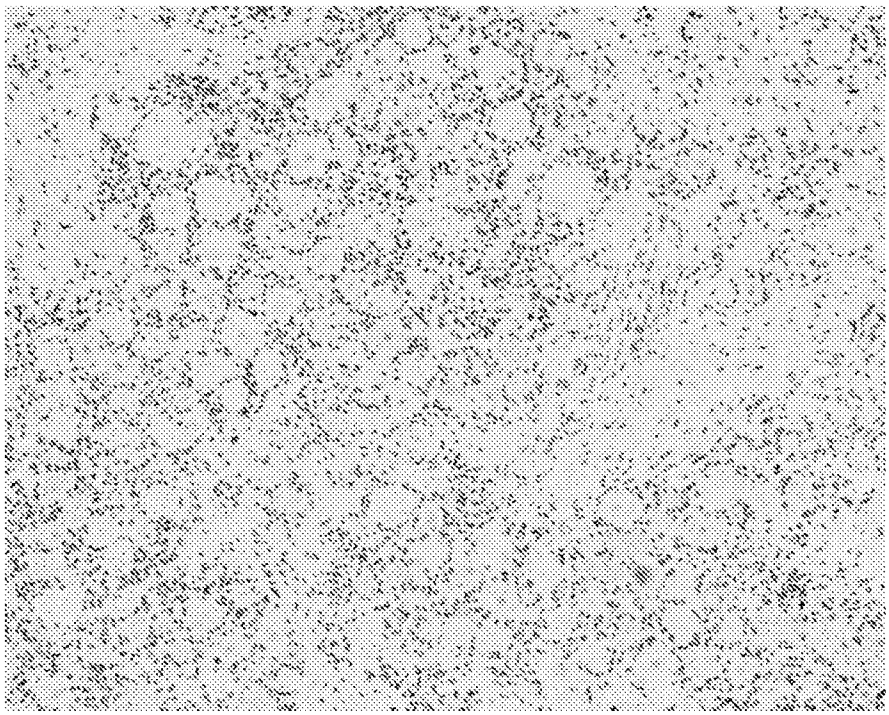


FIG. 13A

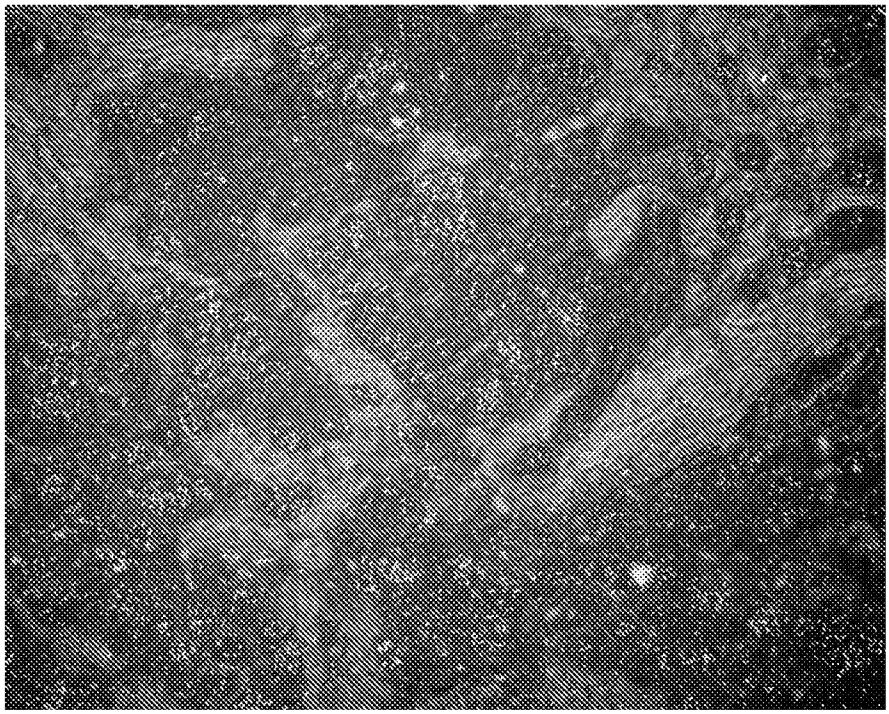


FIG. 13B

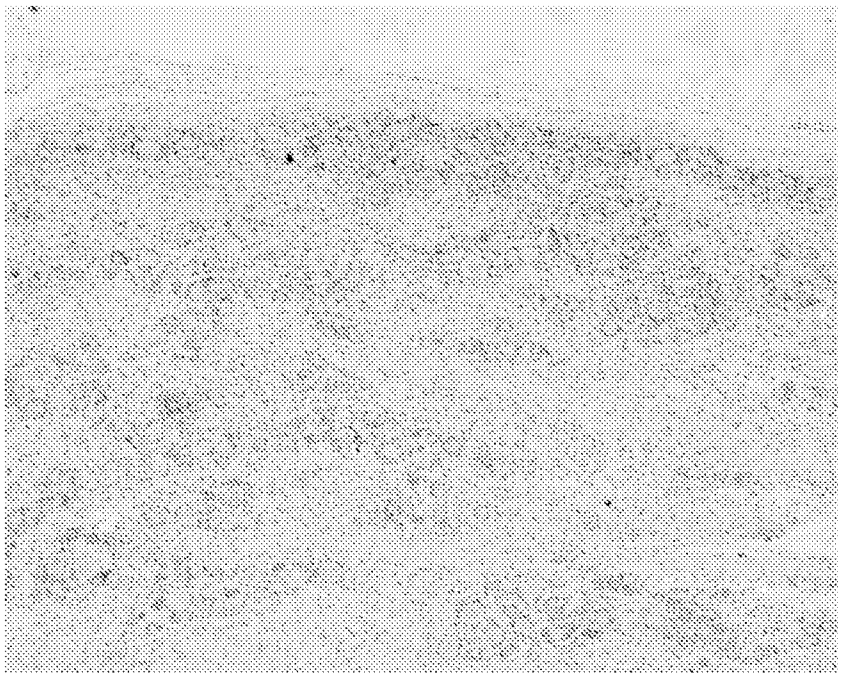


FIG. 13C

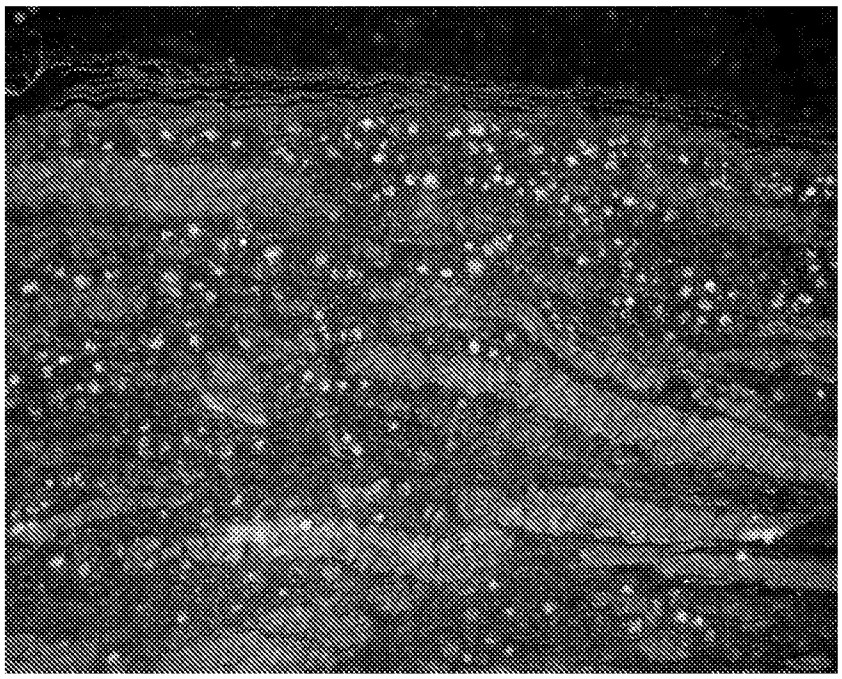


FIG. 13D

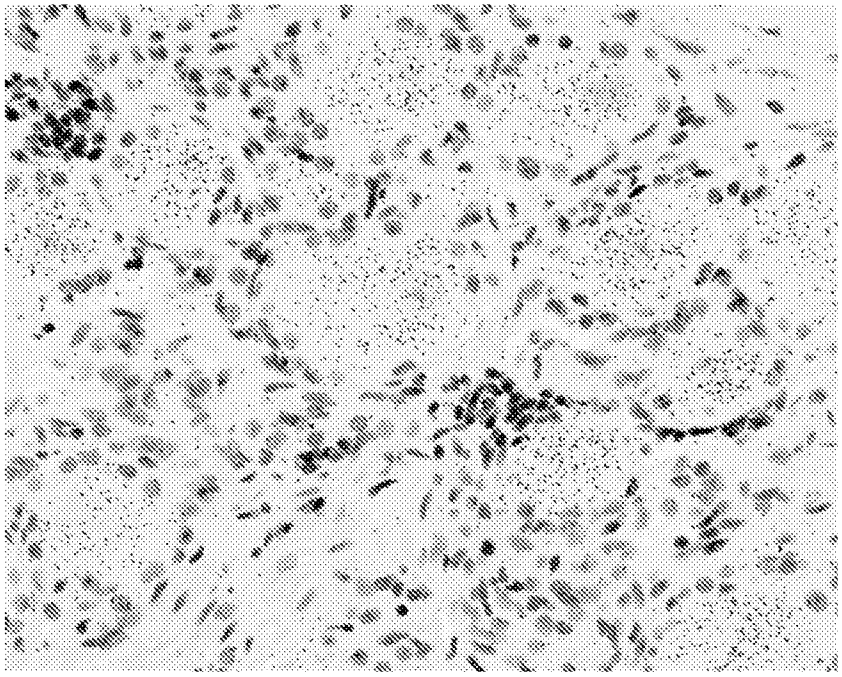


FIG. 13E

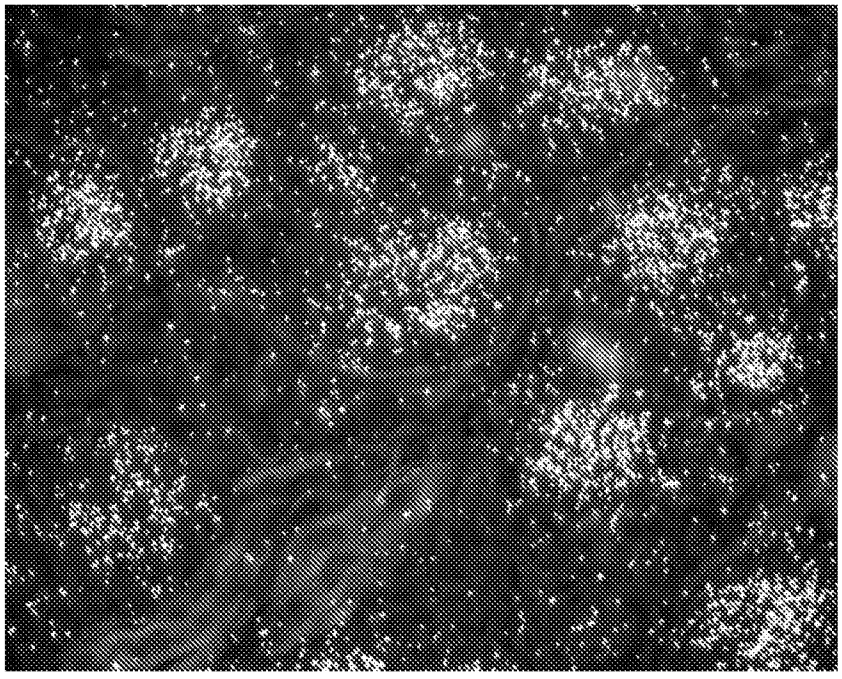


FIG. 13F

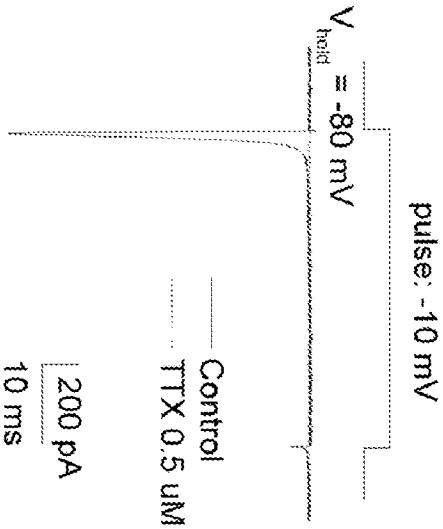


FIG. 14A

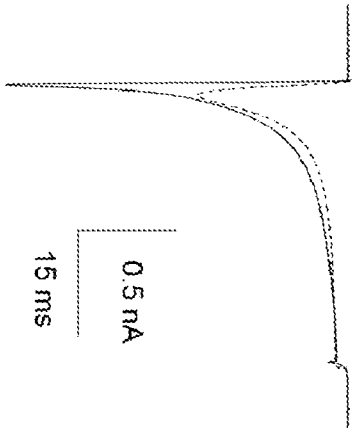


FIG. 14B

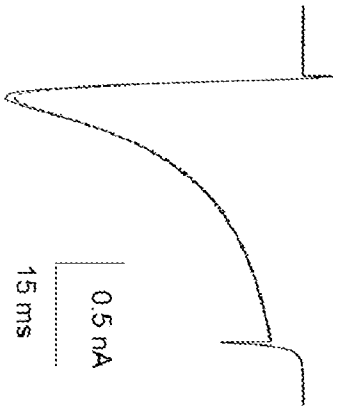


FIG. 14C

SNL

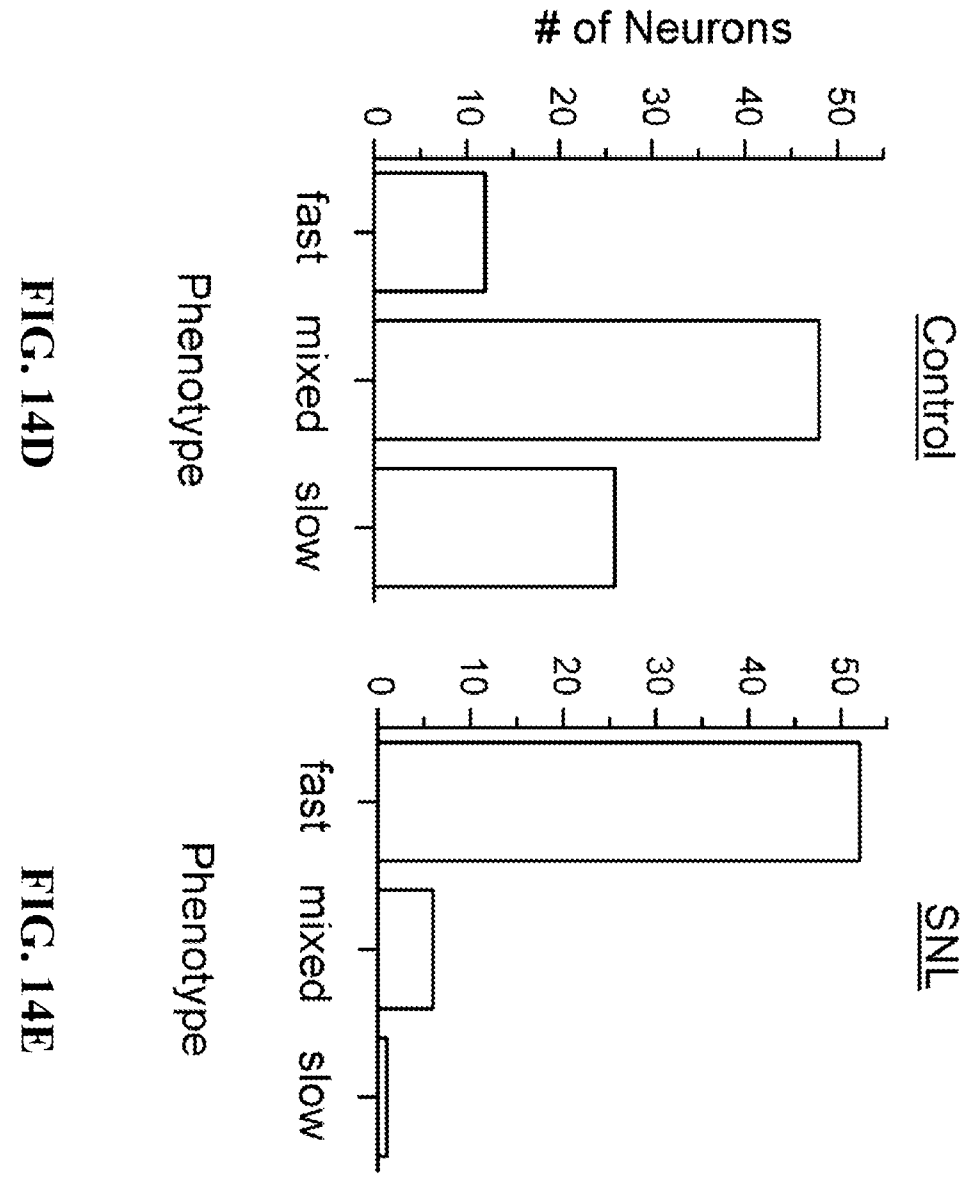


FIG. 14D

FIG. 14E

```
KIIIA              1 CCNCSSKWCR-DHSRCC                          16
GpTx-1{1-34}       1 DCLGFMRKCIPDNDKCCRPN-LVCSRTHKWCKYVF        34
Huwentoxin-IV      1 ECLEIFKACNPSNDQCCKSSKLVCSRKTRWCKYQI        35
Huwentoxin-I       1 ACKGVFDACTPGKNECCPNR--VCSDKHKWCKWKL        33
ProTx II           1 YCQKWMWTCD-SERKCCEGM--VCR---LWCKKKLW        30
                       *       *       **
```

FIG 15A

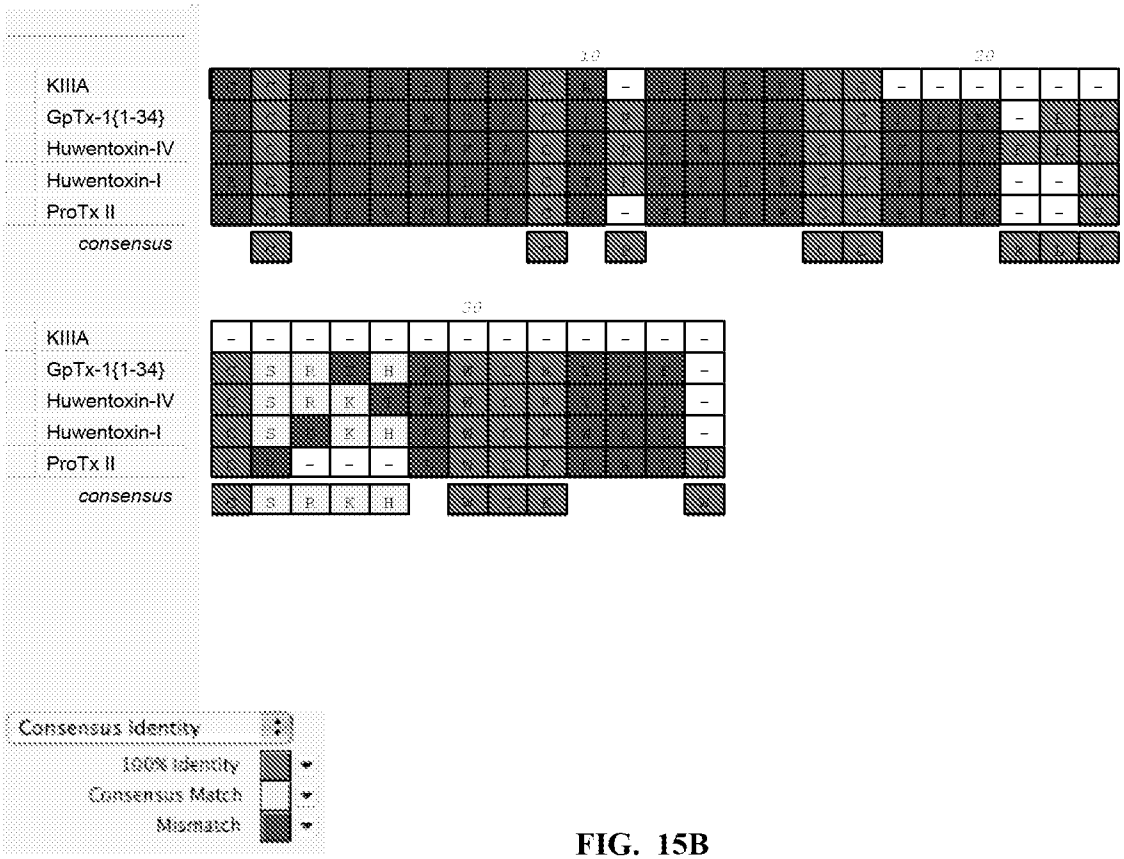


FIG. 15B

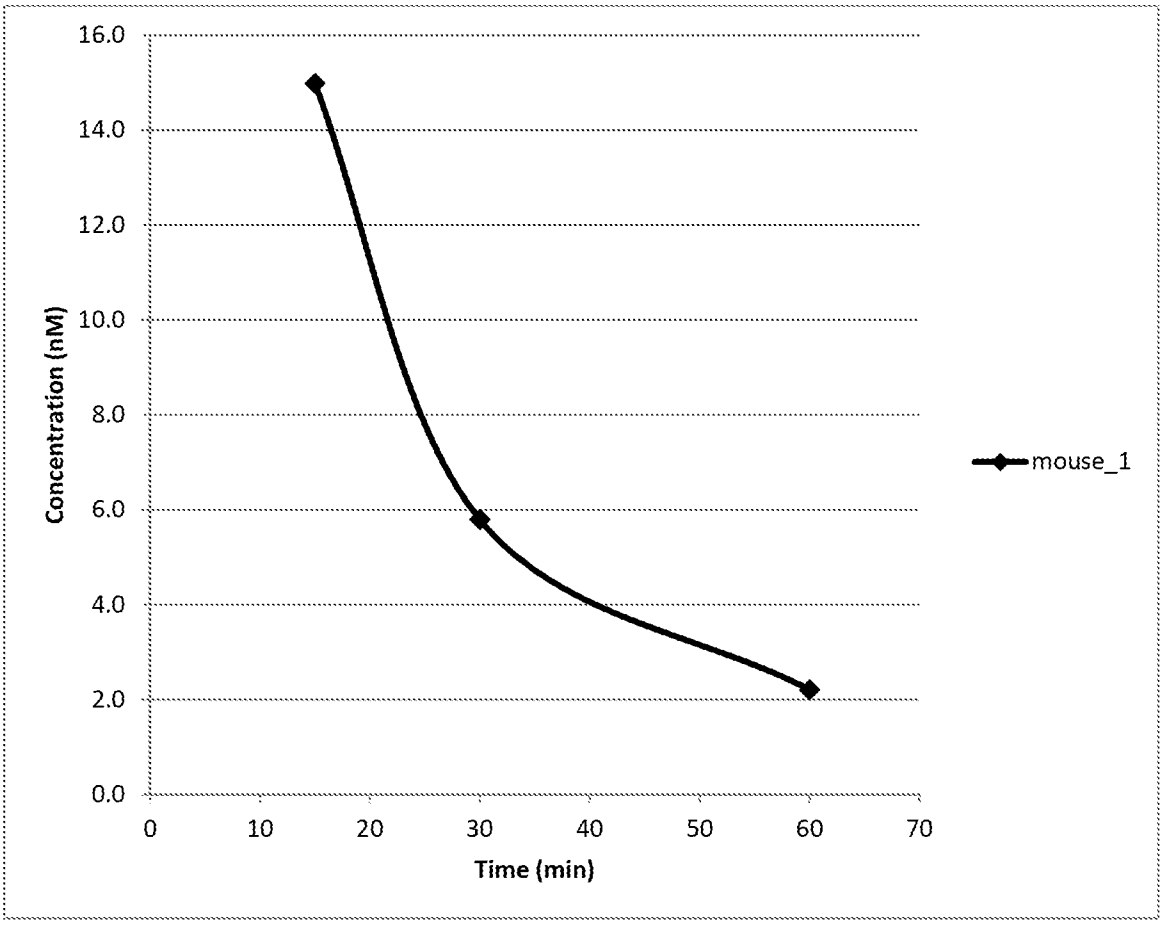

16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Concentration (nM)
0
10
20
30
40
50
60
70
Time (min)
mouse_1

FIG. 16

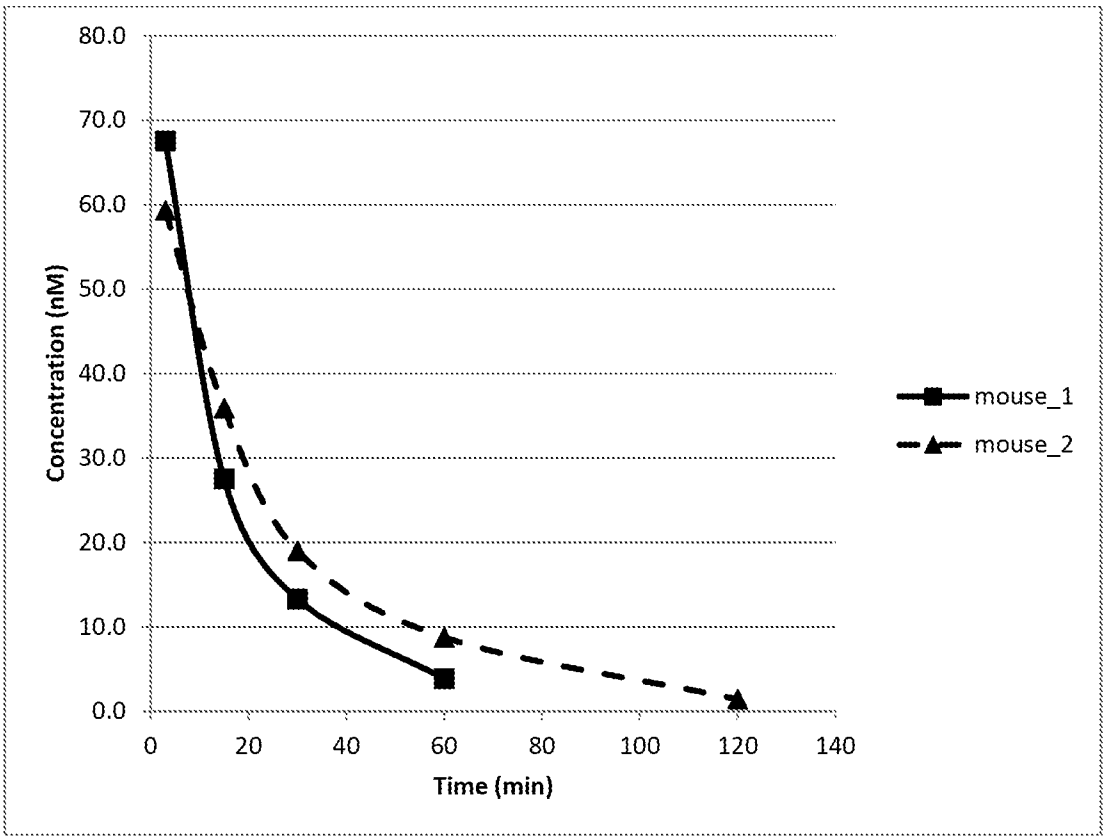

80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Concentration (nM)
0
20
40
60
80
100
120
140
Time (min)
mouse_1
mouse_2

FIG.17A

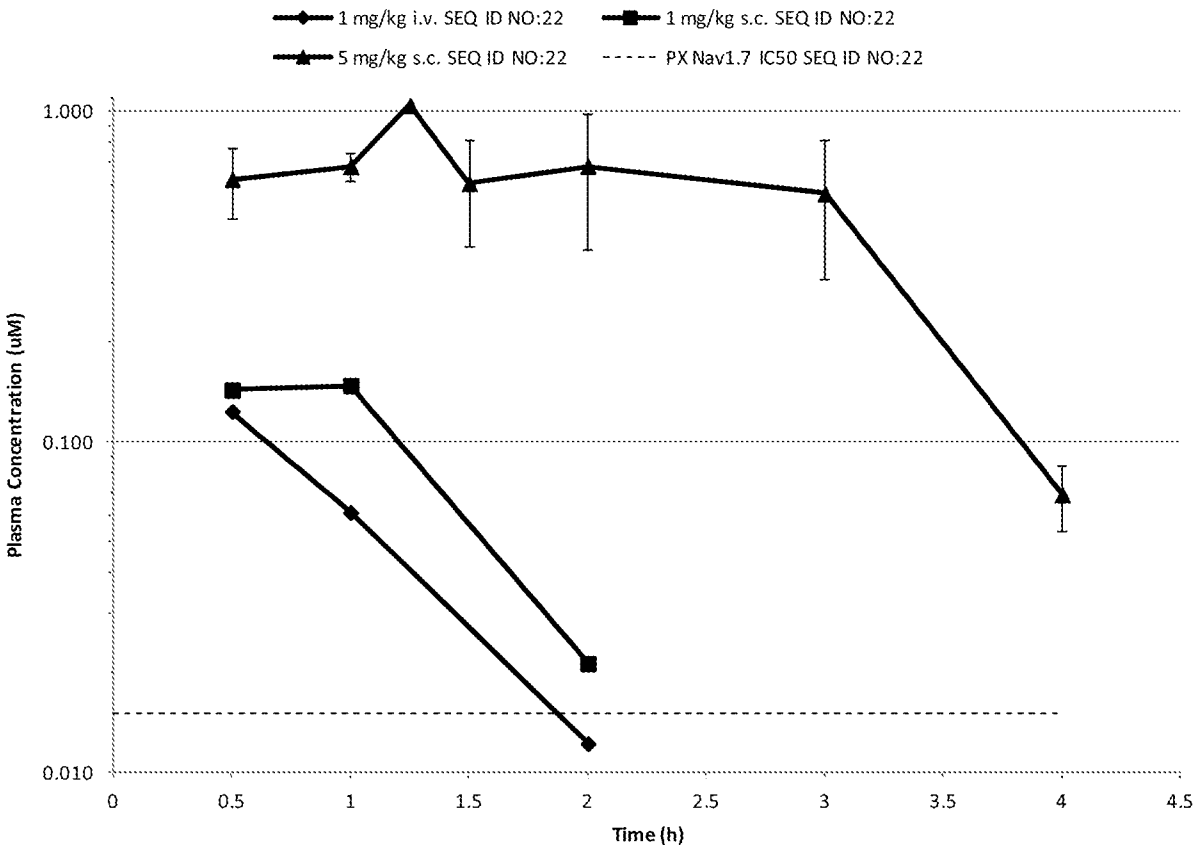

1 mg/kg i.v. SEQ ID NO:22
1 mg/kg s.c. SEQ ID NO:22
5 mg/kg s.c. SEQ ID NO:22
PX Nav1.7 IC50 SEQ ID NO:22
1.000
0.100
0.010
Plasma Concentration (uM)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
Time (h)

FIG. 17B

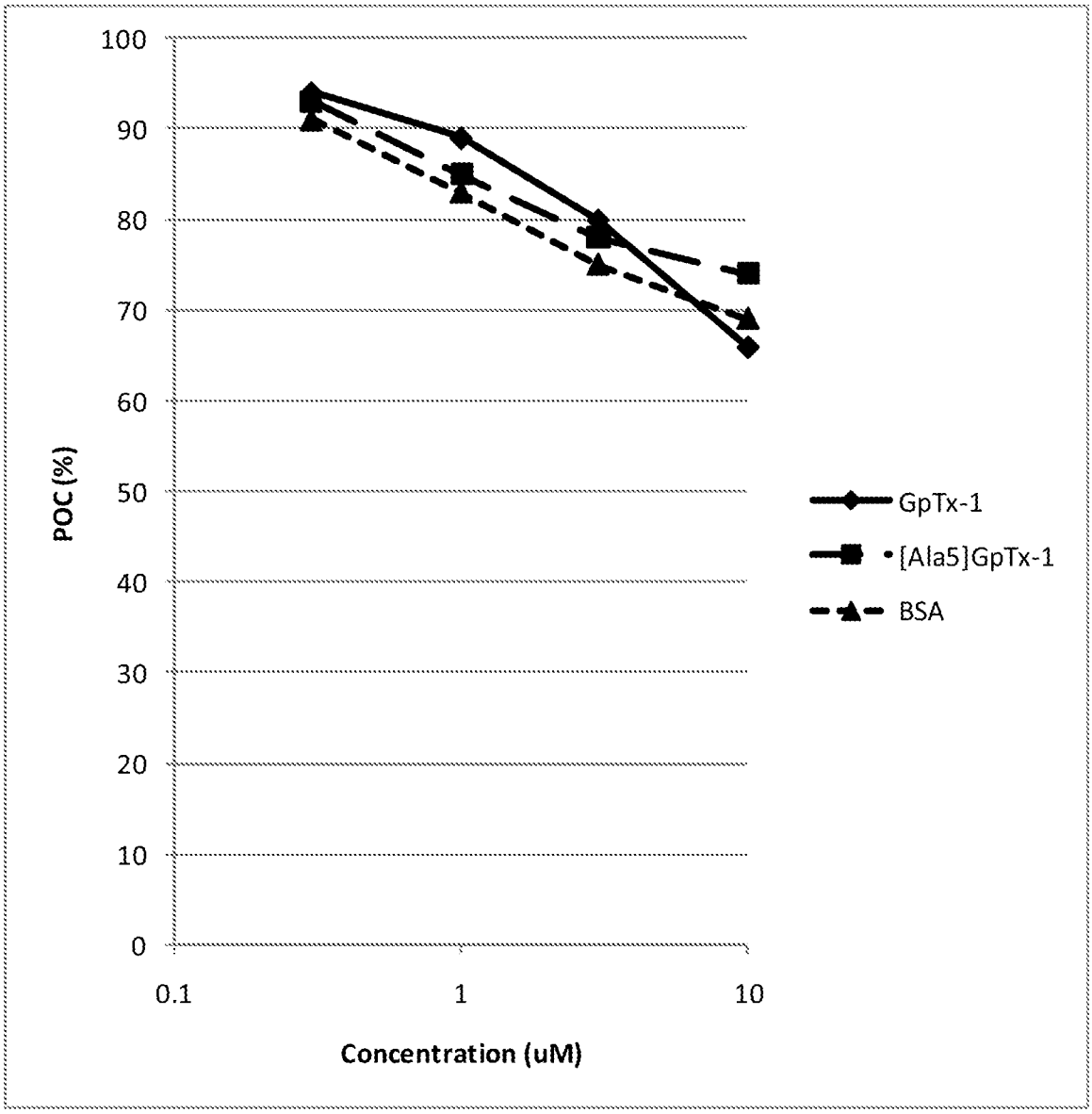

100
90
80
70
60
50
40
30
20
10
0
POC (%)
0.1
1
10
Concentration (uM)
GpTx-1
[Ala5]GpTx-1
BSA

FIG. 18

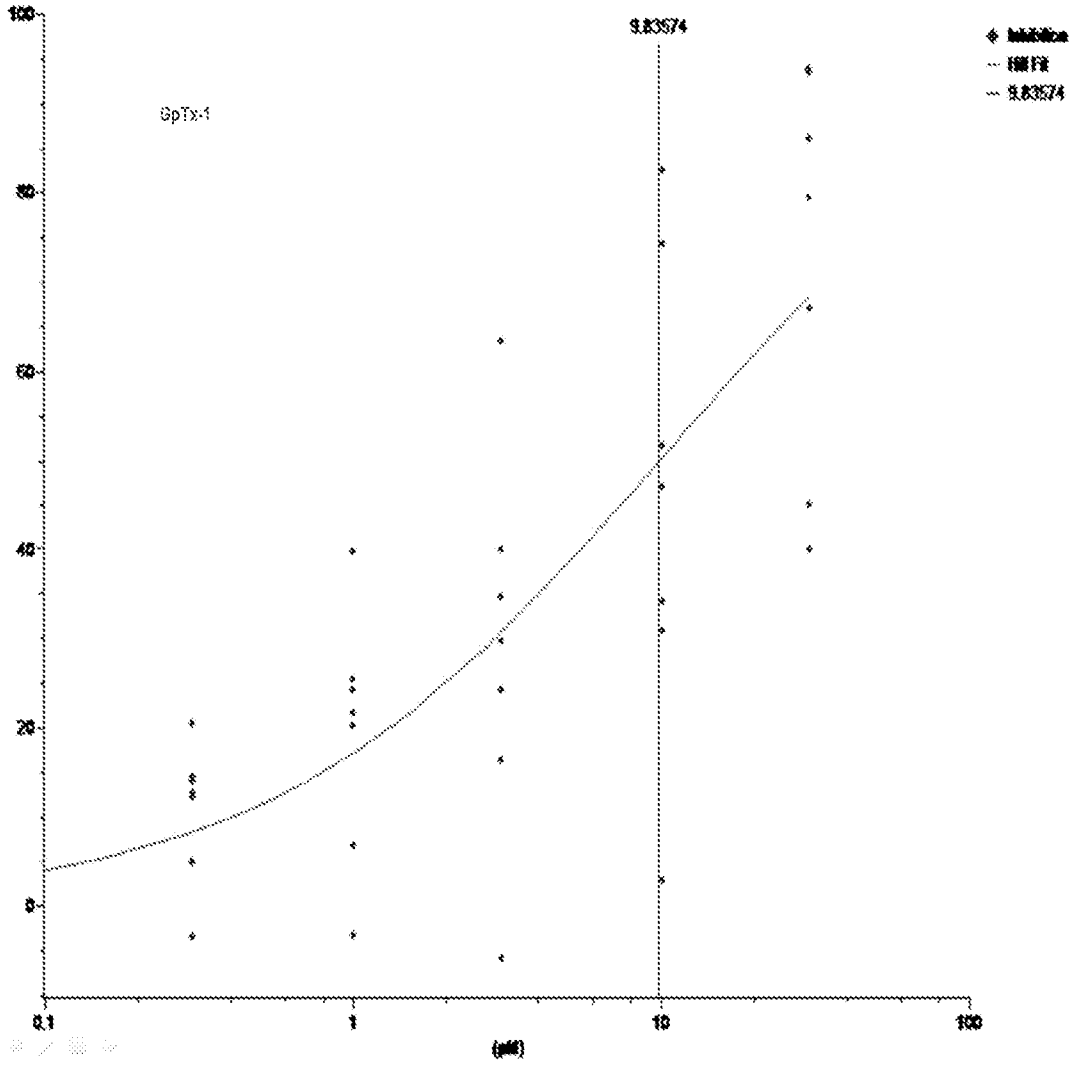


FIG. 19A

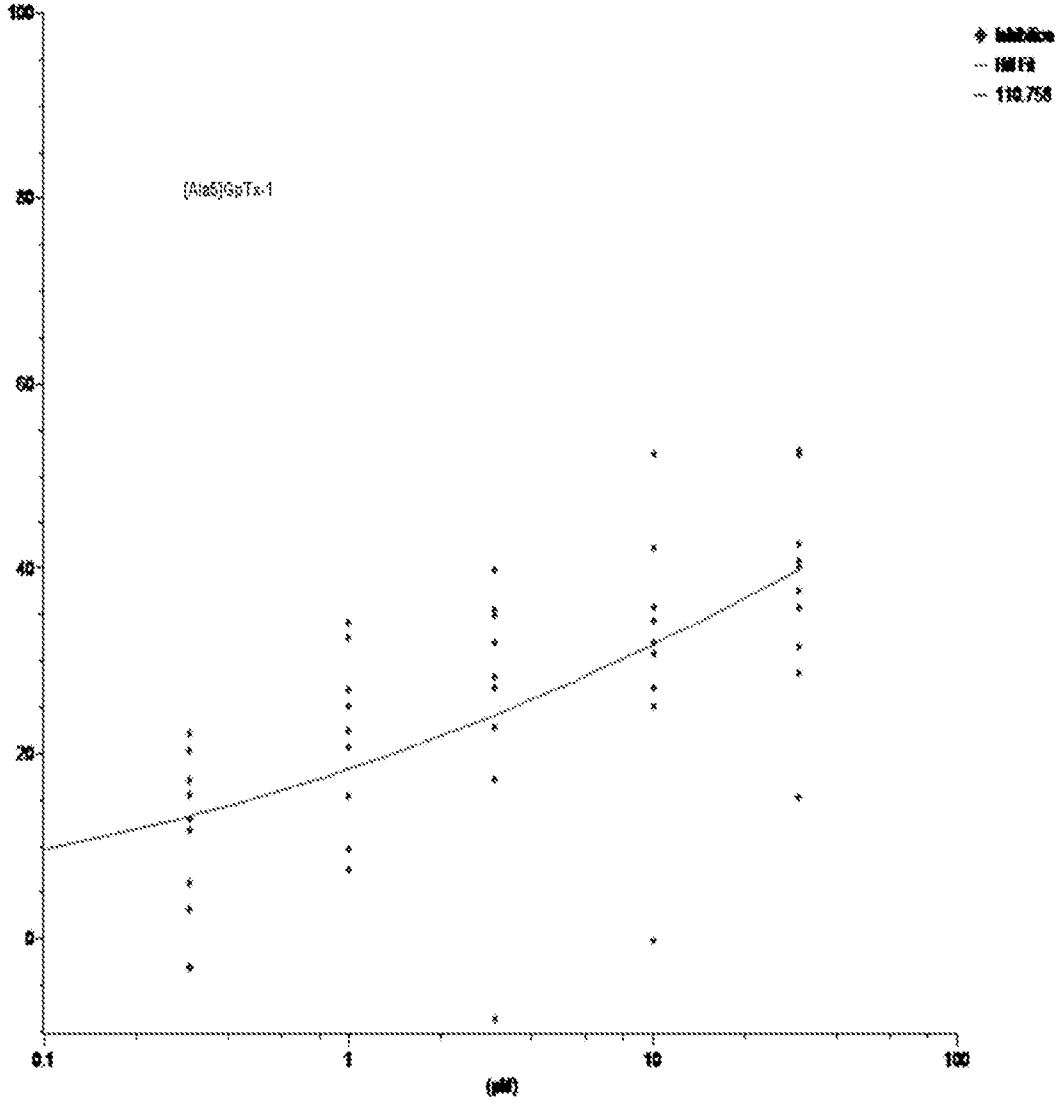


FIG. 19B

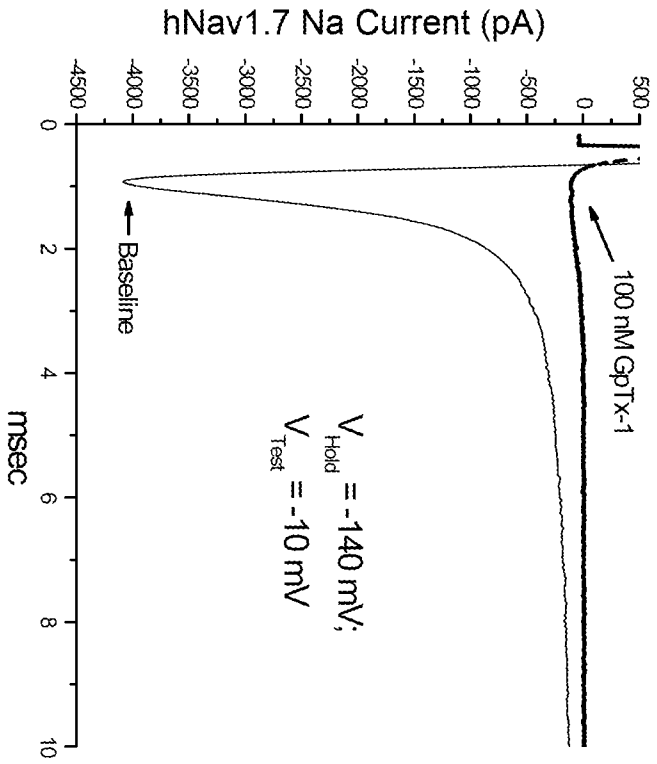

hNav1.7 Na Current (pA)
-4500
-4000
-3500
-3000
-2500
-2000
-1500
-1000
-500
0
500
0
2
4
6
8
10
msec
Baseline
100 nM GpTx-1
V_{Hold} = -140 mV;
V_{Test} = -10 mV

FIG. 20

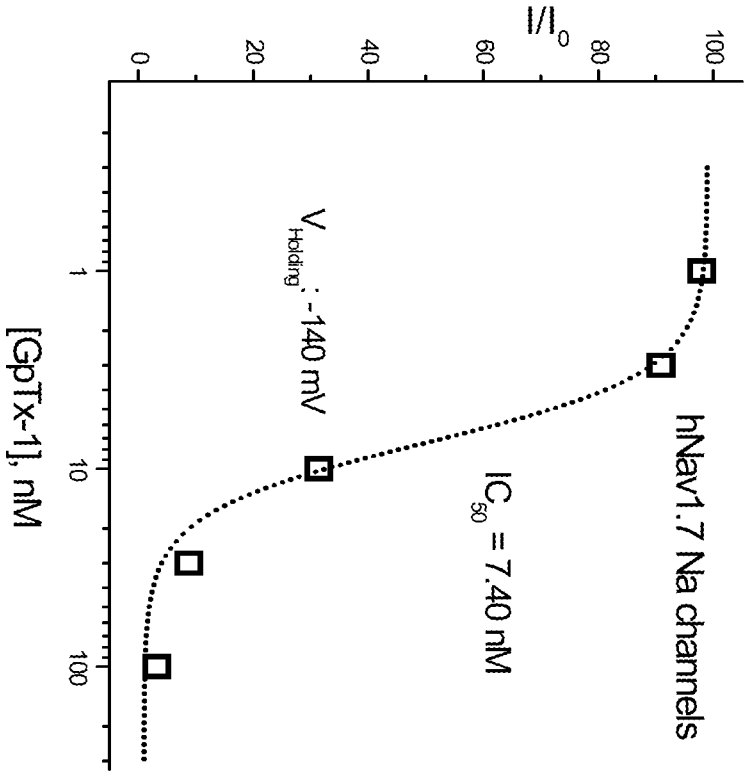

I/I0
0
20
40
60
80
100
1
10
100
[GpTx-1], nM
VHolding: -140 mV
IC50 = 7.40 nM
hNav1.7 Na channels

FIG. 21

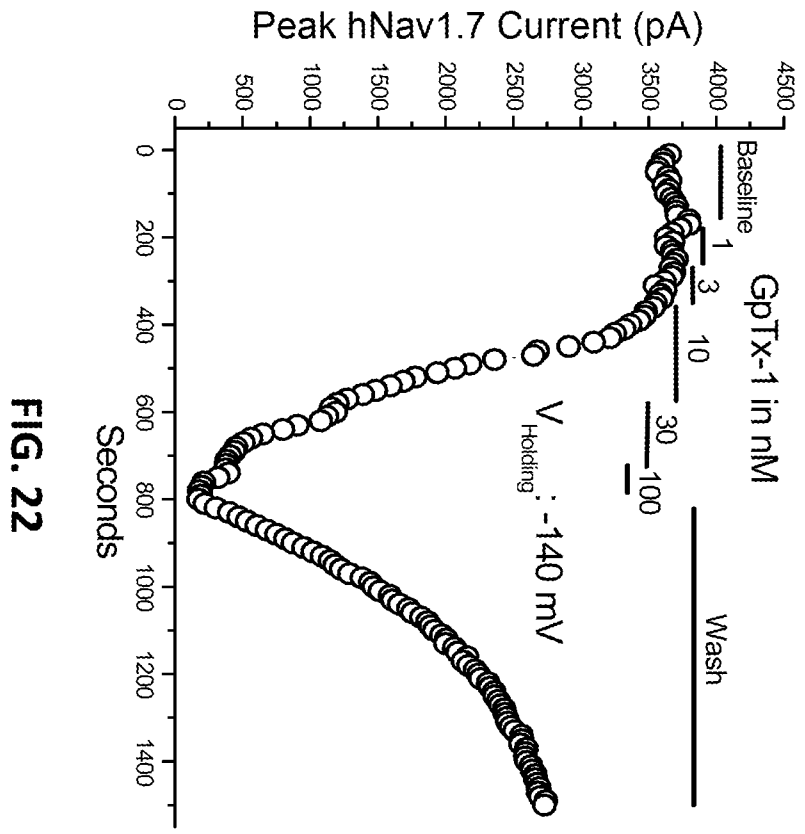

Peak hNav1.7 Current (pA)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Seconds
0
200
400
600
800
1000
1200
1400
Baseline
1
3
10
30
100
Wash
GpTx-1 in nM
V Holding: -140 mV

FIG. 22

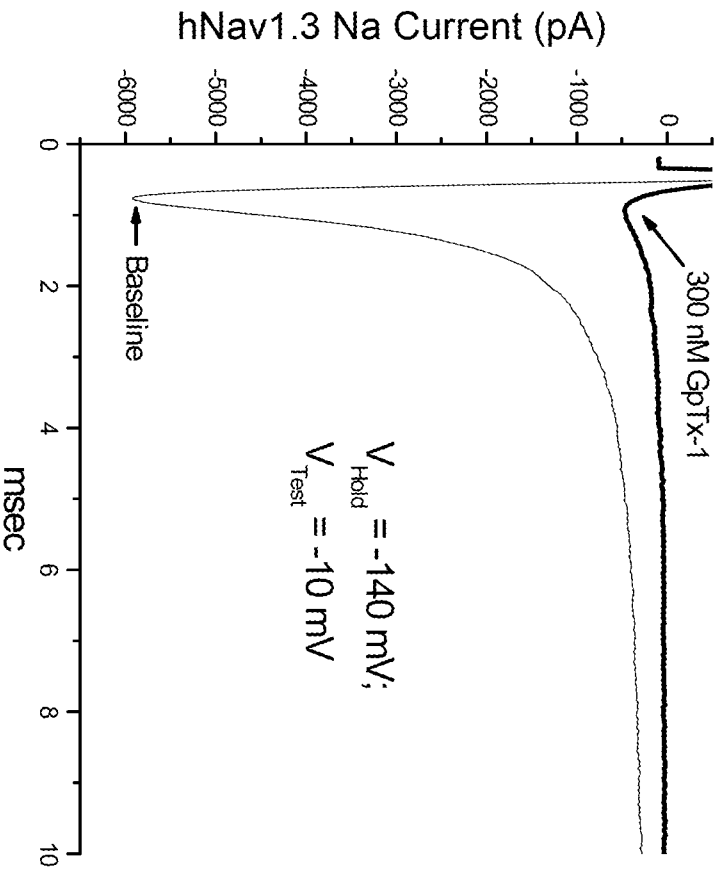

hNav1.3 Na Current (pA)
-6000
-5000
-4000
-3000
-2000
-1000
0
0
2
4
6
8
10
msec
Baseline
300 nM GpTx-1
V Hold = -140 mV;
V Test = -10 mV

FIG. 23

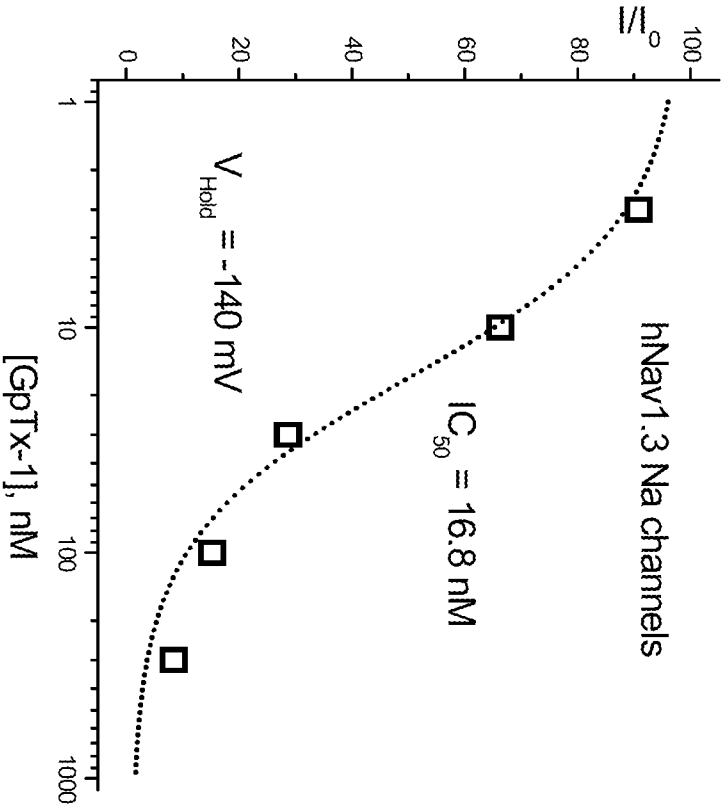

I/I0
100
80
60
40
20
0
1
10
100
1000
[GpTx-1], nM
hNav1.3 Na channels
IC50 = 16.8 nM
VHold = -140 mV

FIG. 24

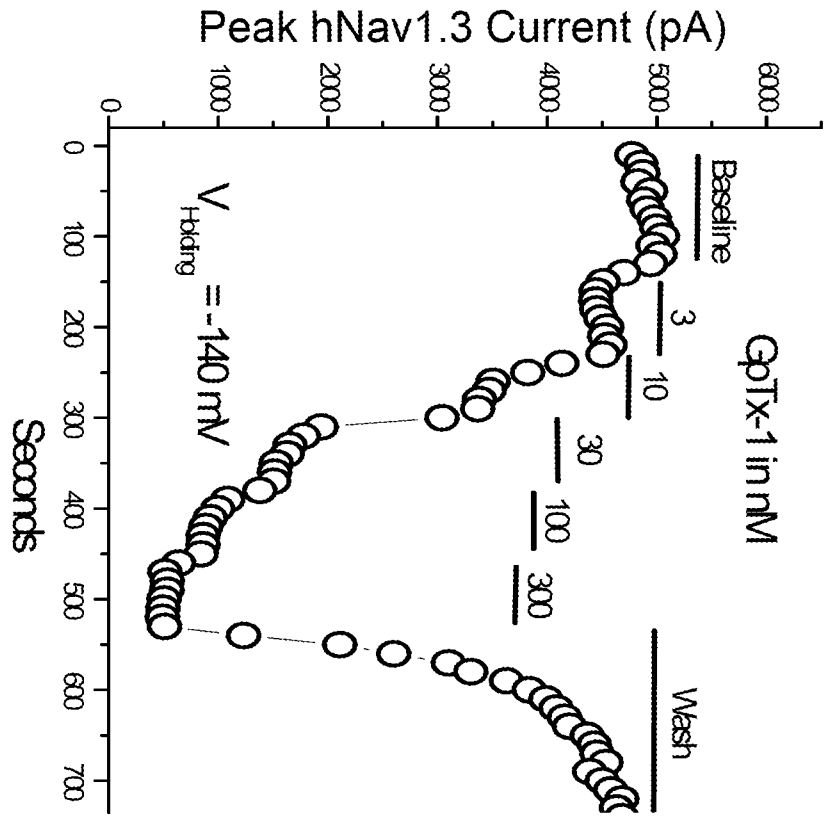

Peak hNav1.3 Current (pA)
0
1000
2000
3000
4000
5000
6000
Seconds
0
100
200
300
400
500
600
700
V Holding = -140 mV
Baseline
3
10
30
100
300
Wash
GpTx-1 in nM

FIG. 25

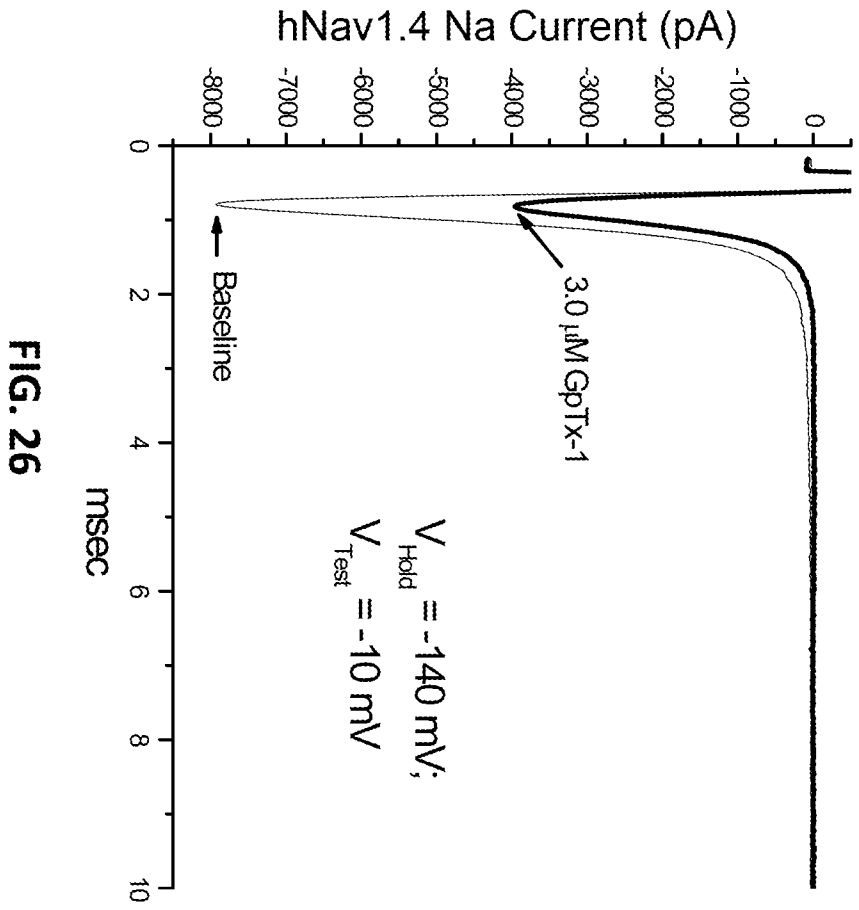

hNav1.4 Na Current (pA)
0
-1000
-2000
-3000
-4000
-5000
-6000
-7000
-8000
0
2
4
6
8
10
msec
Baseline
3.0 μM GpTx-1
V Hold = -140 mV;
V Test = -10 mV

FIG. 26

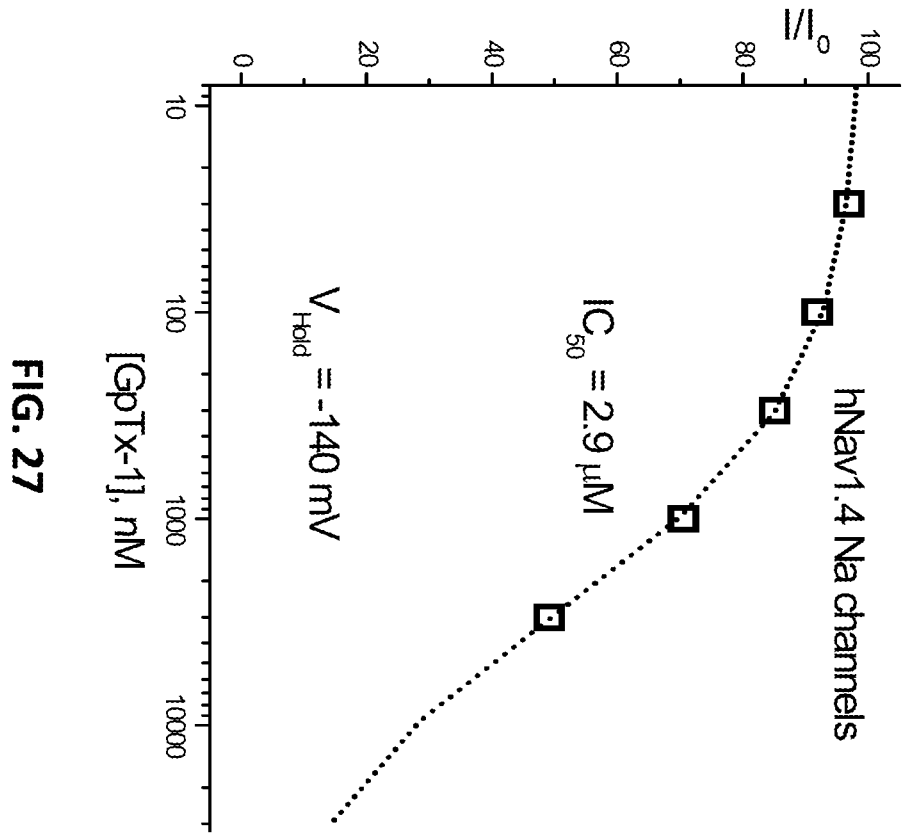

I/I0
100
80
60
40
20
0
10
100
1000
10000
[GpTx-1], nM
hNav1.4 Na channels
IC50 = 2.9 μM
VHold = -140 mV

FIG. 27

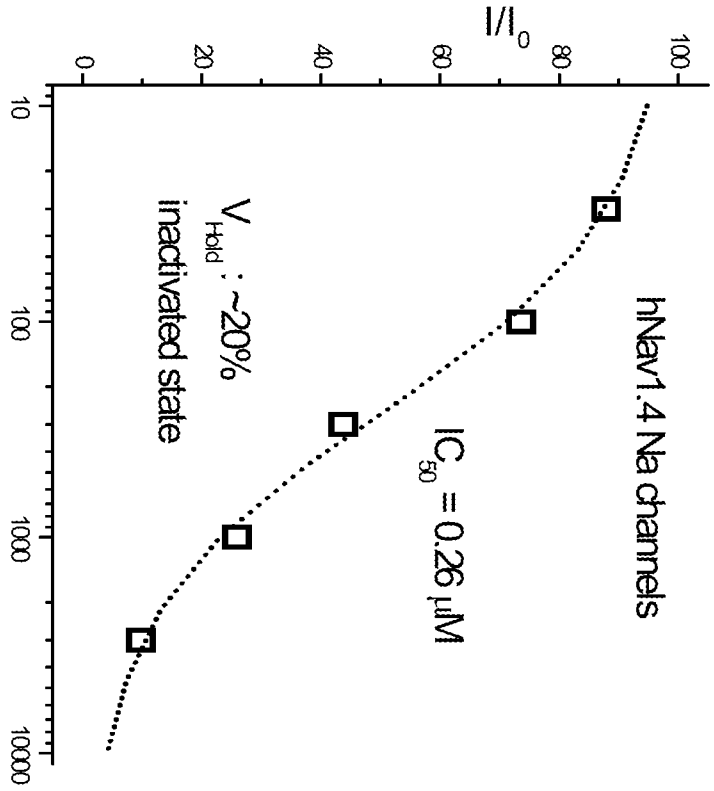

I/I0
0
20
40
60
80
100
10
100
1000
10000
[GpTx-1], nM
hNav1.4 Na channels
IC50 = 0.26 μM
VHold : ~20%
inactivated state

FIG. 28

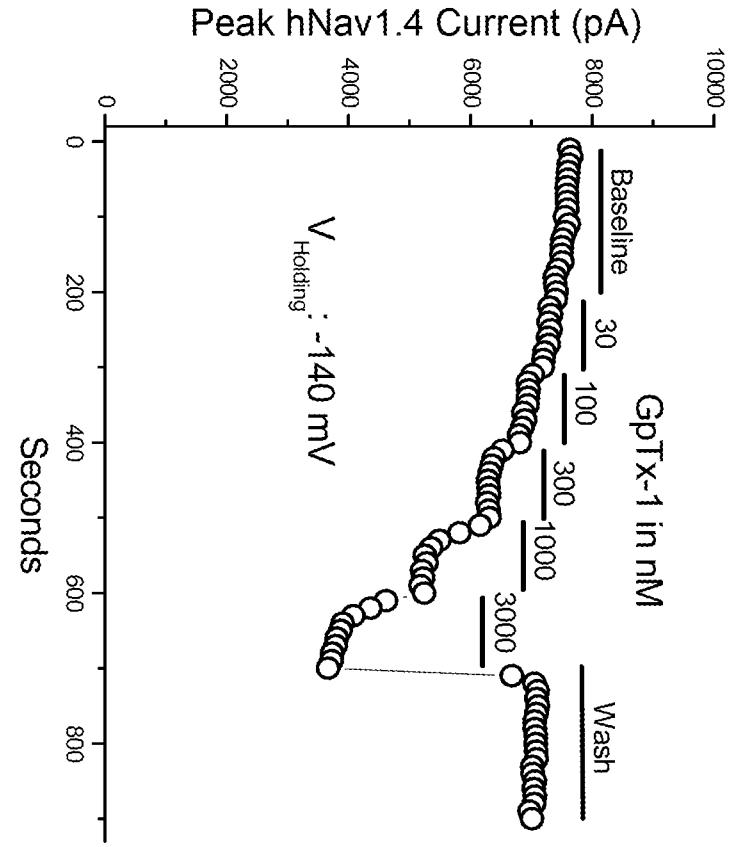

Peak hNav1.4 Current (pA)
0
2000
4000
6000
8000
10000
0
200
400
600
800
Seconds
$V_{Holding}$: -140 mV
Baseline
30
100
300
1000
3000
Wash
GpTx-1 in nM

FIG. 29

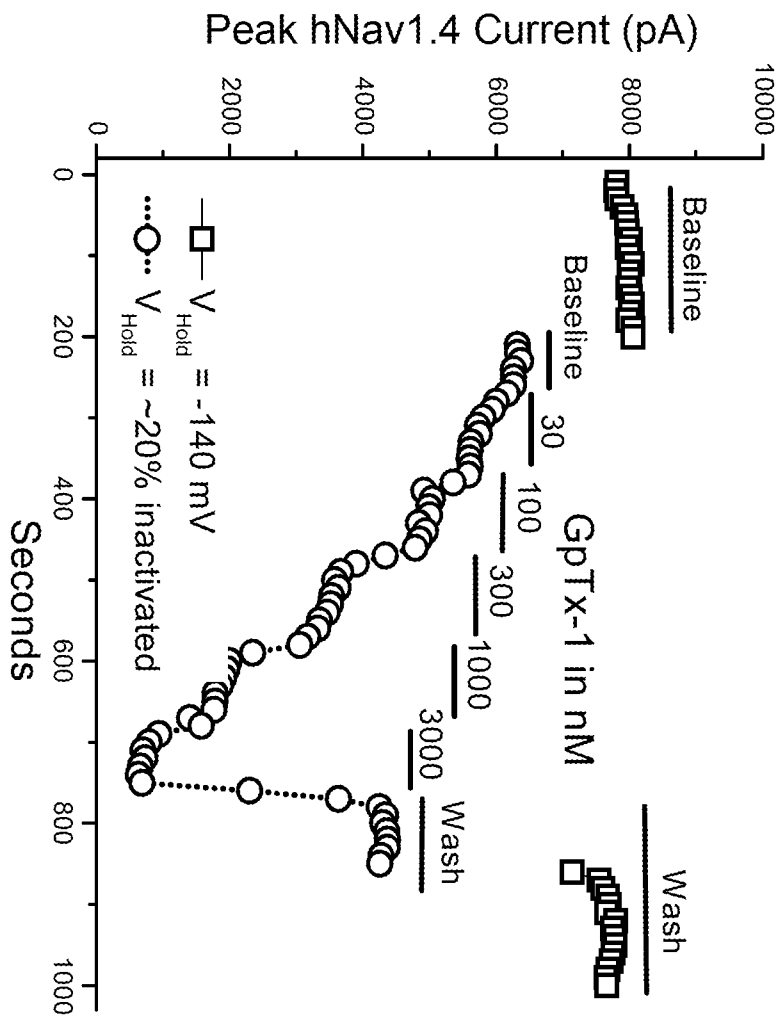

Peak hNav1.4 Current (pA)
0
2000
4000
6000
8000
10000
Baseline
Baseline
30
100
300
1000
3000
Wash
GpTx-1 in nM
Wash
V Hold = -140 mV
V Hold = ~20% inactivated
0
200
400
600
800
1000
Seconds

FIG. 30

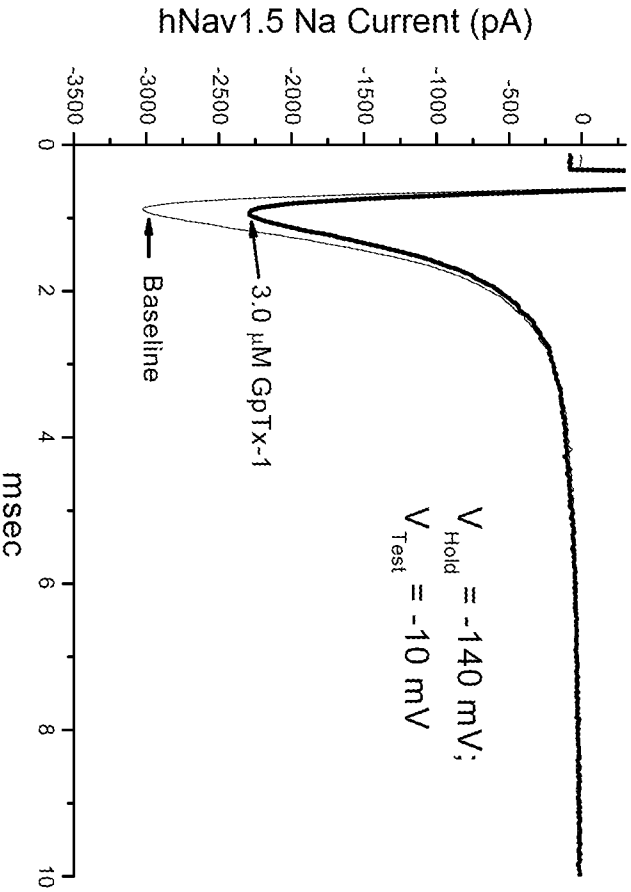

hNav1.5 Na Current (pA)
-3500
-3000
-2500
-2000
-1500
-1000
-500
0
0
2
4
6
8
10
msec
Baseline
3.0 μM GpTx-1
V Hold = -140 mV;
V Test = -10 mV

FIG. 31

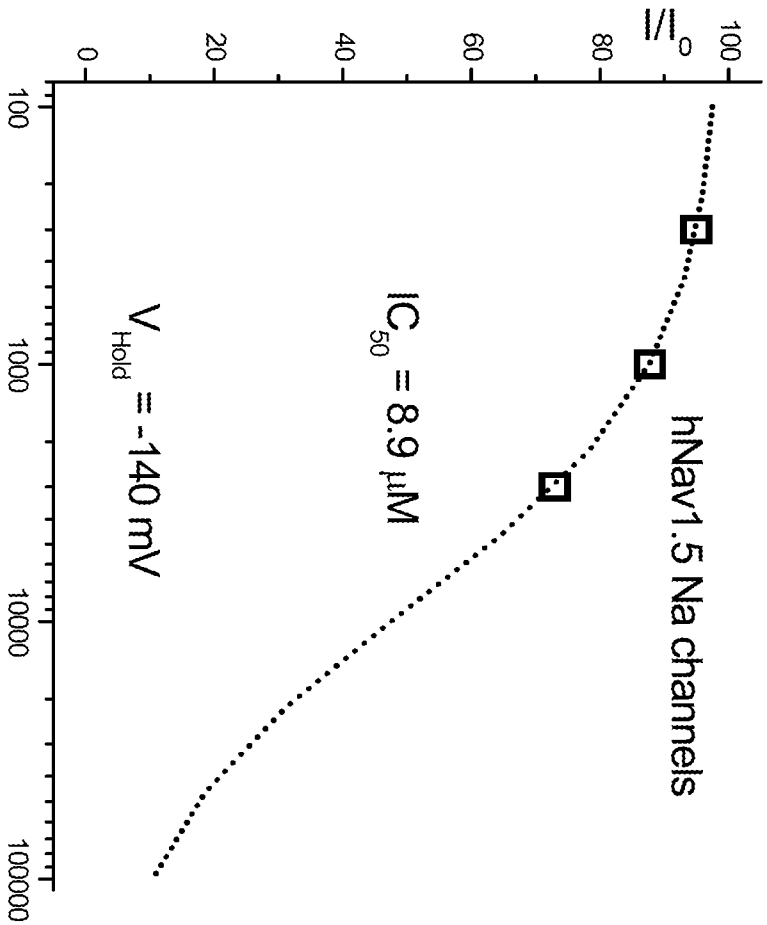

I/I0
100
80
60
40
20
0
100
1000
10000
100000
[GpTx-1], nM
hNav1.5 Na channels
IC50 = 8.9 μM
VHold = -140 mV

FIG. 32

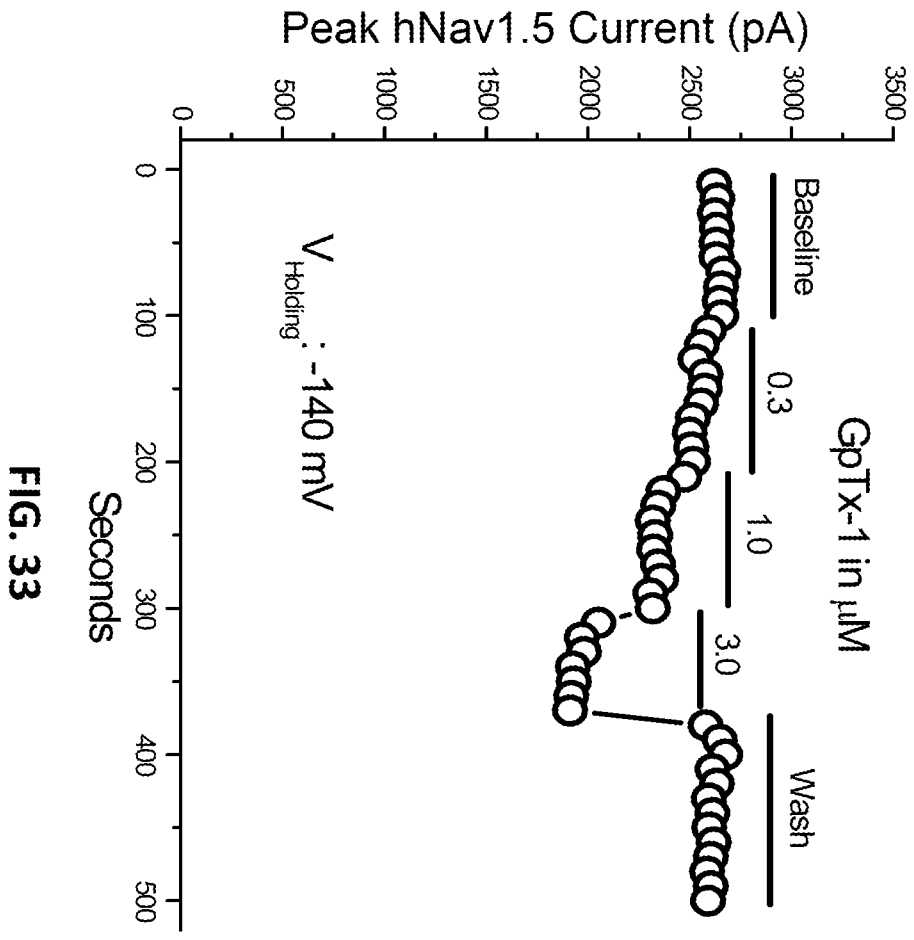

Peak hNav1.5 Current (pA)
0
500
1000
1500
2000
2500
3000
3500
Baseline
0.3
1.0
3.0
Wash
GpTx-1 in μM
V Holding : -140 mV
0
100
200
300
400
500
Seconds

FIG. 33

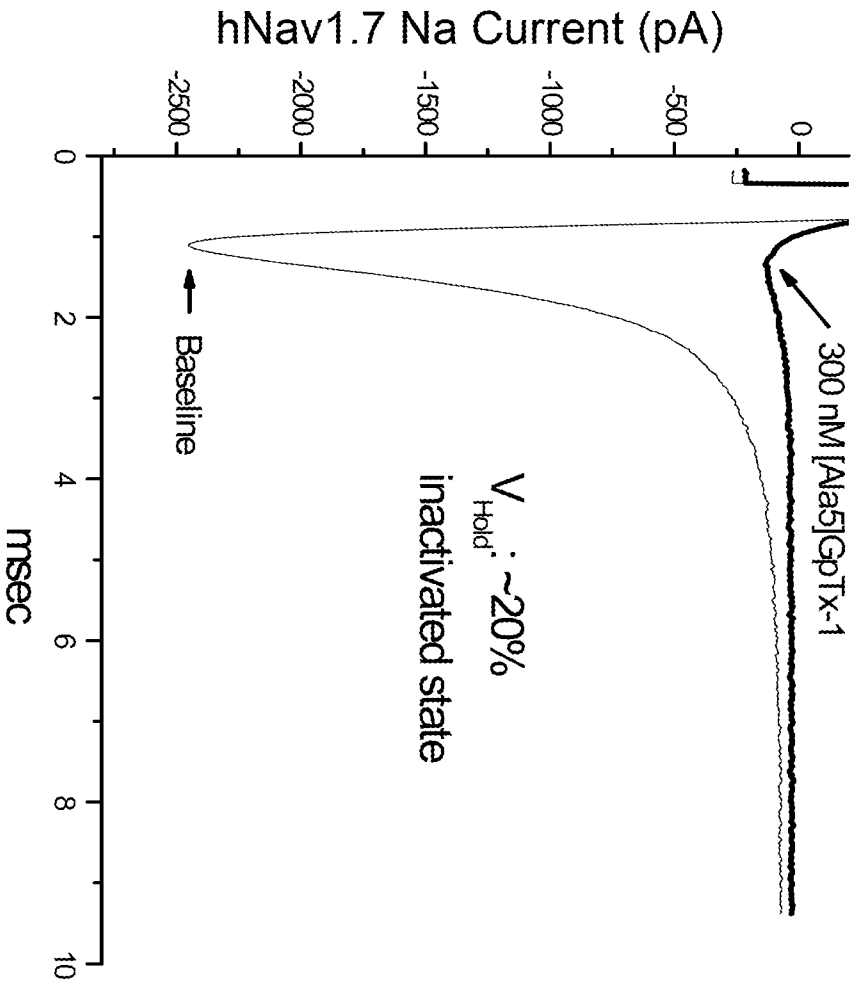

hNav1.7 Na Current (pA)
0
-500
-1000
-1500
-2000
-2500
0
2
4
6
8
10
msec
300 nM [Ala5]GpTx-1
Baseline
V_{Hold}: ~20%
inactivated state

FIG. 34

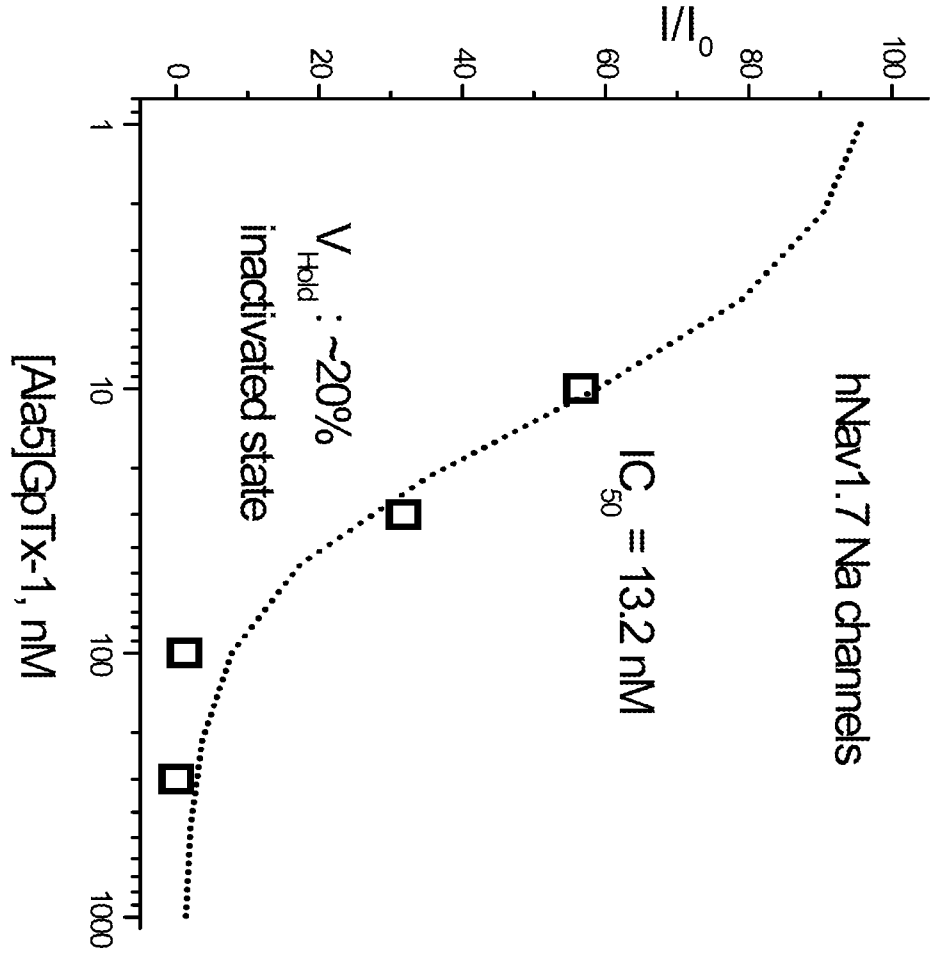

I/I0
100
80
60
40
20
0
1
10
100
1000
[Ala5]GpTx-1, nM
hNav1.7 Na channels
IC50 = 13.2 nM
VHold : ~20%
inactivated state

FIG. 35

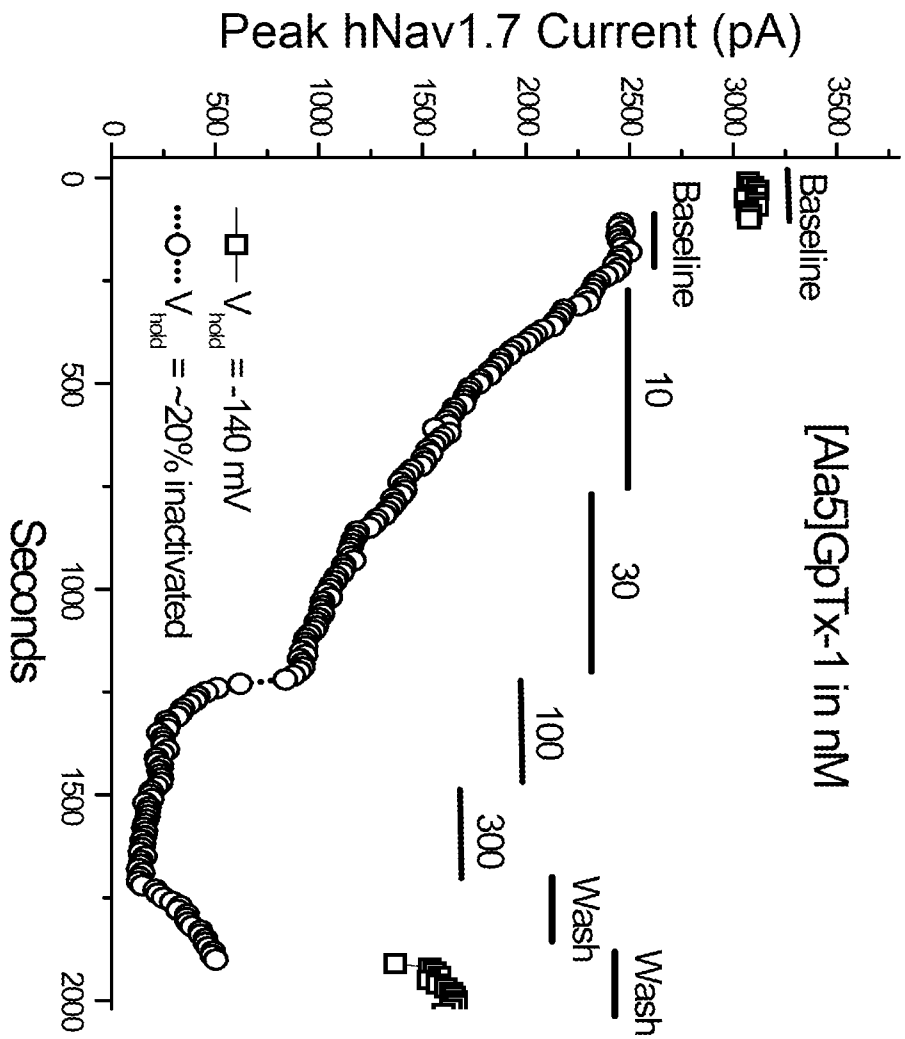

Peak hNav1.7 Current (pA)
0
500
1000
1500
2000
2500
3000
3500
Baseline
Baseline
10
30
100
300
Wash
Wash
[Ala5]GpTx-1 in nM
V hold = -140 mV
V hold = ~20% inactivated
0
500
1000
1500
2000
Seconds

FIG. 36

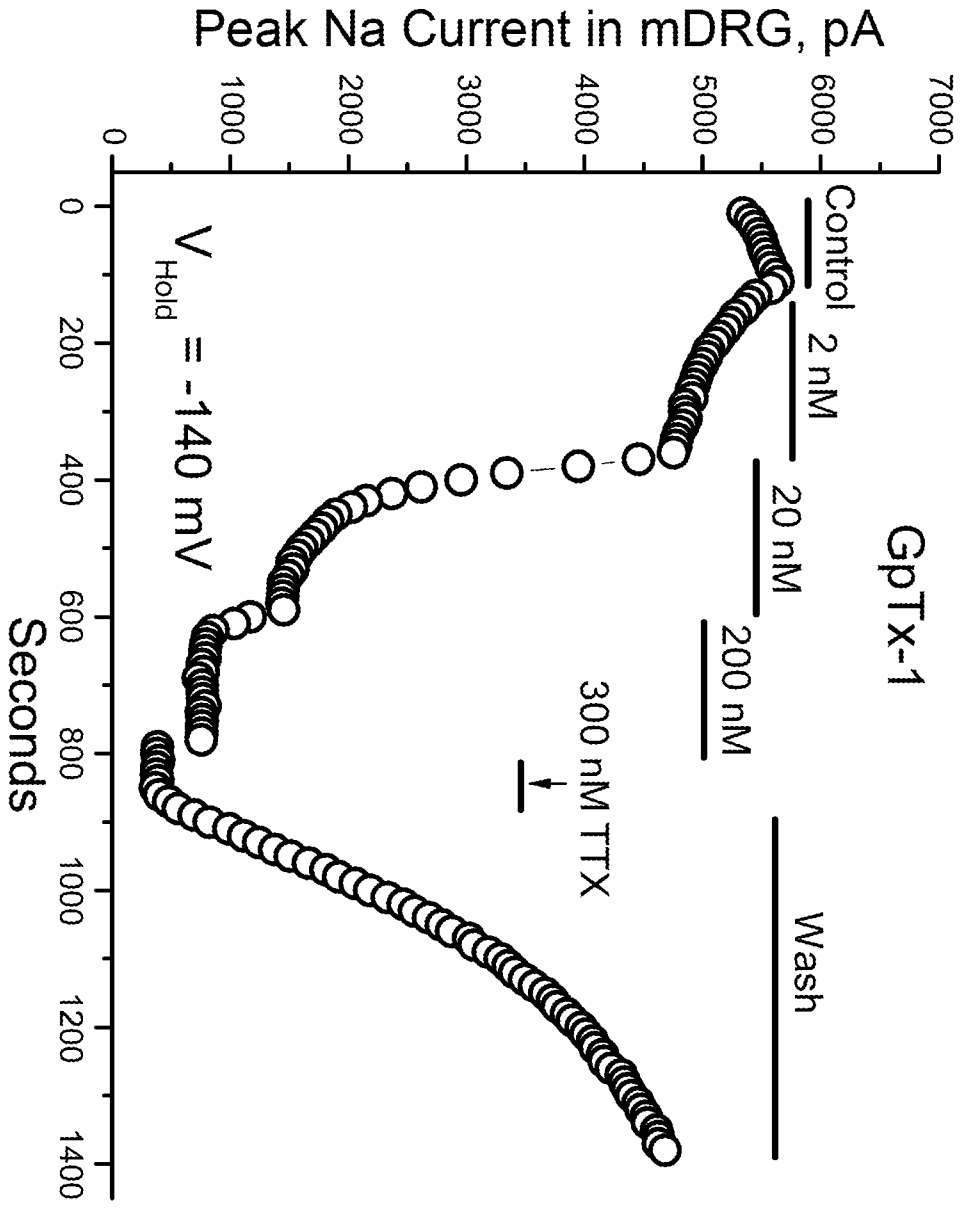

Peak Na Current in mDRG, pA
0
1000
2000
3000
4000
5000
6000
7000
0
200
400
600
800
1000
1200
1400
Seconds
V Hold = -140 mV
Control
2 nM
20 nM
200 nM
300 nM TTX
Wash
GpTx-1

FIG. 37

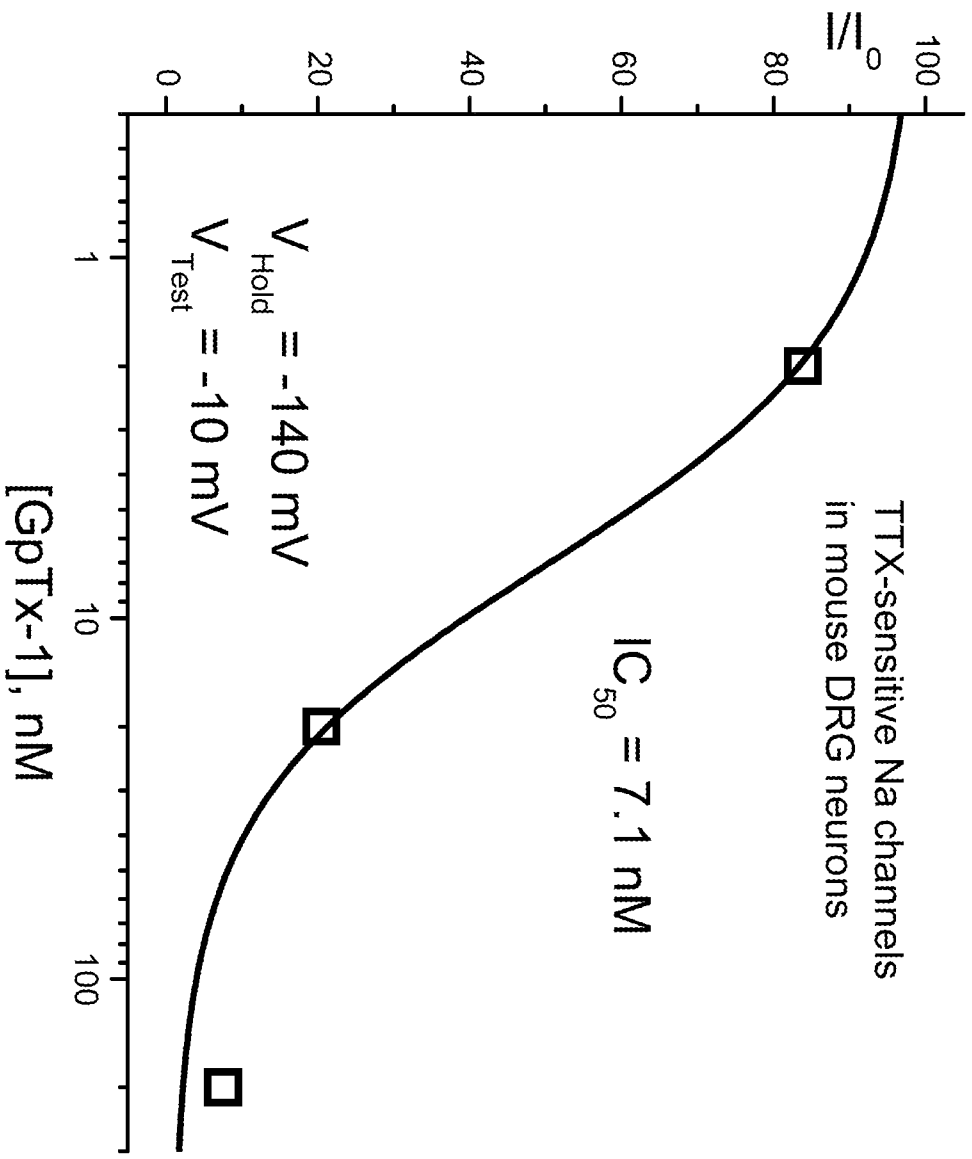

I/I0
100
80
60
40
20
0
1
10
100
[GpTx-1], nM
VHold = -140 mV
VTest = -10 mV
IC50 = 7.1 nM
TTX-sensitive Na channels
in mouse DRG neurons

FIG. 38

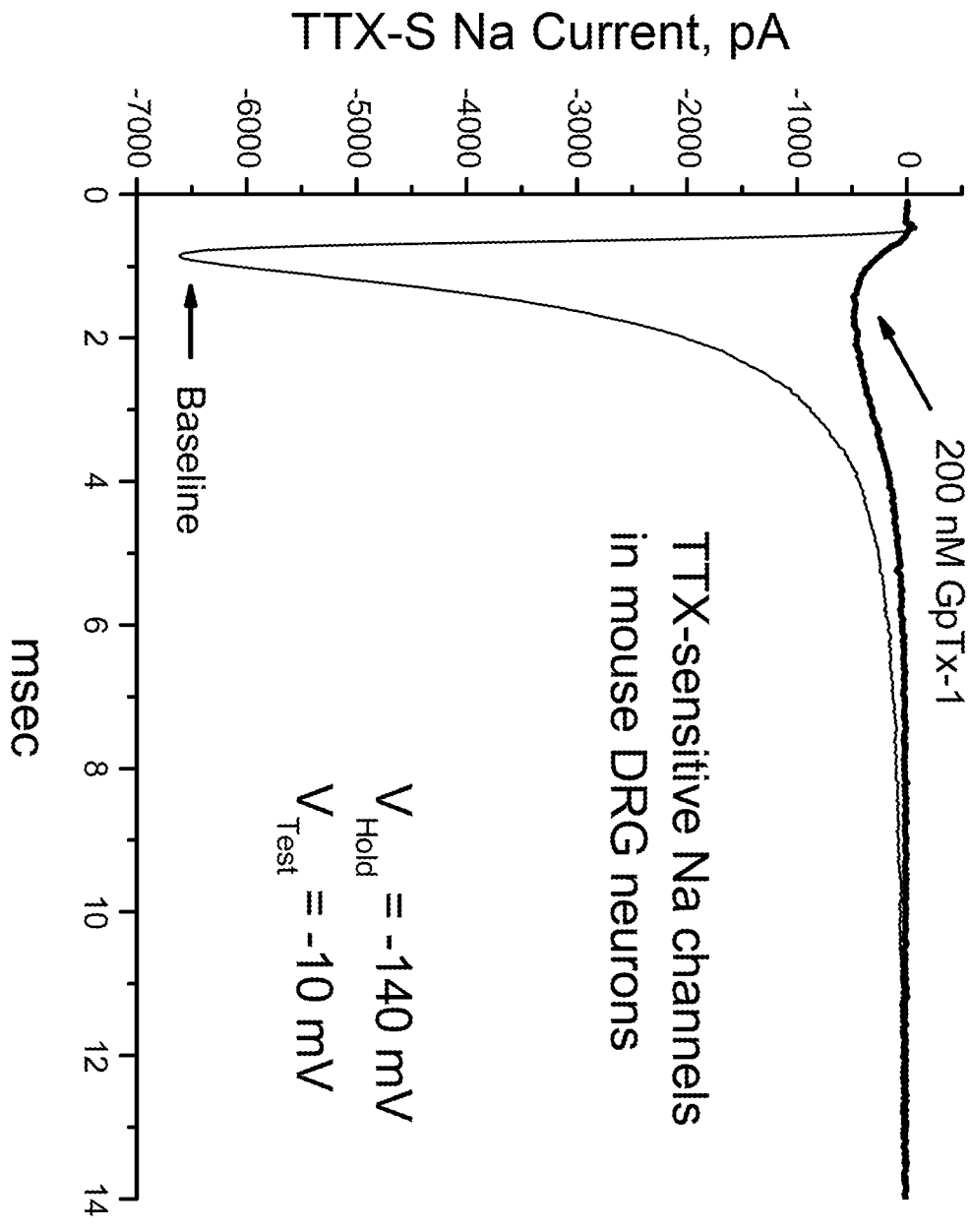

TTX-S Na Current, pA
-7000
-6000
-5000
-4000
-3000
-2000
-1000
0
0
2
4
6
8
10
12
14
msec
Baseline
200 nM GpTx-1
TTX-sensitive Na channels
in mouse DRG neurons
V Hold = -140 mV
V Test = -10 mV

FIG. 39

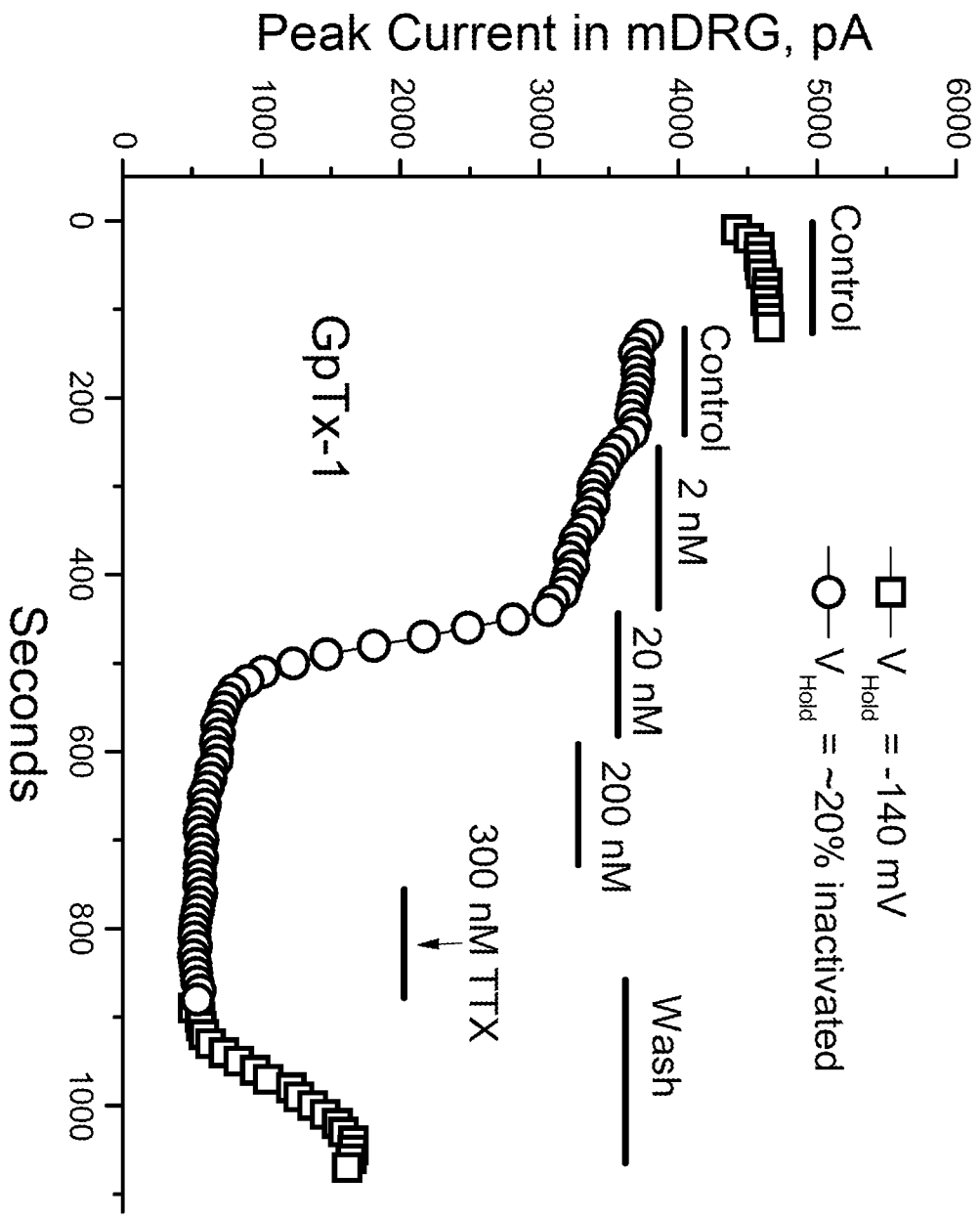

Peak Current in mDRG, pA
0
1000
2000
3000
4000
5000
6000
Seconds
0
200
400
600
800
1000
GpTx-1
Control
Control
2 nM
20 nM
200 nM
300 nM TTX
Wash
V Hold = -140 mV
V Hold = ~20% inactivated

FIG. 40

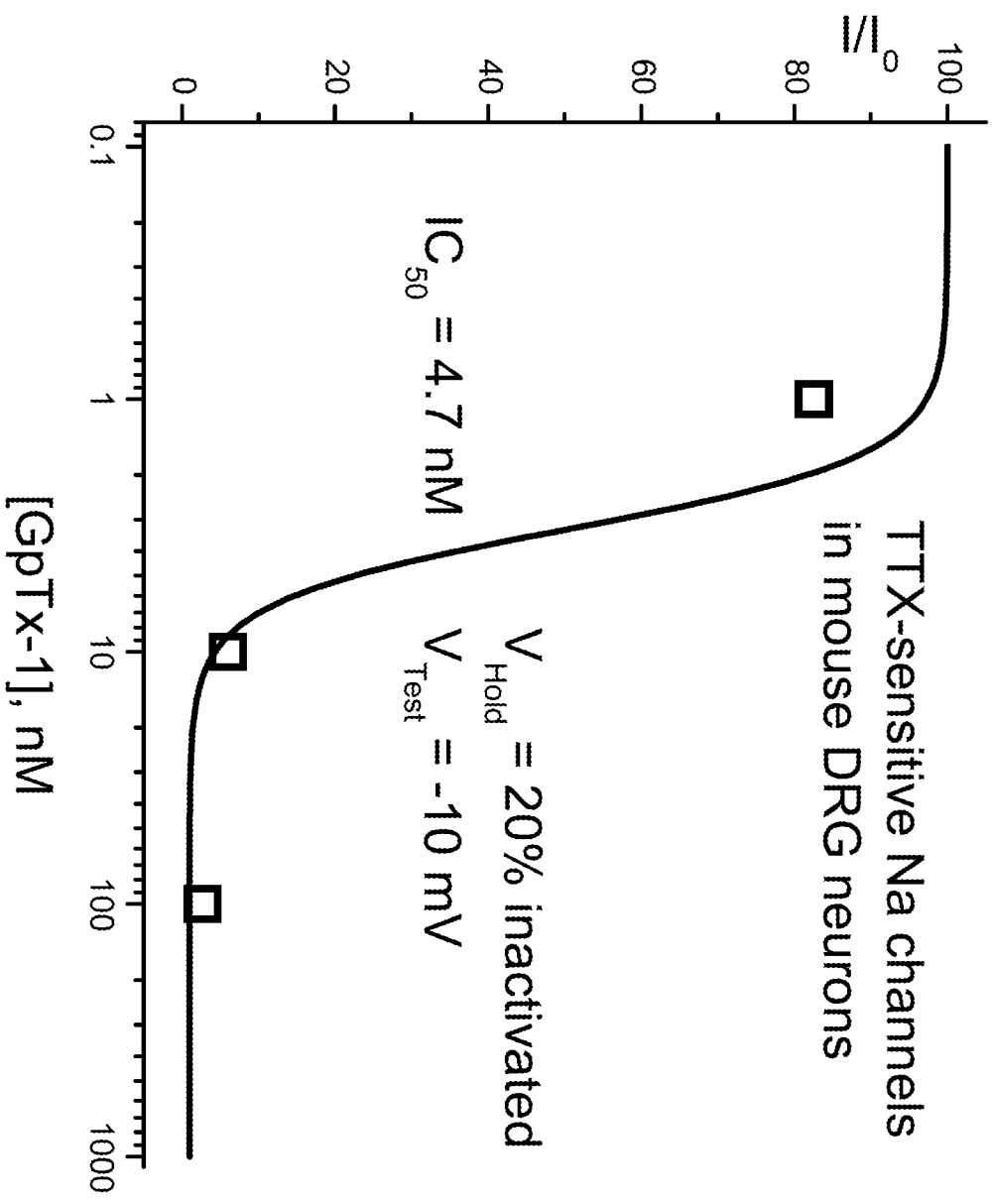

TTX-sensitive Na channels
in mouse DRG neurons
V_{Hold} = 20% inactivated
V_{Test} = -10 mV
IC_{50} = 4.7 nM
I/I$_0$
[GpTx-1], nM
0
20
40
60
80
100
0.1
1
10
100
1000

FIG. 41

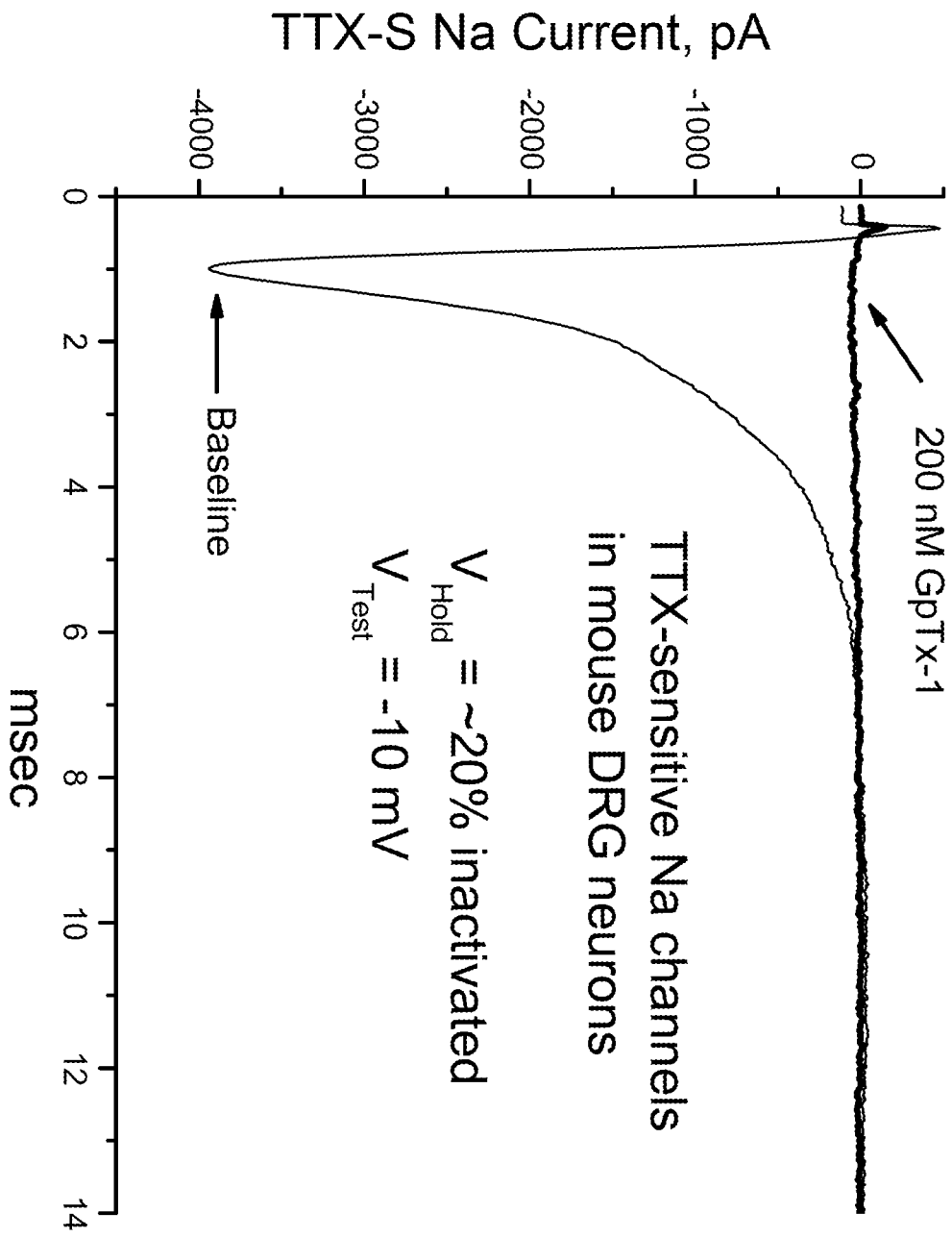
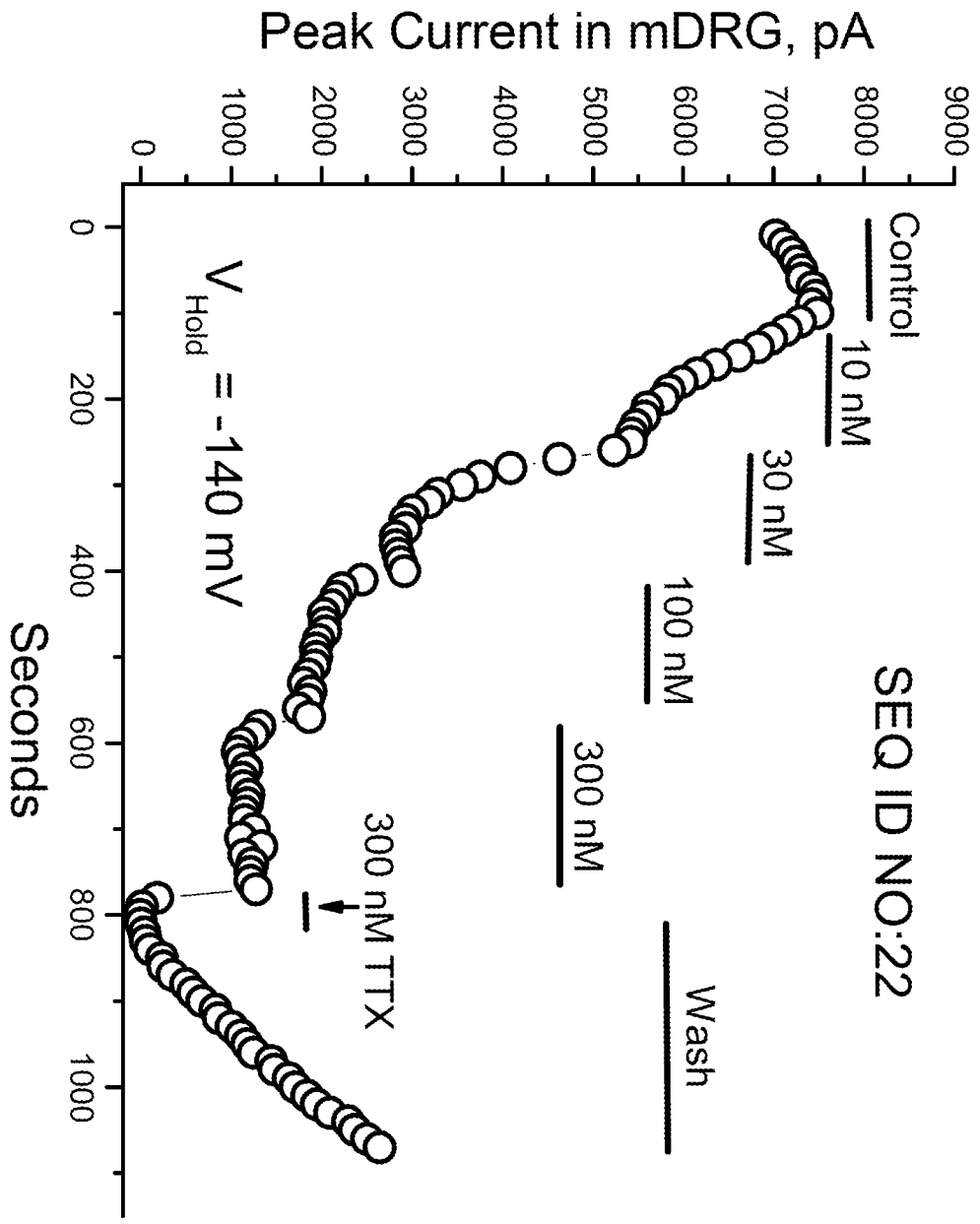

TTX-S Na Current, pA
0
-1000
-2000
-3000
-4000
0
2
4
6
8
10
12
14
msec
200 nM GpTx-1
Baseline
TTX-sensitive Na channels
in mouse DRG neurons
V Hold = ~20% inactivated
V Test = -10 mV

FIG. 42



SEQ ID NO:22

FIG. 43

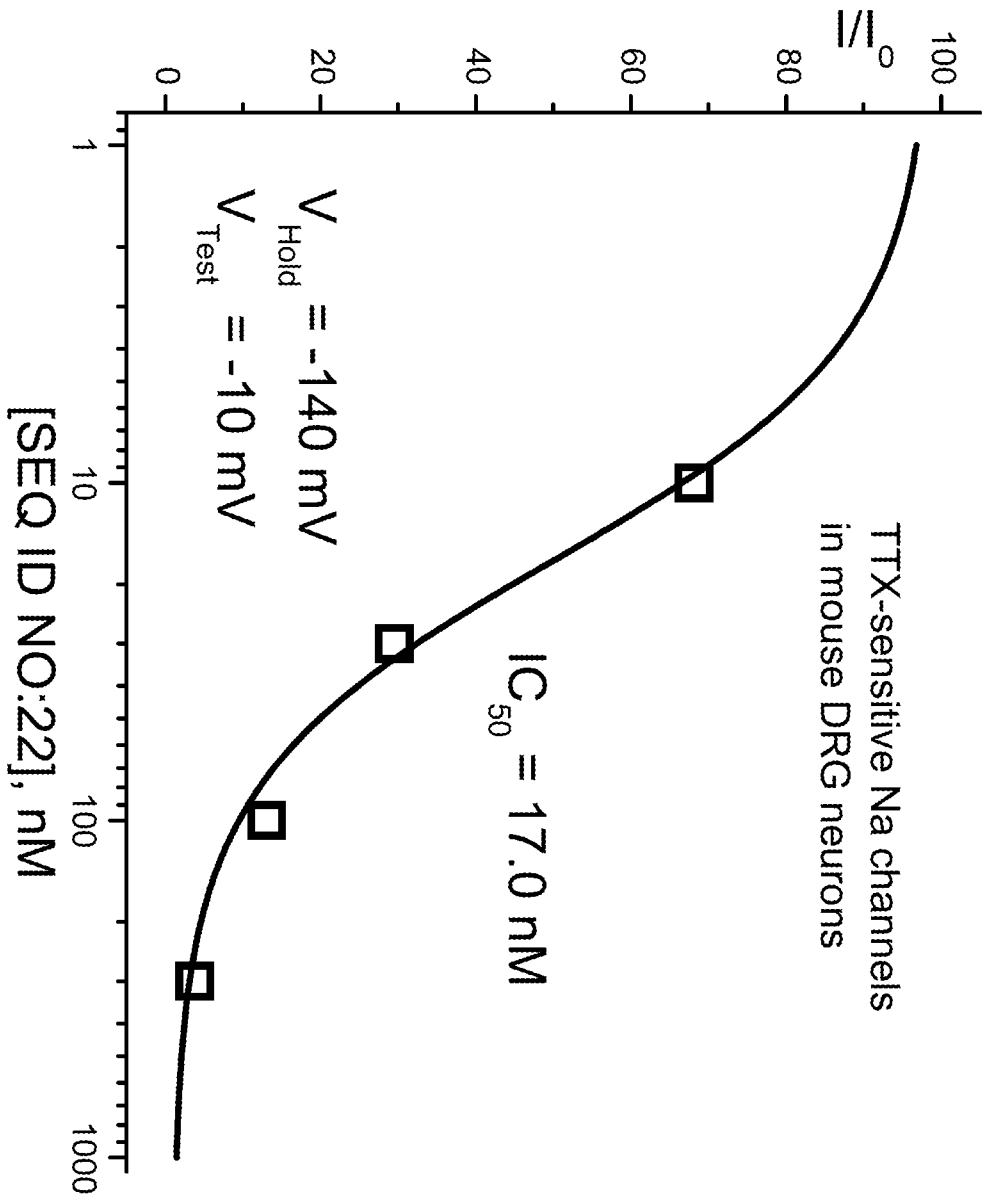

I/I0
100
80
60
40
20
0
1
10
100
1000
[SEQ ID NO:22], nM
VHold = -140 mV
VTest = -10 mV
IC50 = 17.0 nM
TTX-sensitive Na channels
in mouse DRG neurons

FIG. 44

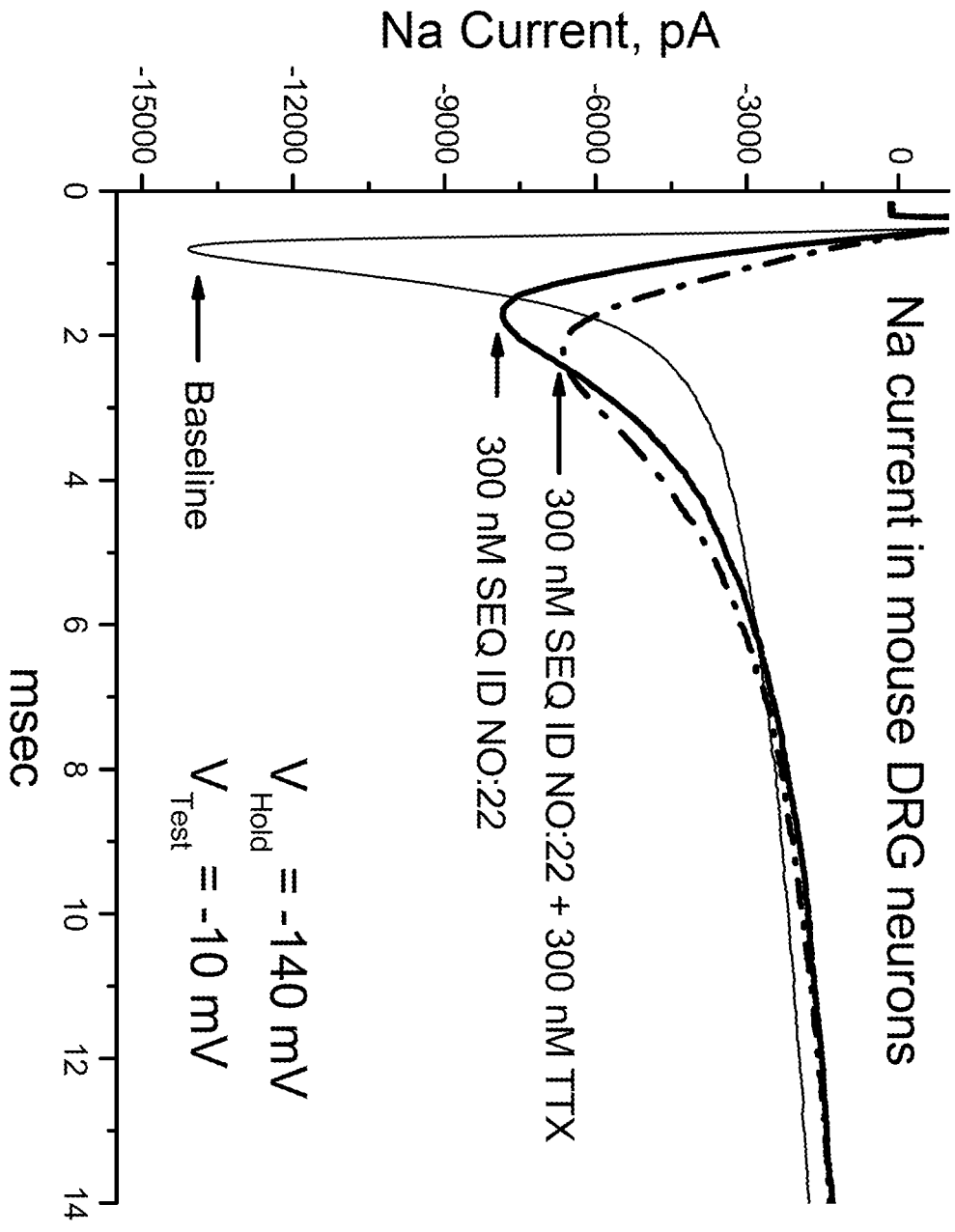

Na Current, pA
0
-3000
-6000
-9000
-12000
-15000
0
2
4
6
8
10
12
14
msec
Na current in mouse DRG neurons
300 nM SEQ ID NO:22 + 300 nM TTX
300 nM SEQ ID NO:22
Baseline
V Hold = -140 mV
V Test = -10 mV

FIG. 45

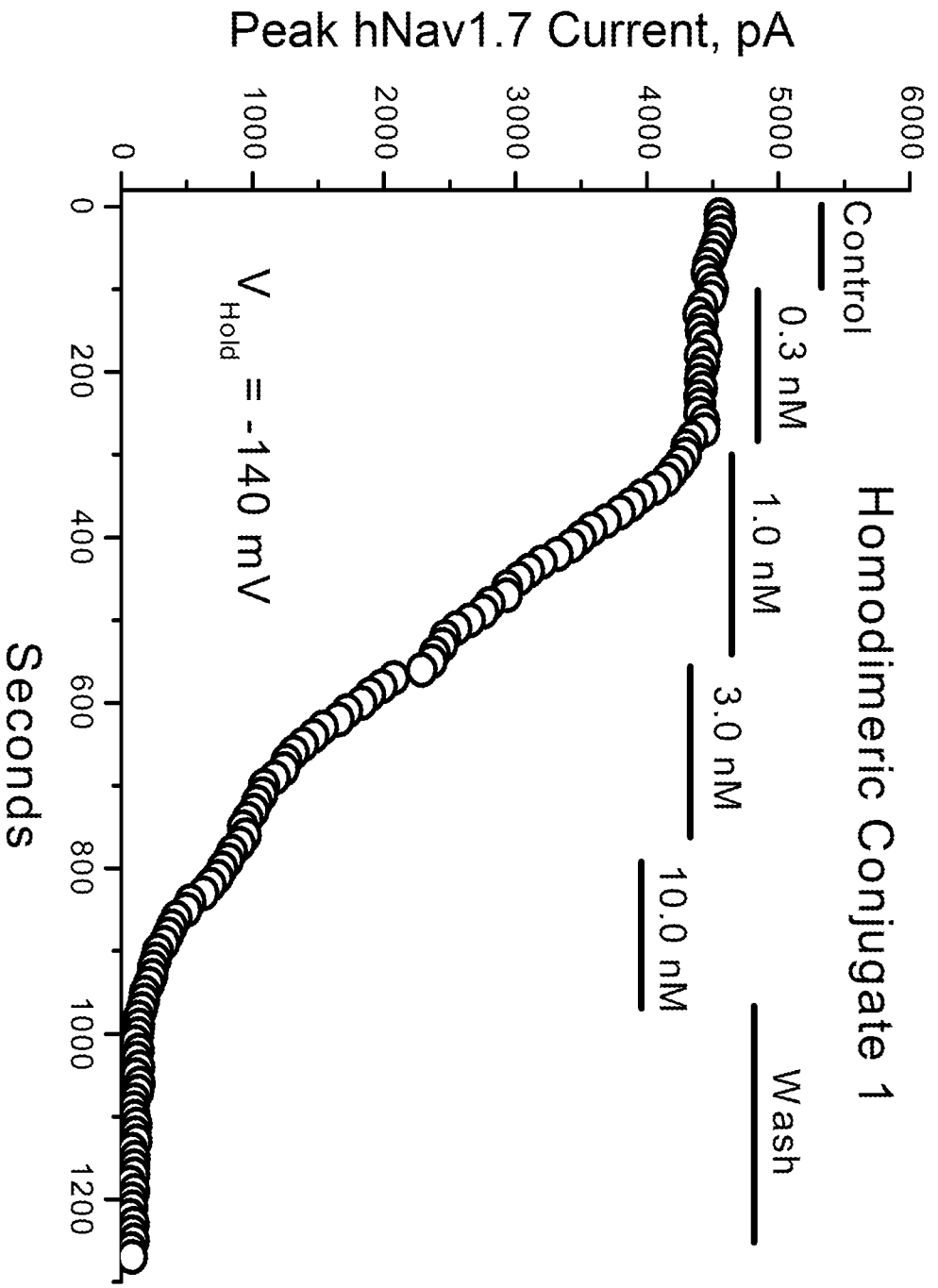

Peak hNav1.7 Current, pA
0
1000
2000
3000
4000
5000
6000
Seconds
0
200
400
600
800
1000
1200
V_{Hold} = -140 mV
Control
0.3 nM
1.0 nM
3.0 nM
10.0 nM
Wash
Homodimeric Conjugate 1

FIG. 46

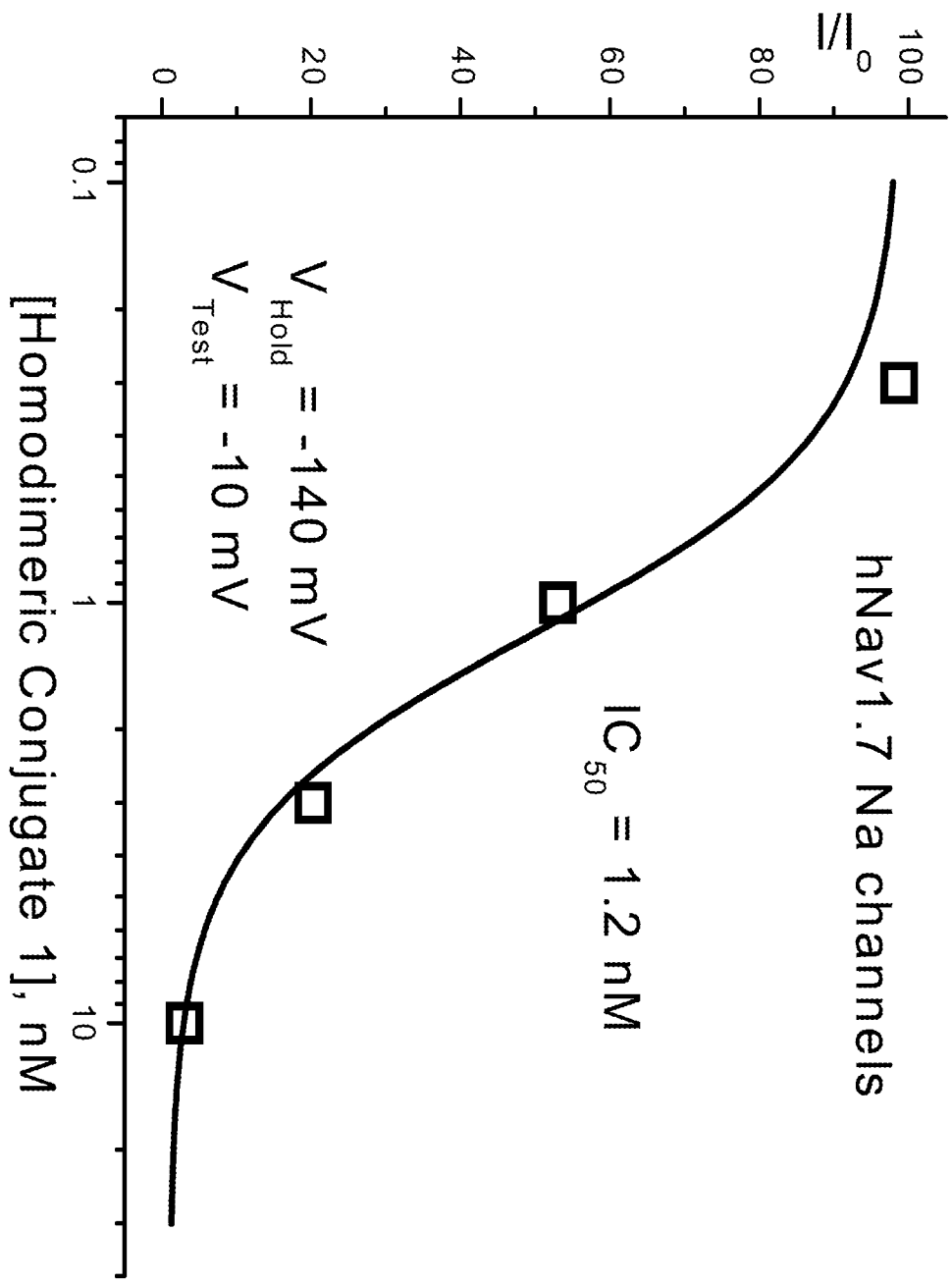

I/I0
100
80
60
40
20
0
0.1
1
10
[Homodimeric Conjugate 1], nM
hNav1.7 Na channels
IC50 = 1.2 nM
VHold = -140 mV
VTest = -10 mV

FIG. 47

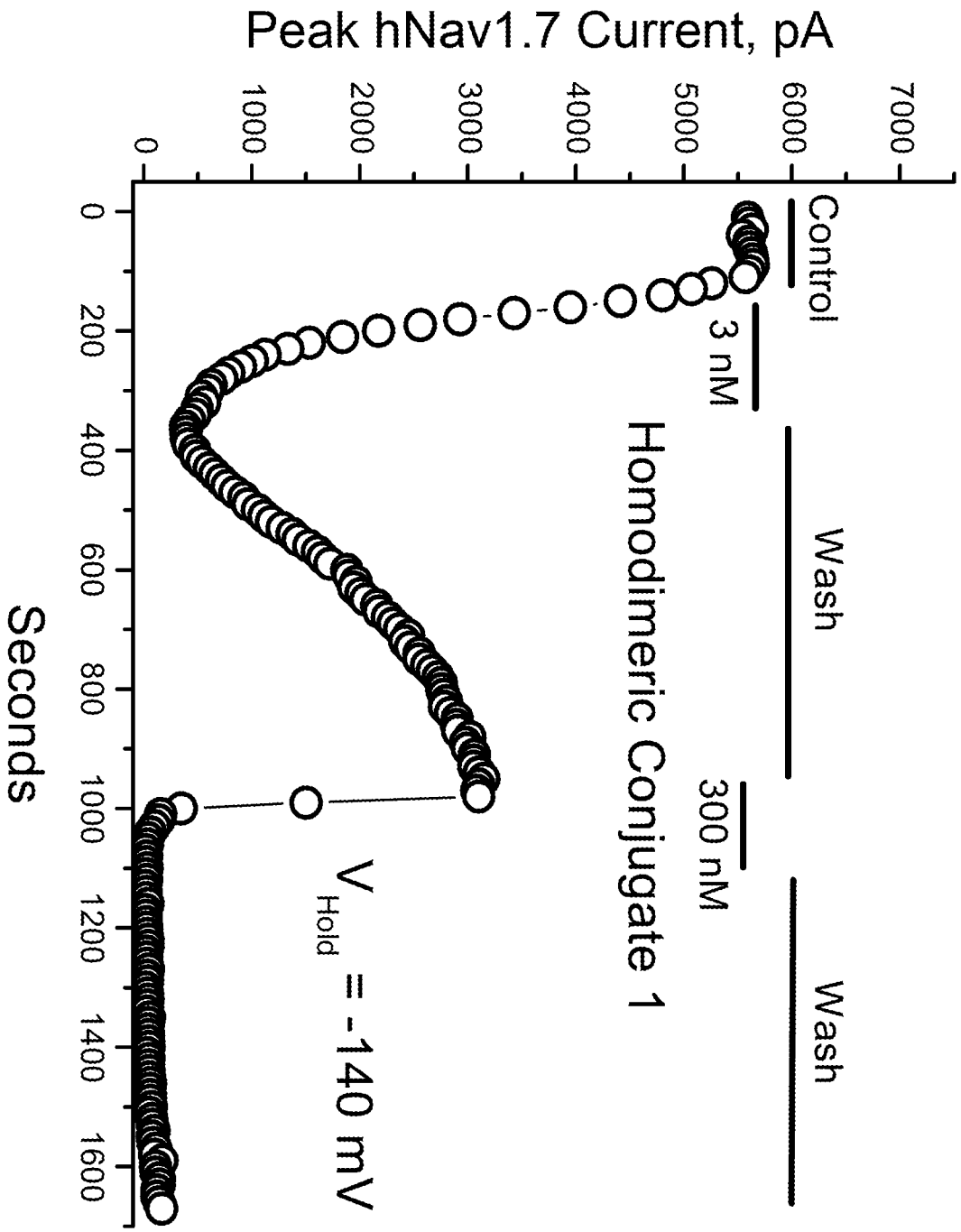

Peak hNav1.7 Current, pA
0
1000
2000
3000
4000
5000
6000
7000
Seconds
0
200
400
600
800
1000
1200
1400
1600
Control
3 nM
Wash
300 nM
Wash
Homodimeric Conjugate 1
V Hold = -140 mV

FIG. 48

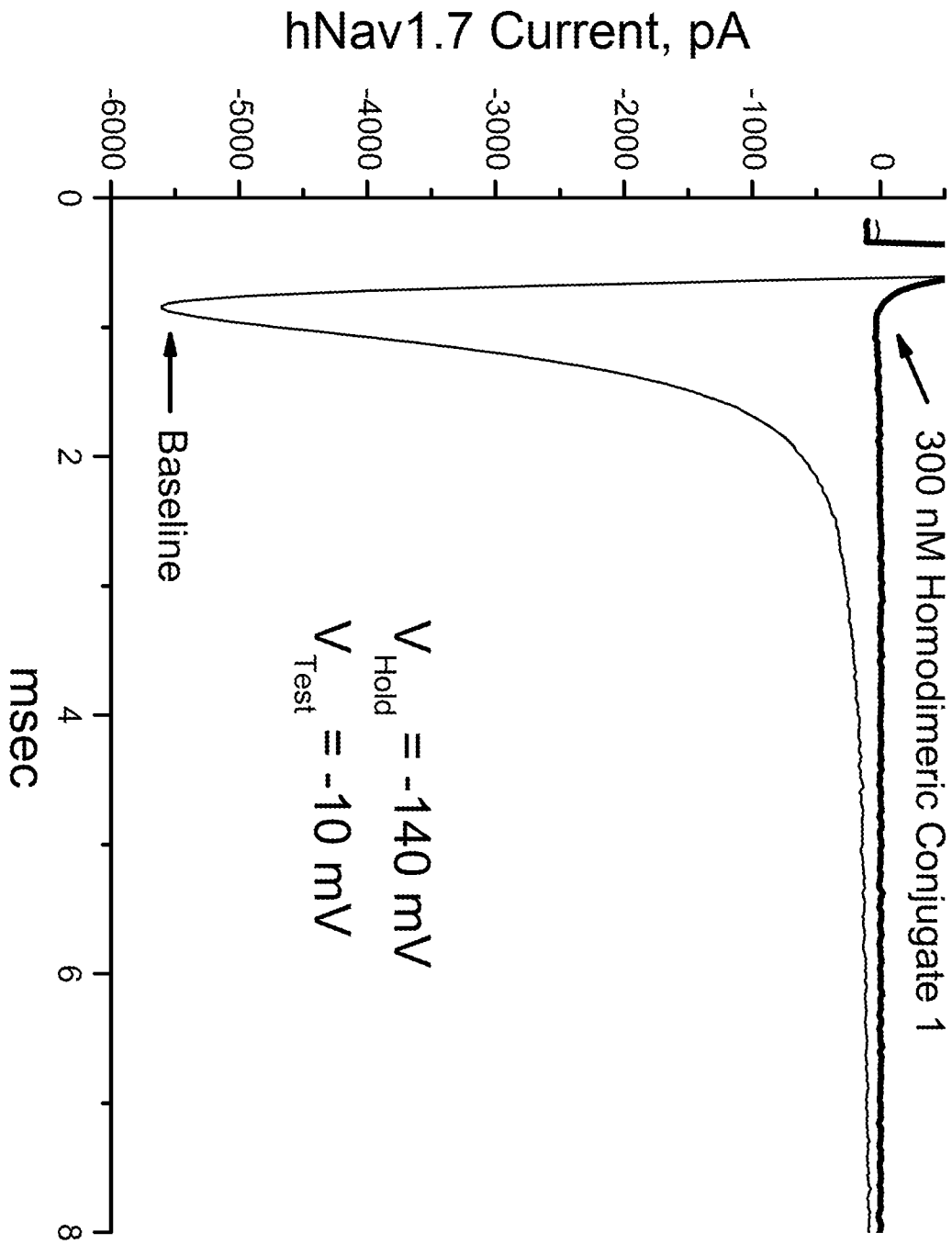

hNav1.7 Current, pA
-6000
-5000
-4000
-3000
-2000
-1000
0
0
2
4
6
8
msec
Baseline
300 nM Homodimeric Conjugate 1
V_{Hold} = -140 mV
V_{Test} = -10 mV

FIG. 49

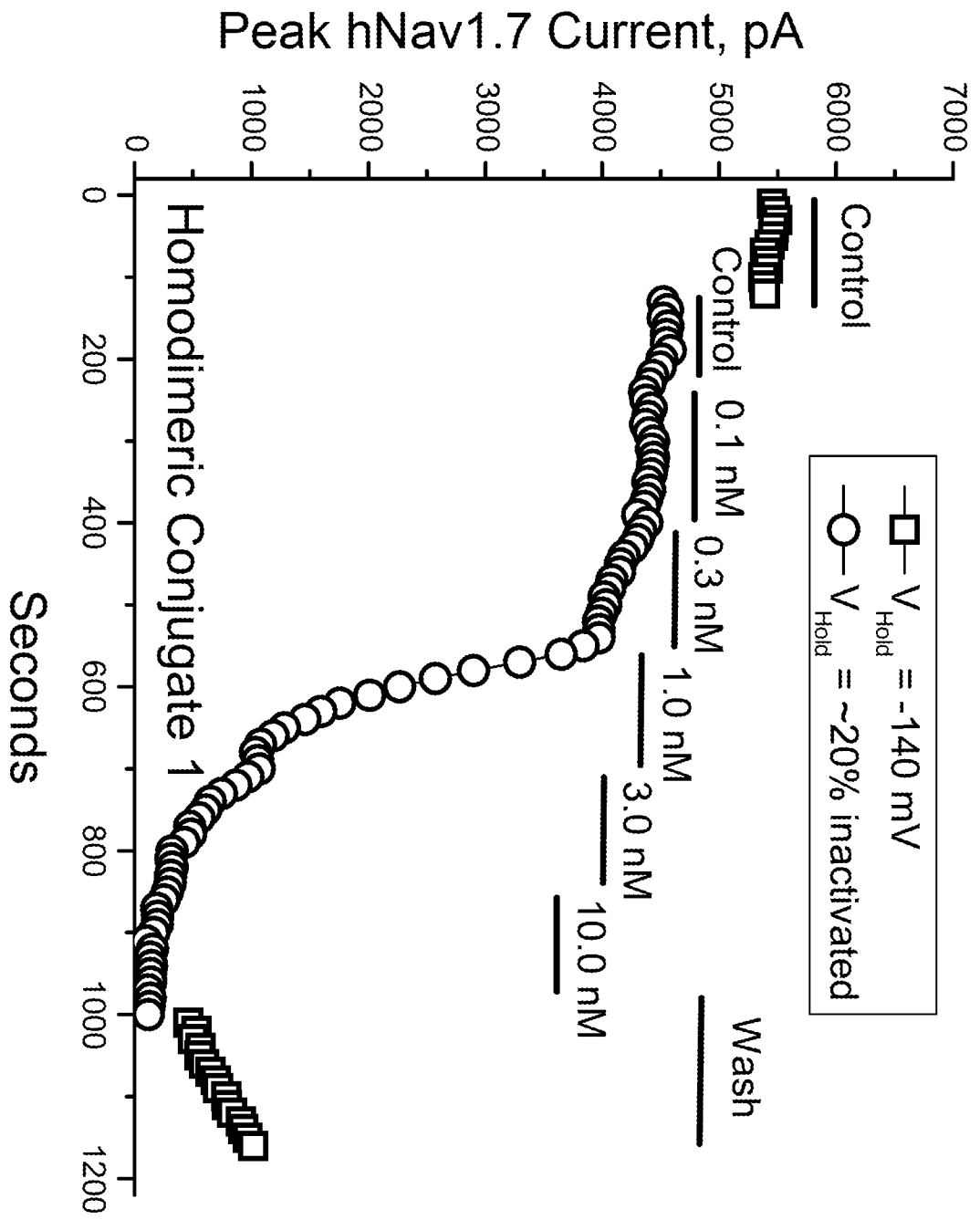

Peak hNav1.7 Current, pA
0
1000
2000
3000
4000
5000
6000
7000
Seconds
0
200
400
600
800
1000
1200
Homodimeric Conjugate 1
Control
Control
0.1 nM
0.3 nM
1.0 nM
3.0 nM
10.0 nM
Wash
V Hold = -140 mV
V Hold = ~20% inactivated

FIG. 50

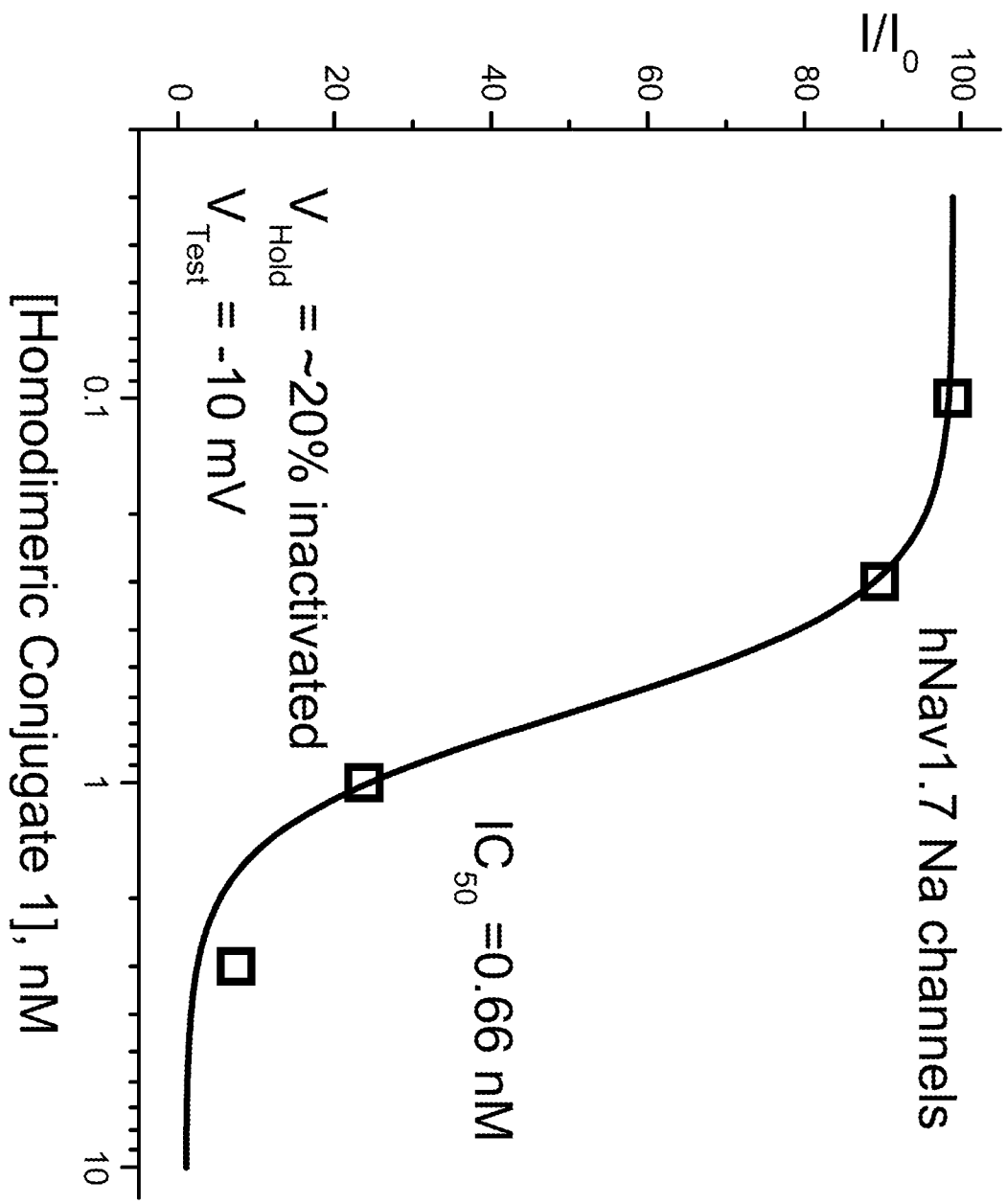

I/I0
0
20
40
60
80
100
0.1
1
10
[Homodimeric Conjugate 1], nM
VHold = ~20% inactivated
VTest = -10 mV
IC50 =0.66 nM
hNav1.7 Na channels

FIG. 51

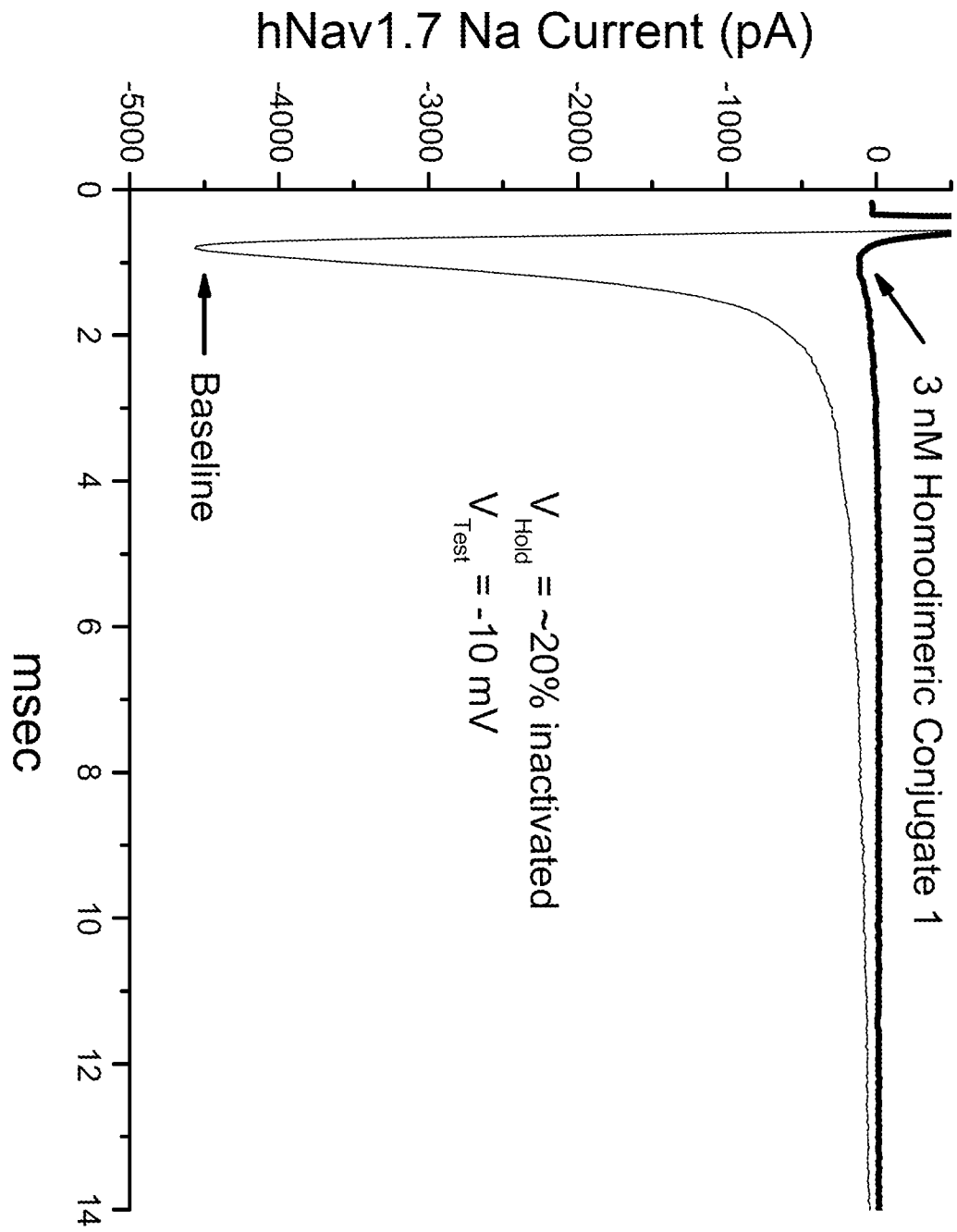

hNav1.7 Na Current (pA)
0
-1000
-2000
-3000
-4000
-5000
0
2
4
6
8
10
12
14
msec
3 nM Homodimeric Conjugate 1
Baseline
V Hold = ~20% inactivated
V Test = -10 mV

FIG. 52

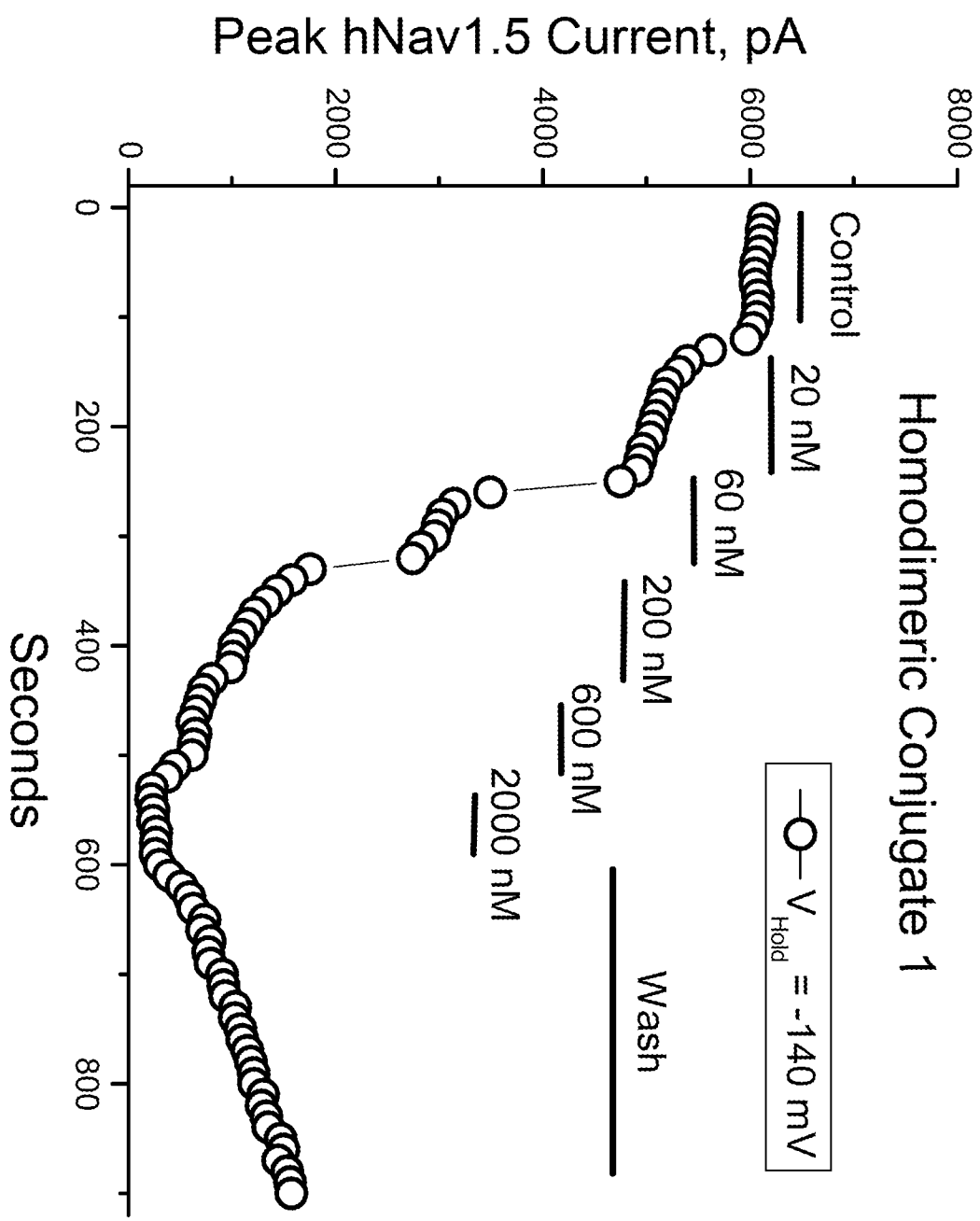

Peak hNav1.5 Current, pA
0
2000
4000
6000
8000
Seconds
0
200
400
600
800
Control
20 nM
60 nM
200 nM
600 nM
2000 nM
Wash
Homodimeric Conjugate 1
V Hold = -140 mV

FIG. 53

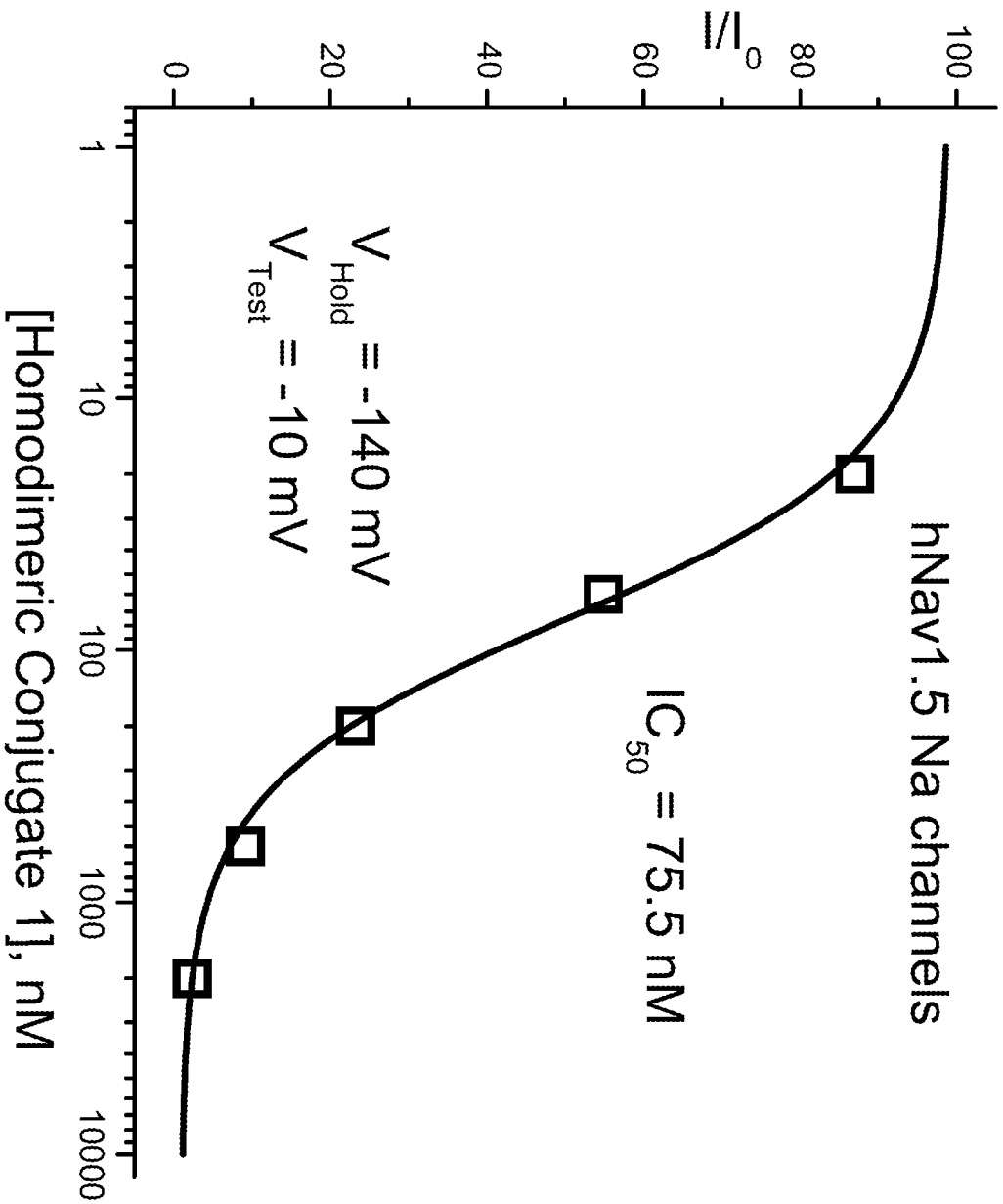

I/I0
100
80
60
40
20
0
1
10
100
1000
10000
[Homodimeric Conjugate 1], nM
hNav1.5 Na channels
IC50 = 75.5 nM
VHold = -140 mV
VTest = -10 mV

FIG. 54

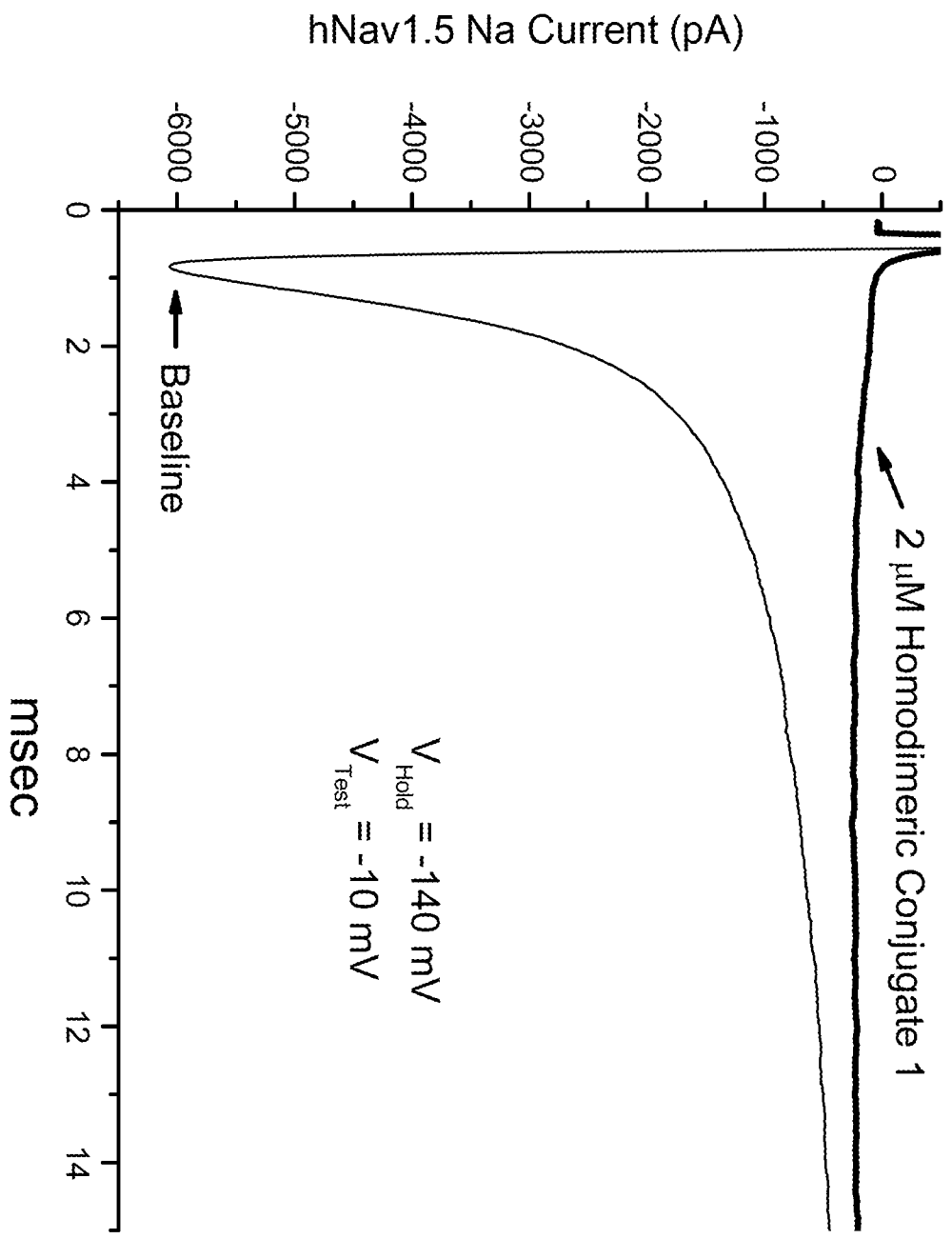

hNav1.5 Na Current (pA)
0
-1000
-2000
-3000
-4000
-5000
-6000
0
2
4
6
8
10
12
14
msec
Baseline
2 μM Homodimeric Conjugate 1
V Hold = -140 mV
V Test = -10 mV

FIG. 55

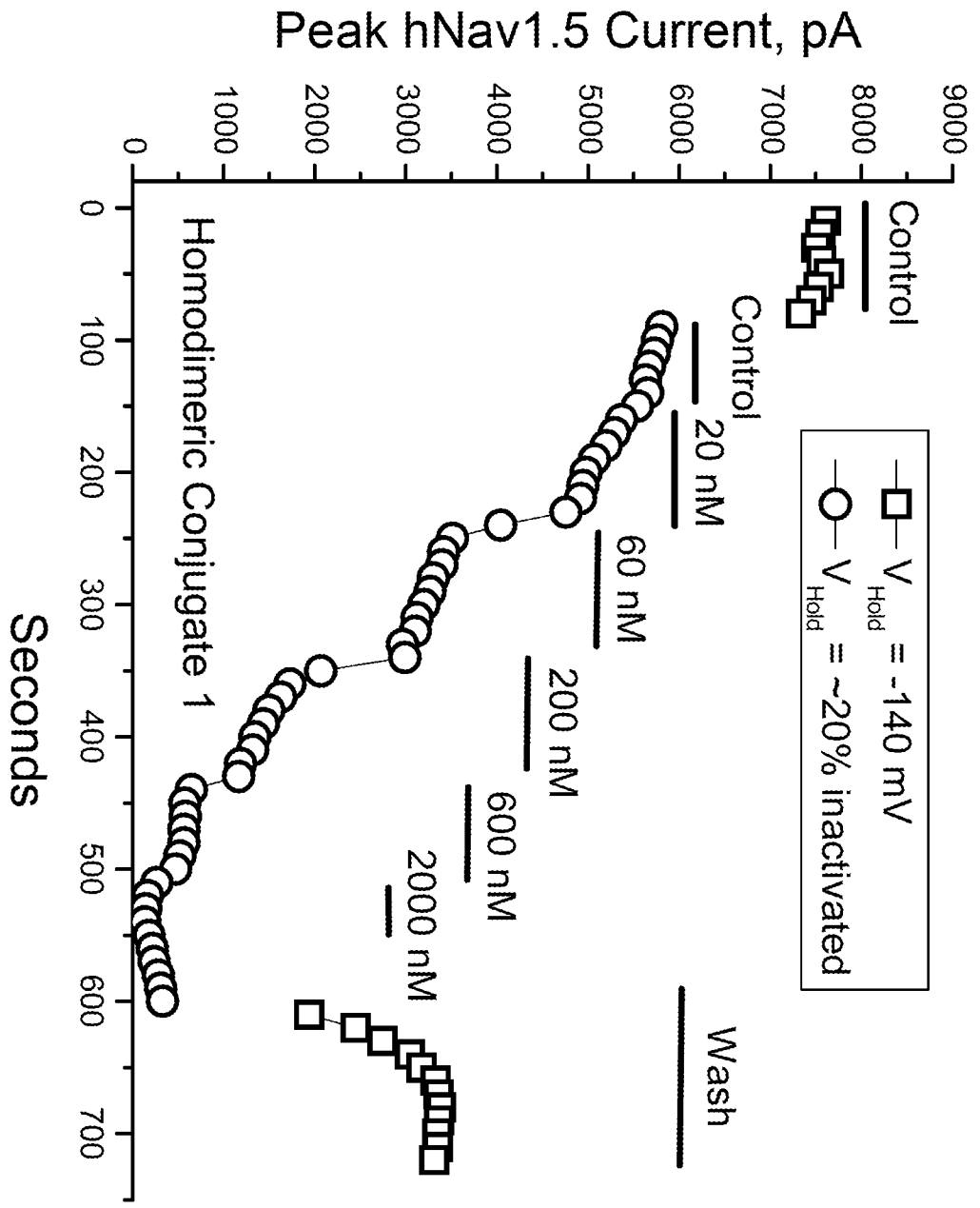

Peak hNav1.5 Current, pA
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
Seconds
0
100
200
300
400
500
600
700
Homodimeric Conjugate 1
Control
20 nM
60 nM
200 nM
600 nM
2000 nM
Wash
Control
V Hold = -140 mV
V Hold = ~20% inactivated

FIG. 56

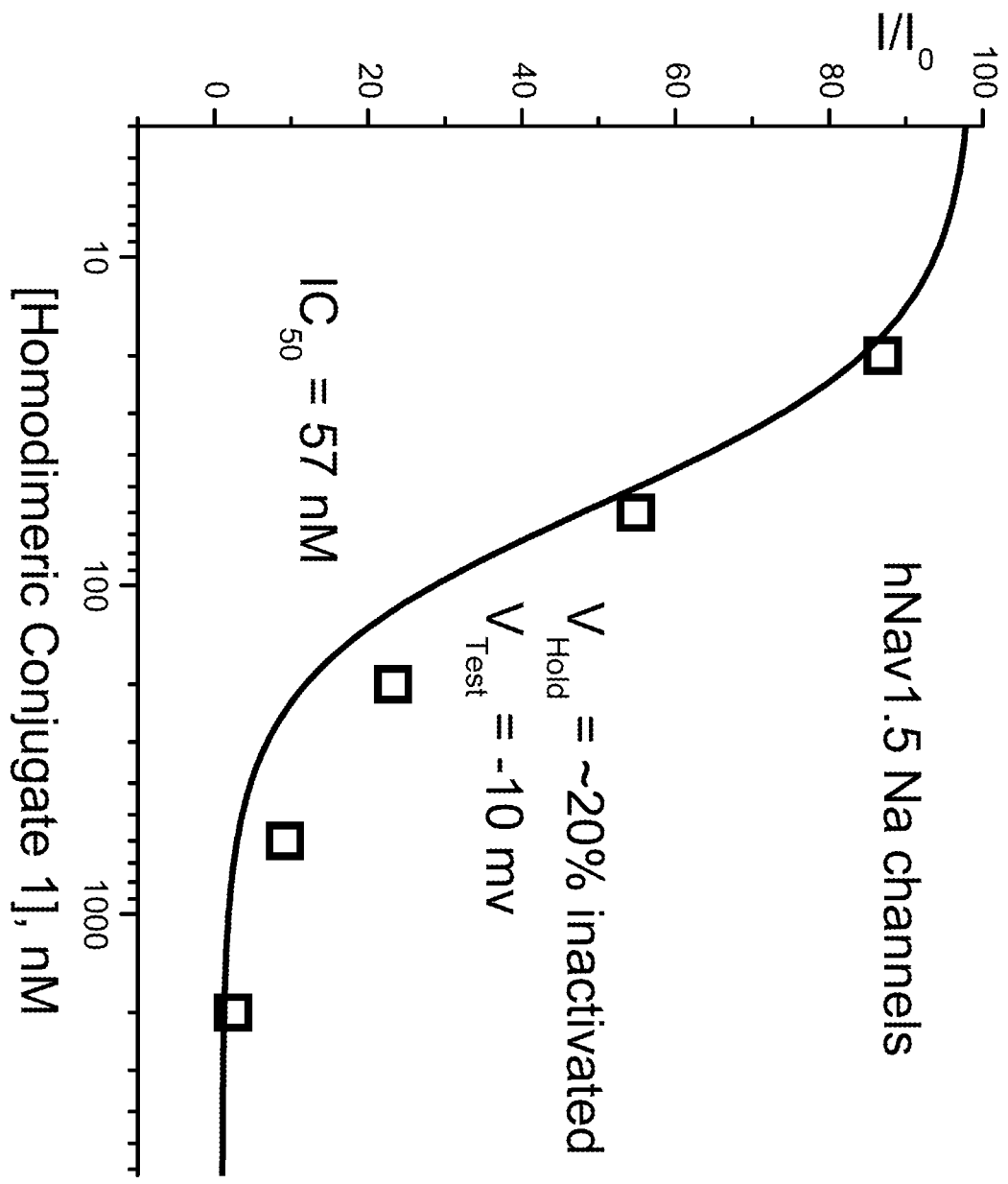

I/I0
100
80
60
40
20
0
10
100
1000
[Homodimeric Conjugate 1], nM
IC50 = 57 nM
VHold = ~20% inactivated
VTest = -10 mv
hNav1.5 Na channels

FIG. 57

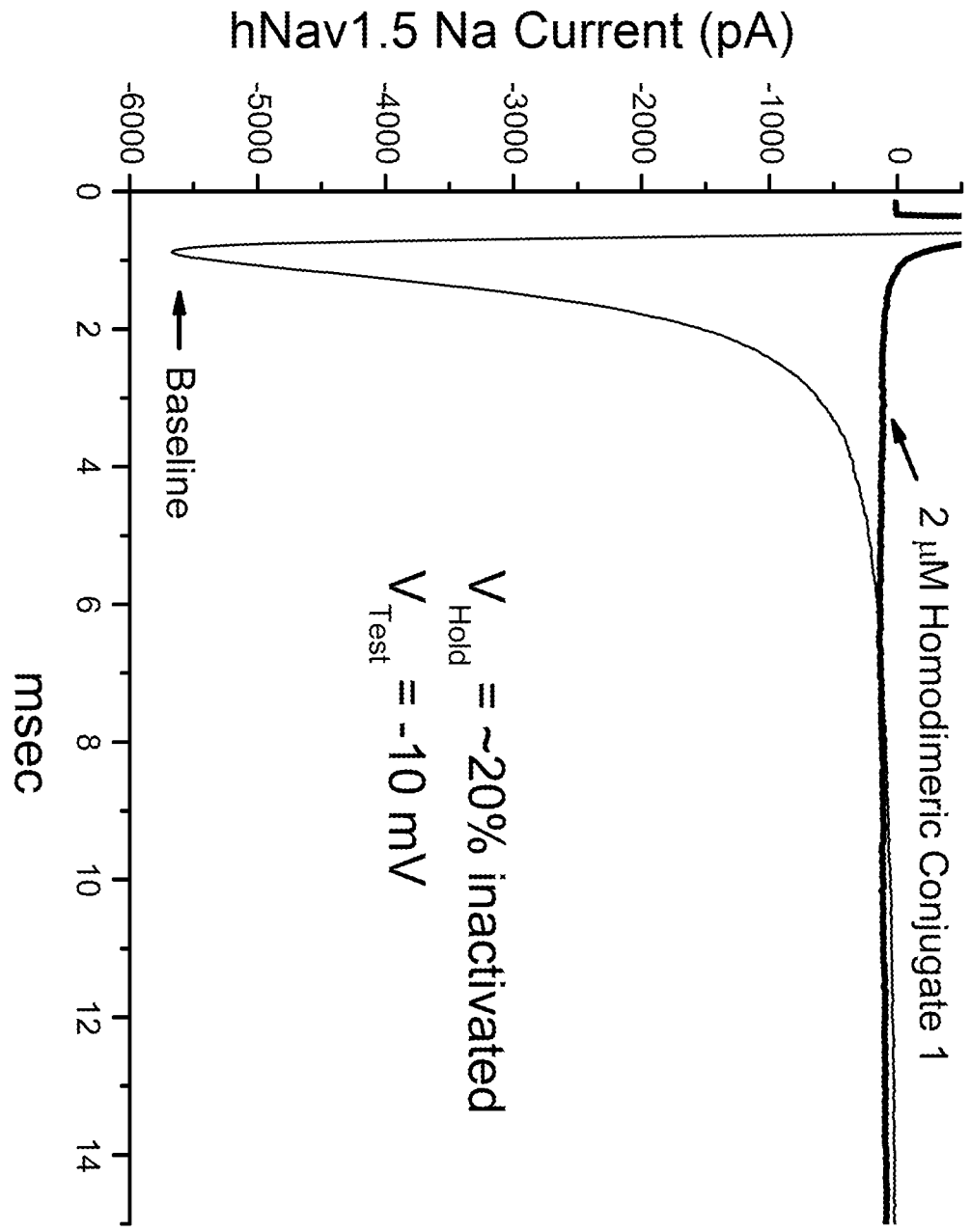

hNav1.5 Na Current (pA)
-6000
-5000
-4000
-3000
-2000
-1000
0
0
2
4
6
8
10
12
14
msec
Baseline
2 μM Homodimeric Conjugate 1
V Hold = ~20% inactivated
V Test = -10 mV

FIG. 58

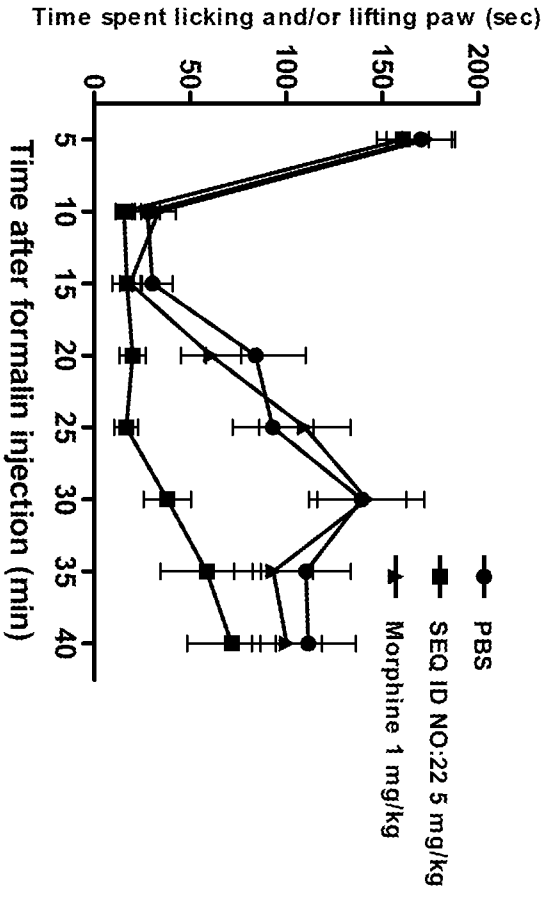

Time spent licking and/or lifting paw (sec)
0
50
100
150
200
Time after formalin injection (min)
5
10
15
20
25
30
35
40
PBS
SEQ ID NO:22 5 mg/kg
Morphine 1 mg/kg

FIG. 59

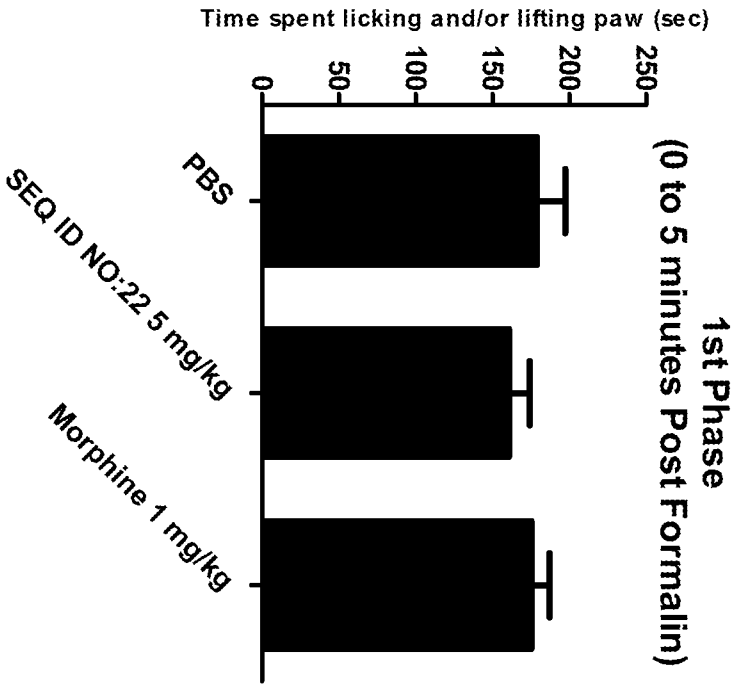

Time spent licking and/or lifting paw (sec)
0
50
100
150
200
250
PBS
SEQ ID NO:22 5 mg/kg
Morphine 1 mg/kg
1st Phase
(0 to 5 minutes Post Formalin)

FIG. 60

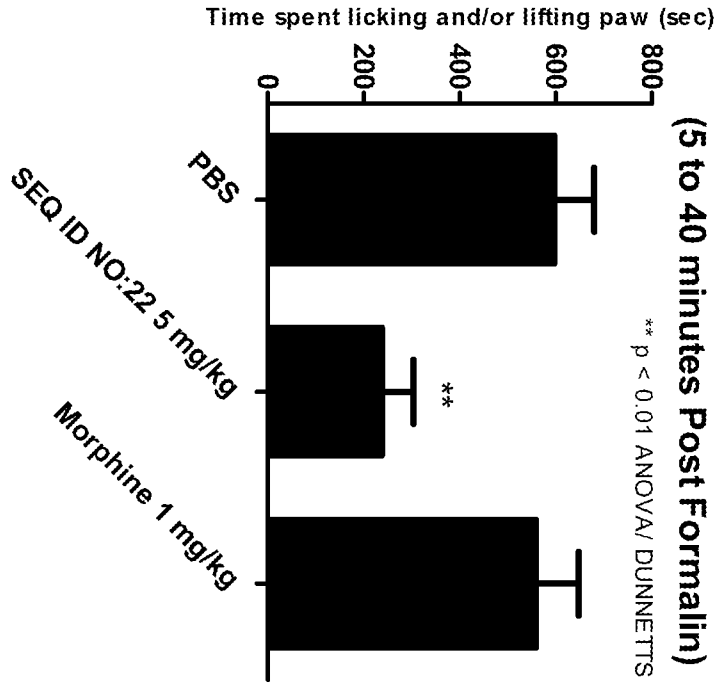

Time spent licking and/or lifting paw (sec)
0
200
400
600
800
PBS
SEQ ID NO:22 5 mg/kg
Morphine 1 mg/kg
**
2nd Phase
(5 to 40 minutes Post Formalin)
** p < 0.01 ANOVA/ DUNNETTS

FIG. 61

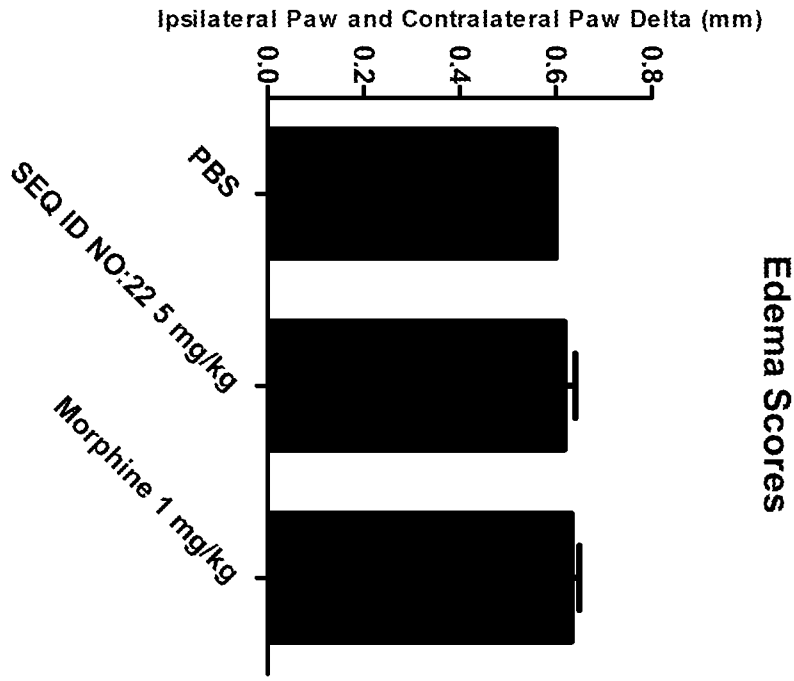

Ipsilateral Paw and Contralateral Paw Delta (mm)
0.0
0.2
0.4
0.6
0.8
PBS
SEQ ID NO:22 5 mg/kg
Morphine 1 mg/kg
Edema Scores

FIG. 62

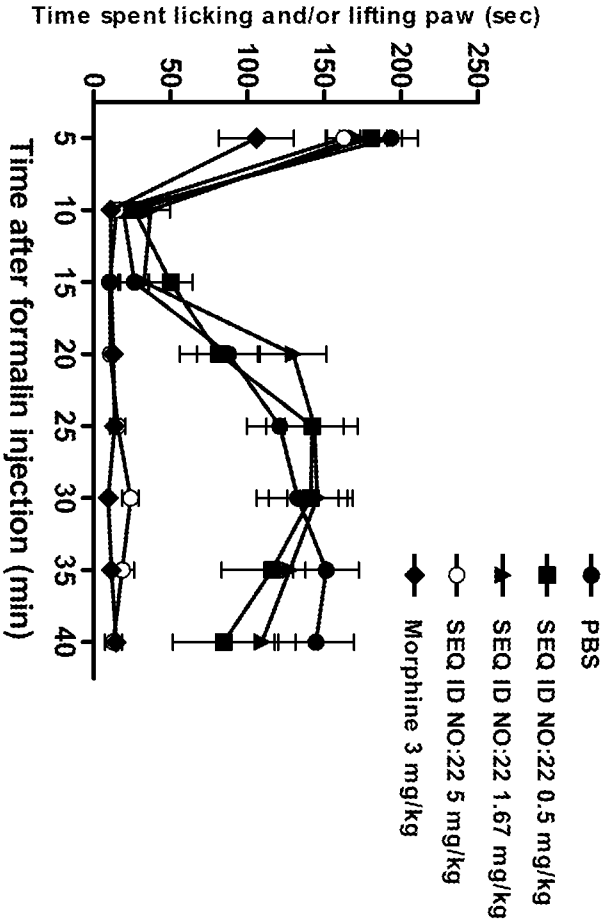

Time spent licking and/or lifting paw (sec)
0
50
100
150
200
250
Time after formalin injection (min)
5
10
15
20
25
30
35
40
PBS
SEQ ID NO:22 0.5 mg/kg
SEQ ID NO:22 1.67 mg/kg
SEQ ID NO:22 5 mg/kg
Morphine 3 mg/kg

FIG. 63

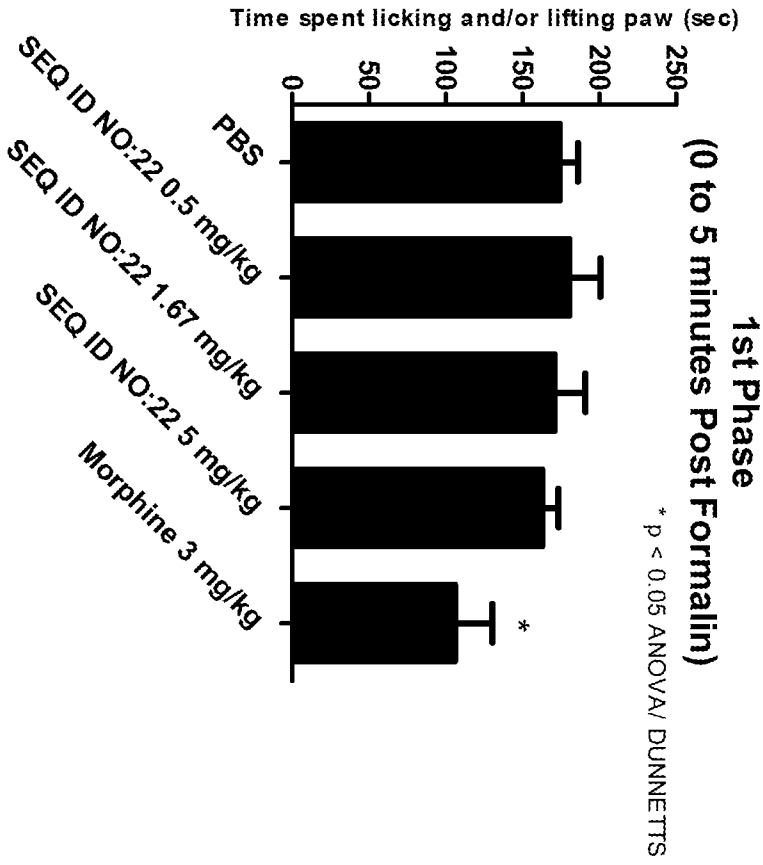

Time spent licking and/or lifting paw (sec)
0
50
100
150
200
250
PBS
SEQ ID NO:22 0.5 mg/kg
SEQ ID NO:22 1.67 mg/kg
SEQ ID NO:22 5 mg/kg
Morphine 3 mg/kg
*
1st Phase
(0 to 5 minutes Post Formalin)
* p < 0.05 ANOVA/ DUNNETTS

FIG. 64

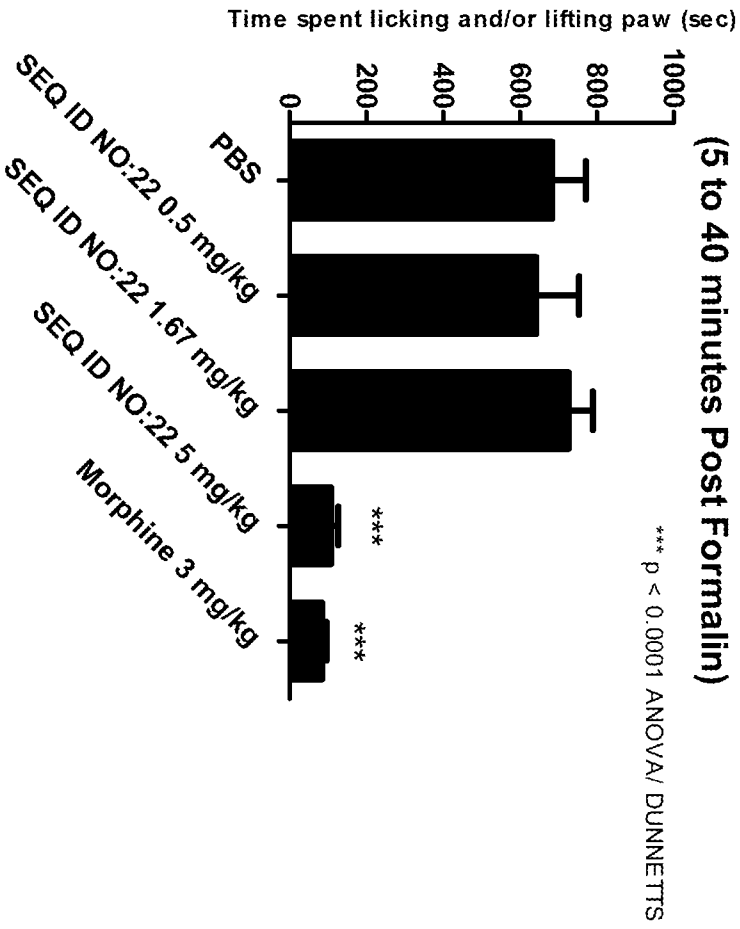
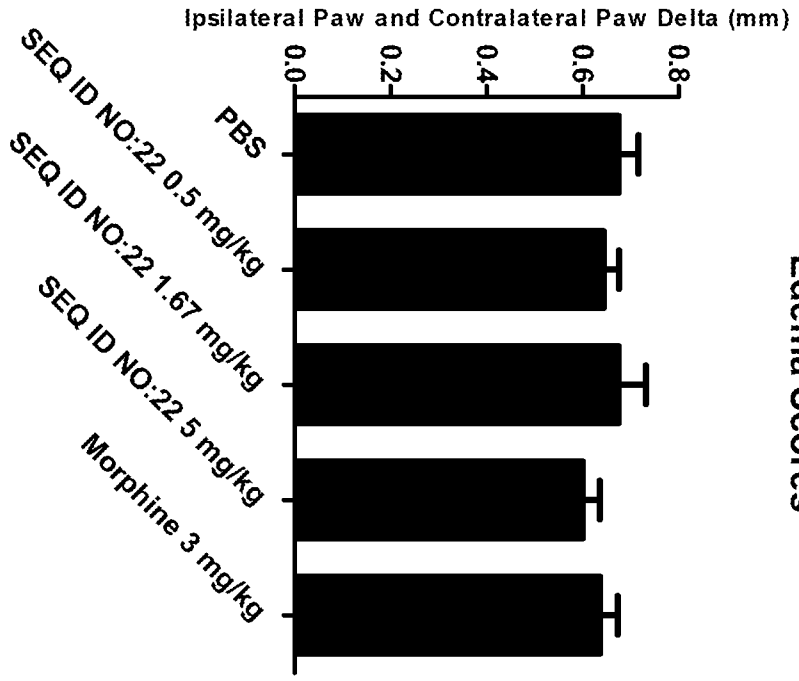

Time spent licking and/or lifting paw (sec)
0
200
400
600
800
1000
PBS
SEQ ID NO:22 0.5 mg/kg
SEQ ID NO:22 1.67 mg/kg
SEQ ID NO:22 5 mg/kg
Morphine 3 mg/kg
***
***
2nd Phase
(5 to 40 minutes Post Formalin)
*** p < 0.0001 ANOVA/ DUNNETTS

FIG. 65



Edema Scores

FIG. 66

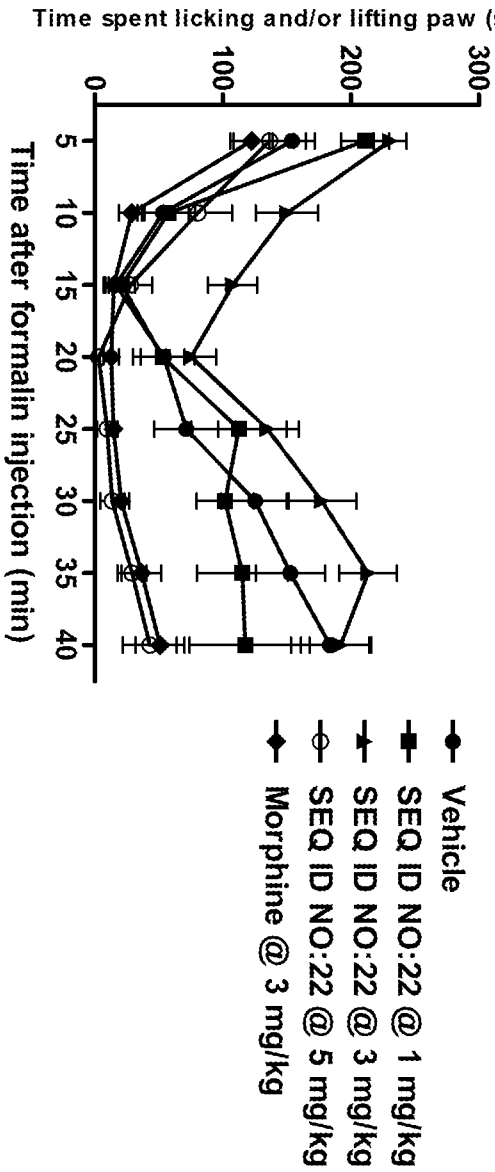

Time spent licking and/or lifting paw (sec)
0
100
200
300
Time after formalin injection (min)
5
10
15
20
25
30
35
40
Vehicle
SEQ ID NO:22 @ 1 mg/kg
SEQ ID NO:22 @ 3 mg/kg
SEQ ID NO:22 @ 5 mg/kg
Morphine @ 3 mg/kg

FIG. 67

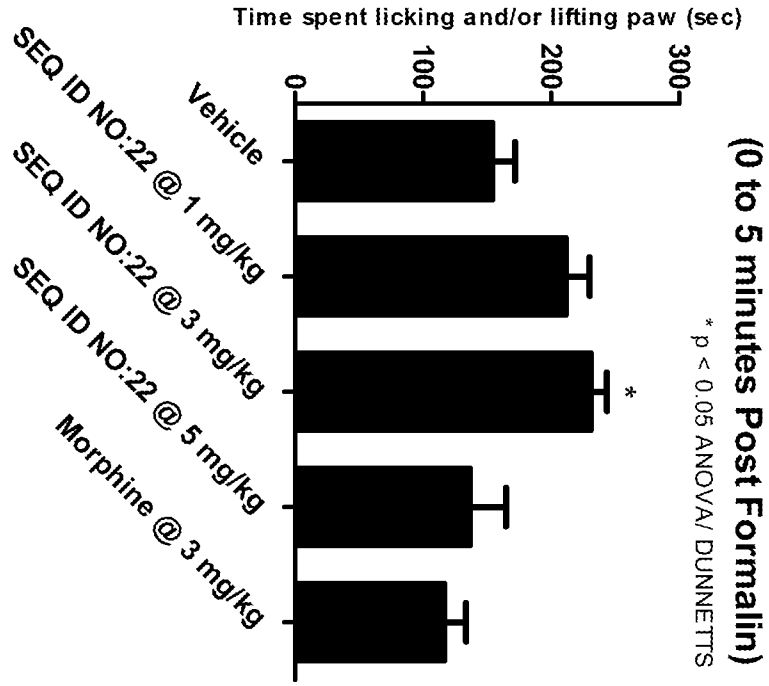

Time spent licking and/or lifting paw (sec)
0
100
200
300
Vehicle
SEQ ID NO:22 @ 1 mg/kg
SEQ ID NO:22 @ 3 mg/kg
SEQ ID NO:22 @ 5 mg/kg
Morphine @ 3 mg/kg
*
1st Phase
(0 to 5 minutes Post Formalin)
* p < 0.05 ANOVA/ DUNNETTS

FIG. 68

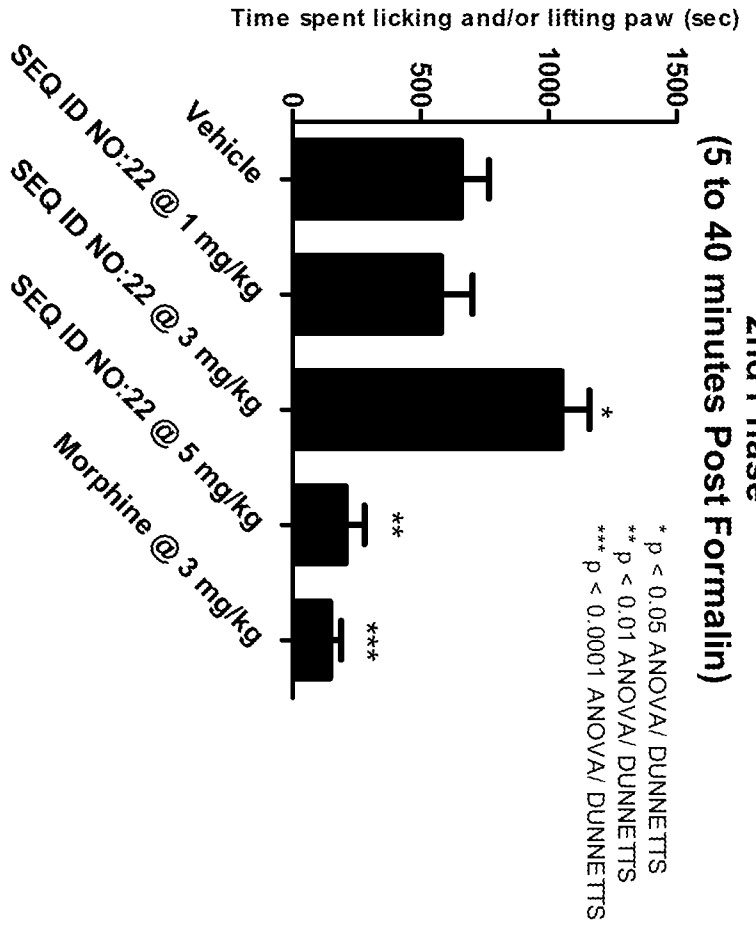

Time spent licking and/or lifting paw (sec)
0
500
1000
1500
Vehicle
SEQ ID NO:22 @ 1 mg/kg
SEQ ID NO:22 @ 3 mg/kg
SEQ ID NO:22 @ 5 mg/kg
Morphine @ 3 mg/kg
*
**
***
2nd Phase
(5 to 40 minutes Post Formalin)
* p < 0.05 ANOVA/ DUNNETTS
** p < 0.01 ANOVA/ DUNNETTS
*** p < 0.0001 ANOVA/ DUNNETTS

FIG. 69

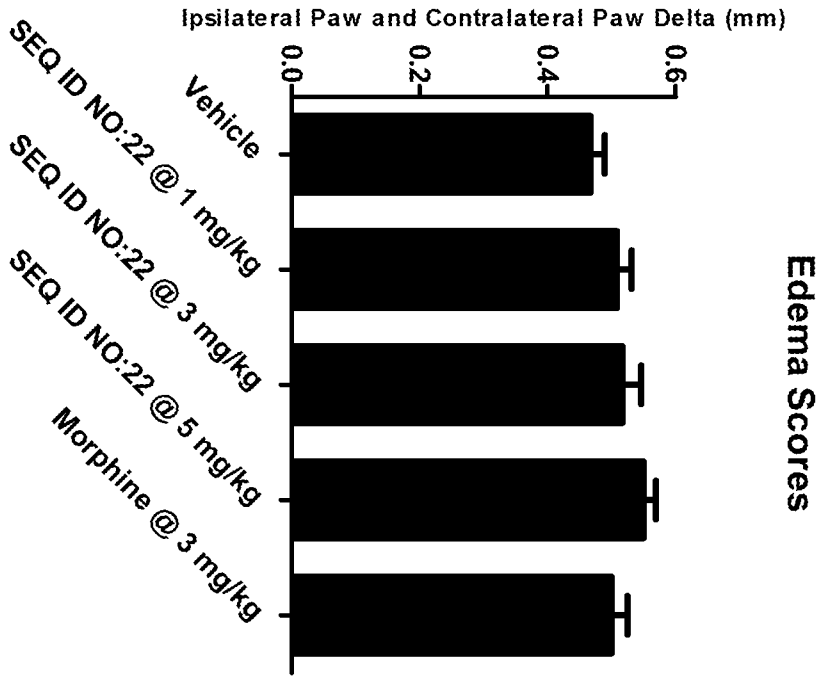

Ipsilateral Paw and Contralateral Paw Delta (mm)
0.0
0.2
0.4
0.6
Vehicle
SEQ ID NO:22 @ 1 mg/kg
SEQ ID NO:22 @ 3 mg/kg
SEQ ID NO:22 @ 5 mg/kg
Morphine @ 3 mg/kg
Edema Scores

FIG. 70

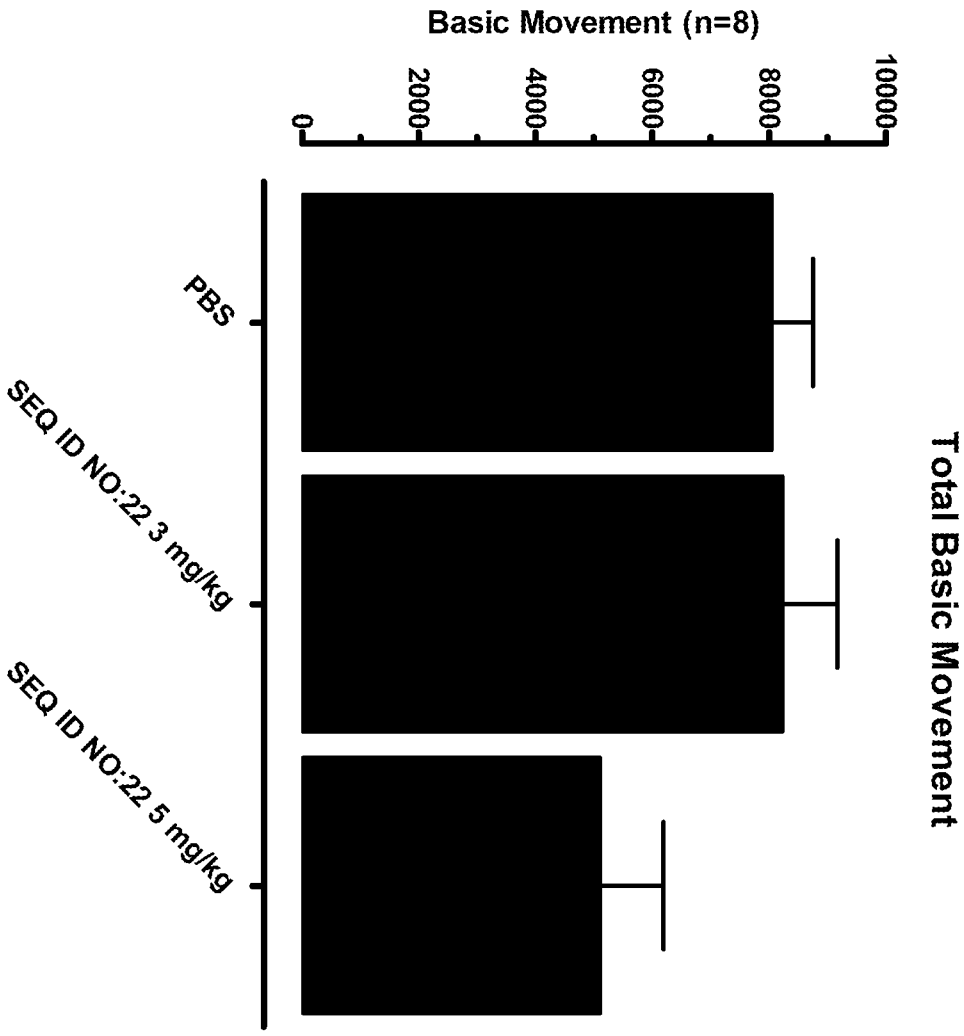

Basic Movement (n=8)
0
2000
4000
6000
8000
10000
PBS
SEQ ID NO:22 3 mg/kg
SEQ ID NO:22 5 mg/kg
Total Basic Movement

FIG. 71

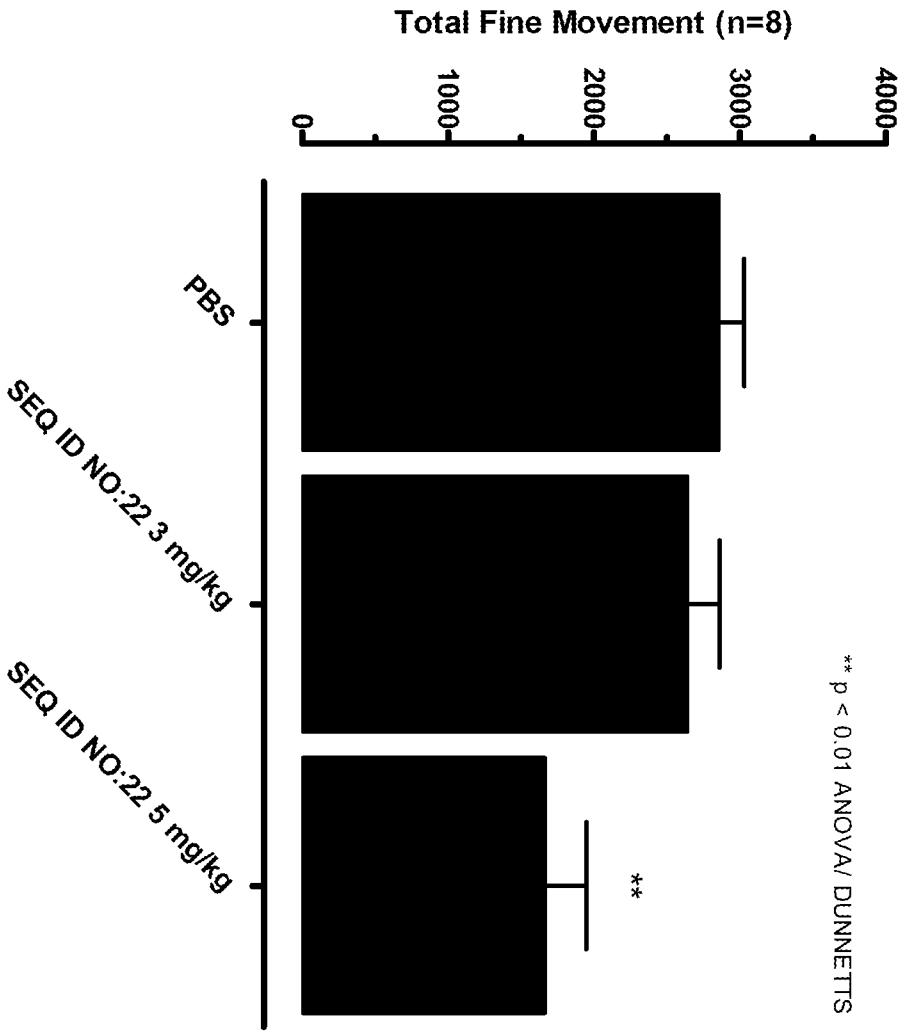

Total Fine Movement (n=8)
0
1000
2000
3000
4000
PBS
SEQ ID NO:22 3 mg/kg
SEQ ID NO:22 5 mg/kg
**
Total Fine Movement
** p < 0.01 ANOVA/ DUNNETTS

FIG. 72

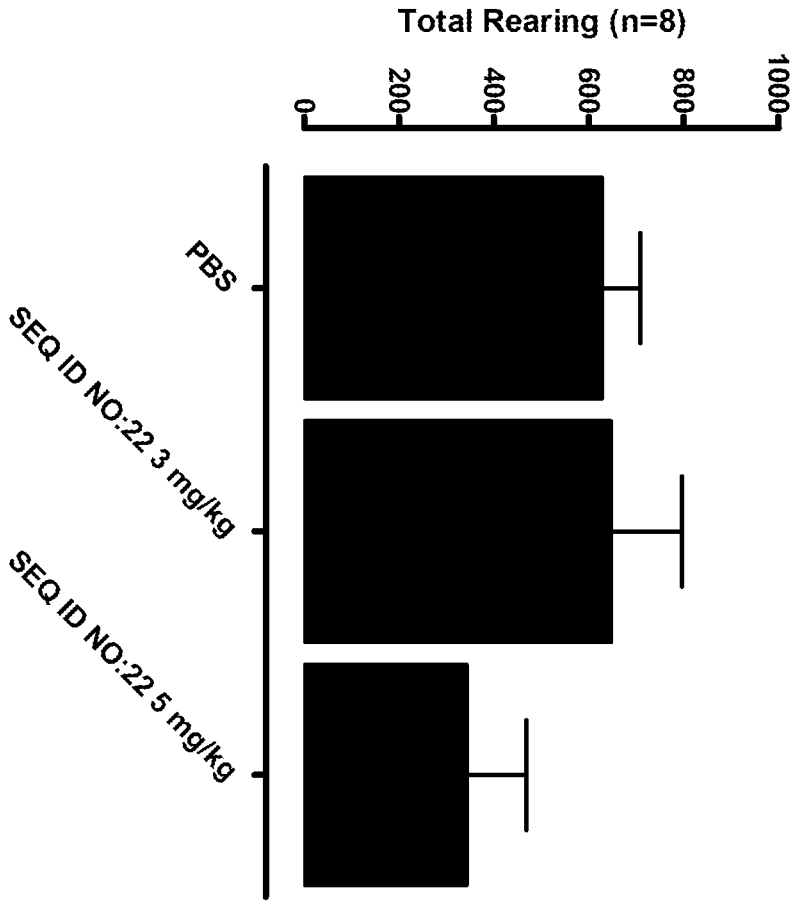

Total Rearing (n=8)
0
200
400
600
800
1000
PBS
SEQ ID NO:22 3 mg/kg
SEQ ID NO:22 5 mg/kg
Total Rearing

FIG. 73

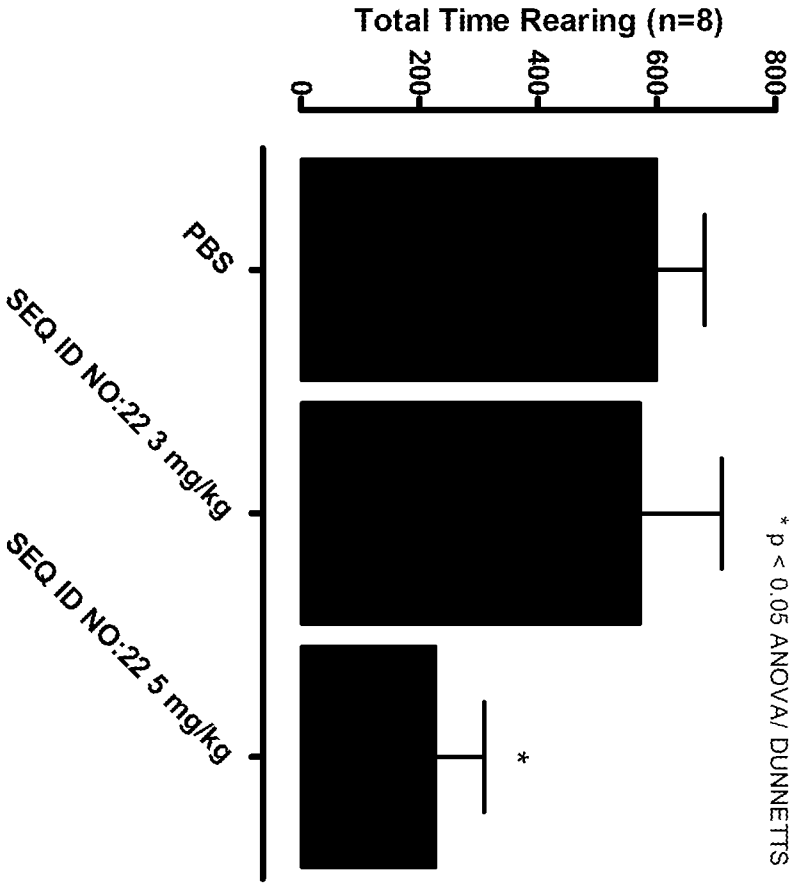

Total Time Rearing (n=8)
0
200
400
600
800
PBS
SEQ ID NO:22 3 mg/kg
SEQ ID NO:22 5 mg/kg
*
Total Time Rearing
* p < 0.05 ANOVA/ DUNNETTS

FIG. 74

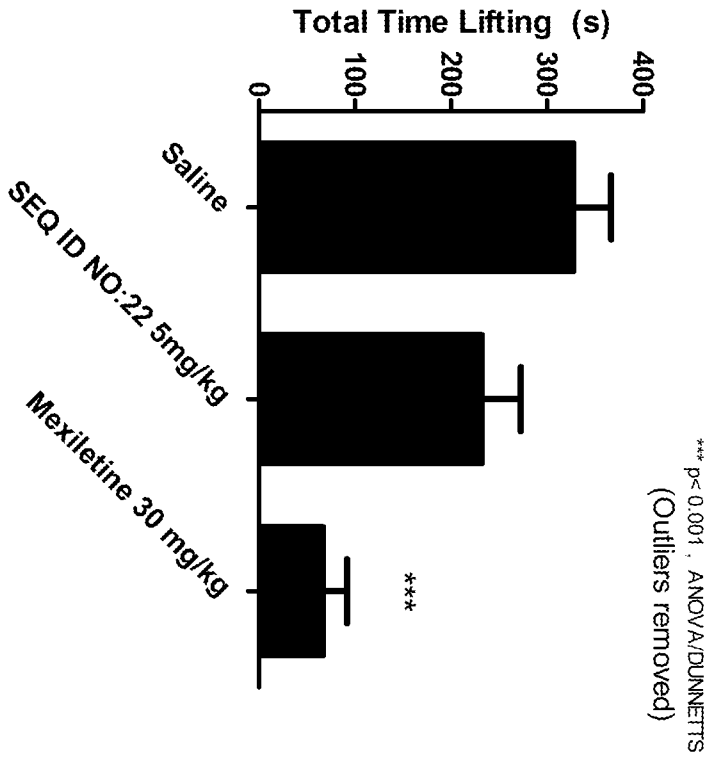

Total Time Lifting (s)
0
100
200
300
400
Saline
SEQ ID NO:22 5mg/kg
Mexiletine 30 mg/kg
***
*** p< 0.001, ANOVA/DUNNETTS
(Outliers removed)

FIG. 75

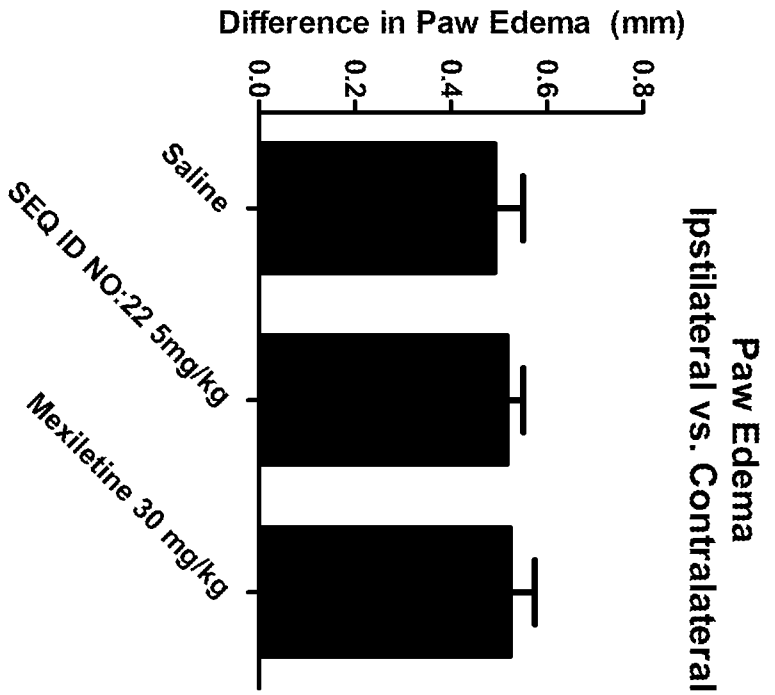

Difference in Paw Edema (mm)
0.0
0.2
0.4
0.6
0.8
Saline
SEQ ID NO:22 5mg/kg
Mexiletine 30 mg/kg
Paw Edema
Ipstilateral vs. Contralateral

FIG. 76

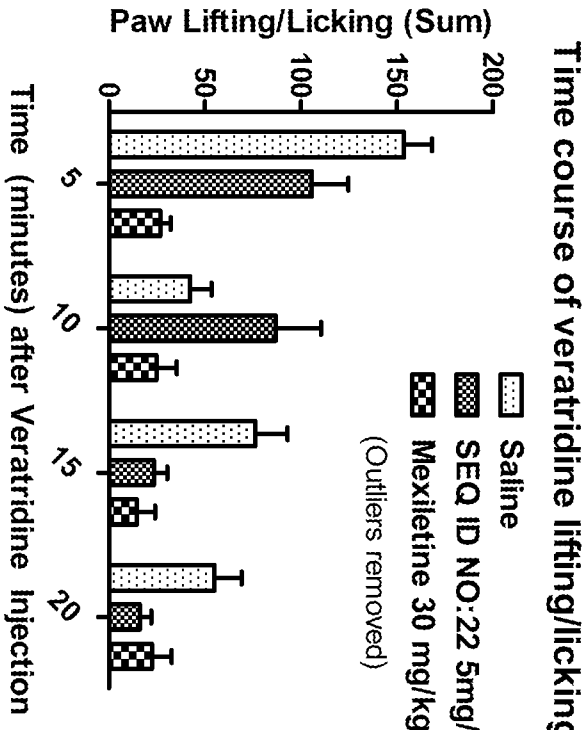

Time course of veratridine lifting/licking
Saline
SEQ ID NO:22 5mg/kg
Mexiletine 30 mg/kg
(Outliers removed)
Paw Lifting/Licking (Sum)
0
50
100
150
200
5
10
15
20
Time (minutes) after Veratridine Injection

FIG. 77

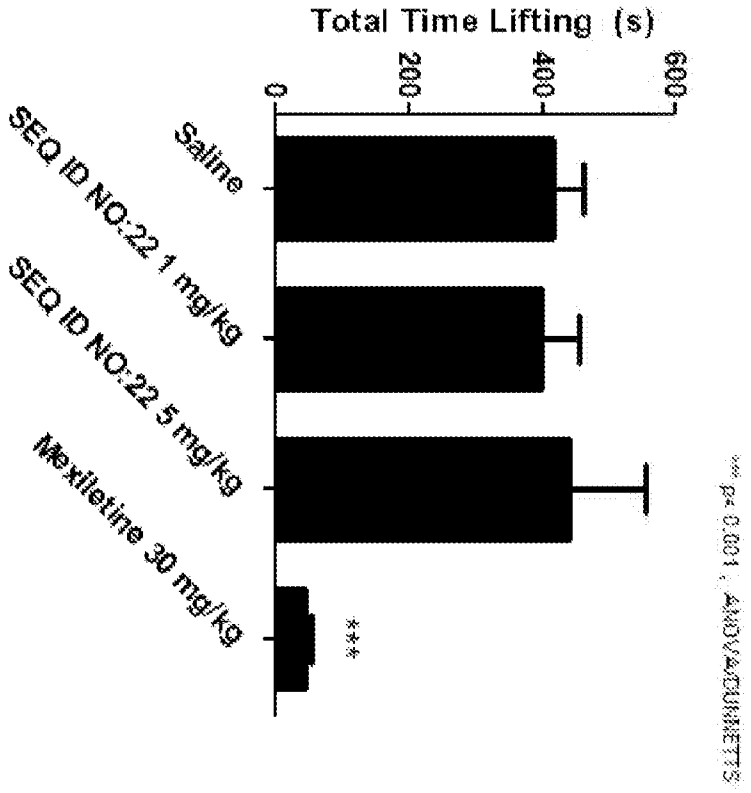

Total Time Lifting (s)
0
200
400
600
Saline
SEQ ID NO:22 1 mg/kg
SEQ ID NO:22 5 mg/kg
Mexiletine 30 mg/kg
***
*** p< 0.001, ANOVA/STUDENT'S

FIG. 78

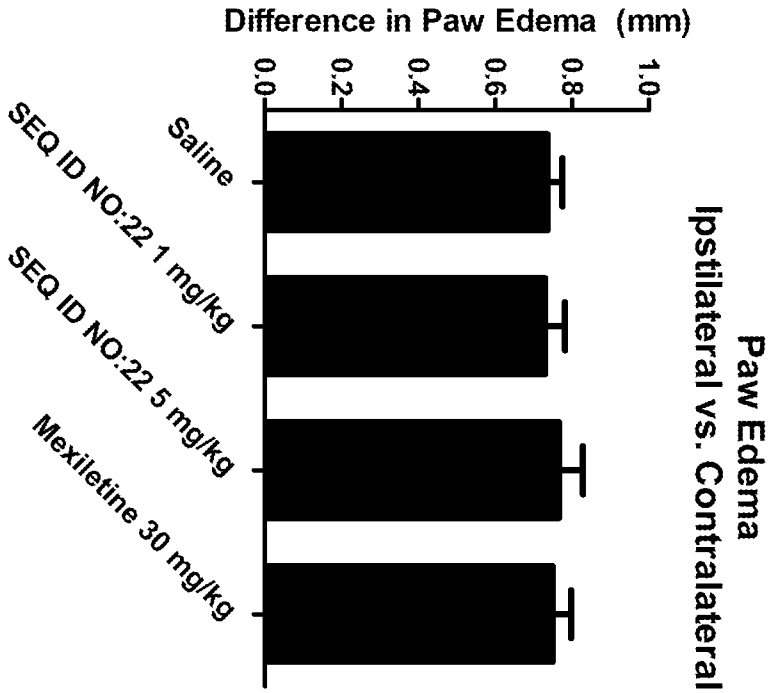

Difference in Paw Edema (mm)
0.0
0.2
0.4
0.6
0.8
1.0
Saline
SEQ ID NO:22 1 mg/kg
SEQ ID NO:22 5 mg/kg
Mexiletine 30 mg/kg
Paw Edema
Ipstilateral vs. Contralateral

FIG. 79

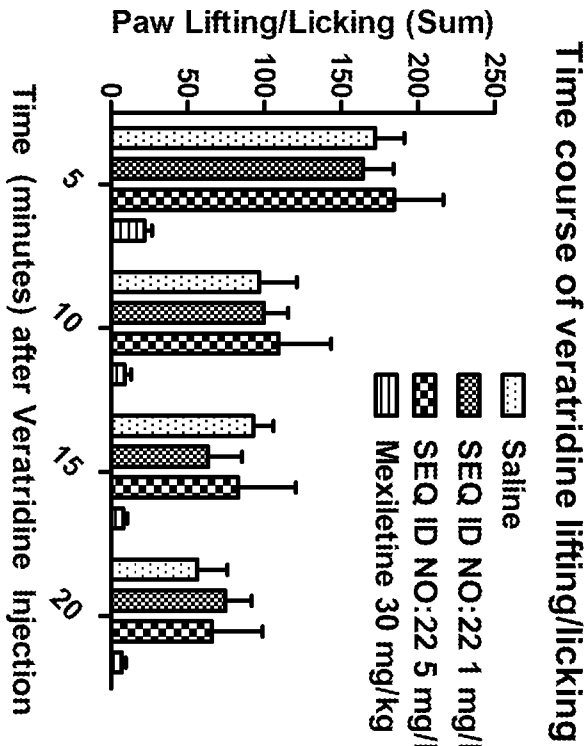

Time course of veratridine lifting/licking
Paw Lifting/Licking (Sum)
0
50
100
150
200
250
5
10
15
20
Time (minutes) after Veratridine Injection
Saline
SEQ ID NO:22 1 mg/kg
SEQ ID NO:22 5 mg/kg
Mexiletine 30 mg/kg

FIG. 80

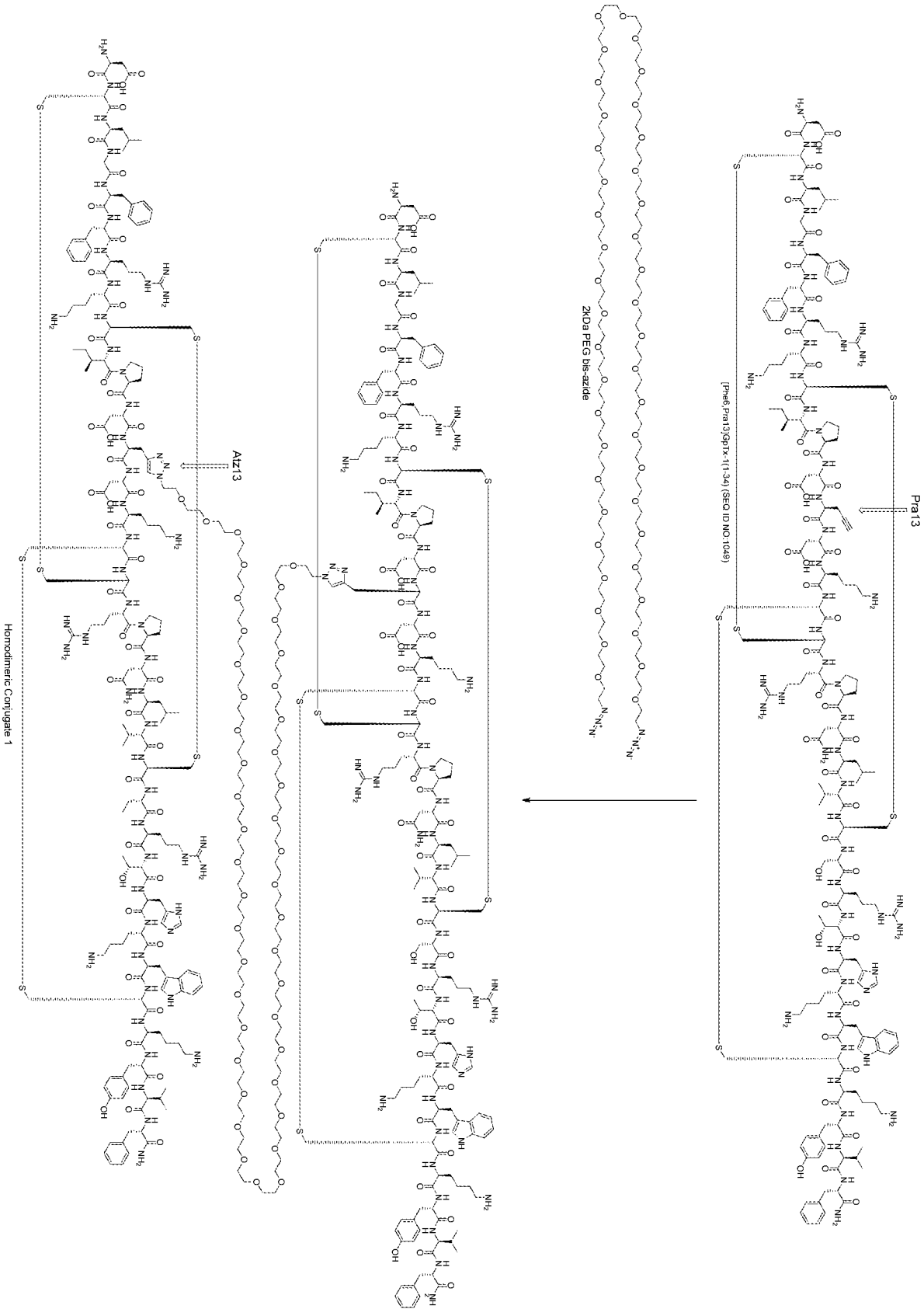

Aiz13
Homodimeric Conjugate 1
2kDa PEG bis-azide
Pra13
[Phe6,Pra13]GpTx-1(1-34) (SEQ ID NO:1049)

FIG. 81A

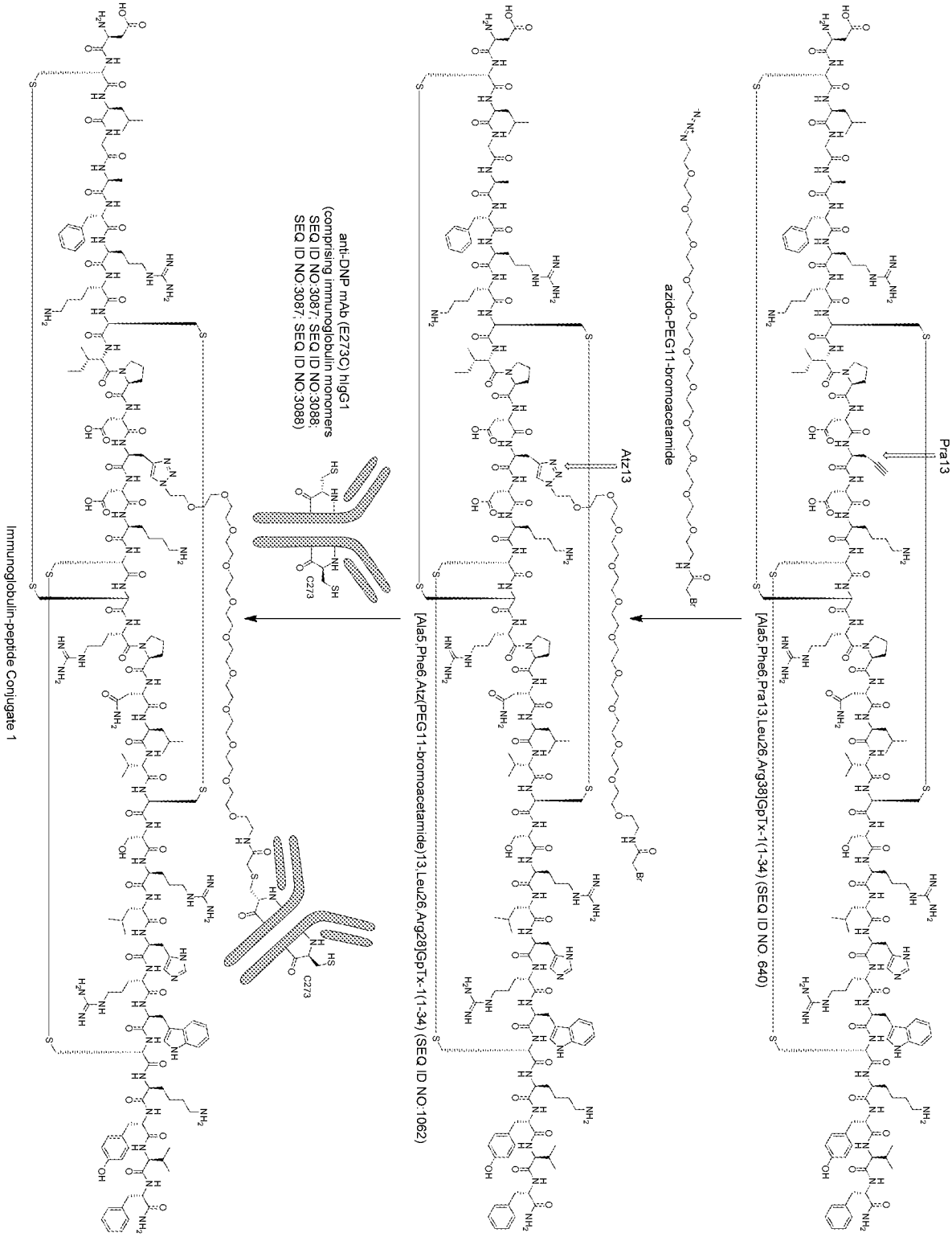

Pra13
[Ala5,Phe6,Pra13,Leu26,Arg38]GpTx-1(1-34) (SEQ ID NO: 640)
azido-PEG11-bromoacetamide
Atz13
[Ala5,Phe6,Atz(PEG11-bromoacetamide)13,Leu26,Arg28]GpTx-1(1-34) (SEQ ID NO:1062)
anti-DNP mAb (E273C) hIgG1
(comprising immunoglobulin monomers
SEQ ID NO:3087; SEQ ID NO:3088;
SEQ ID NO:3087; SEQ ID NO:3088)
C273
C273
Immunoglobulin-peptide Conjugate 1

FIG. 81B

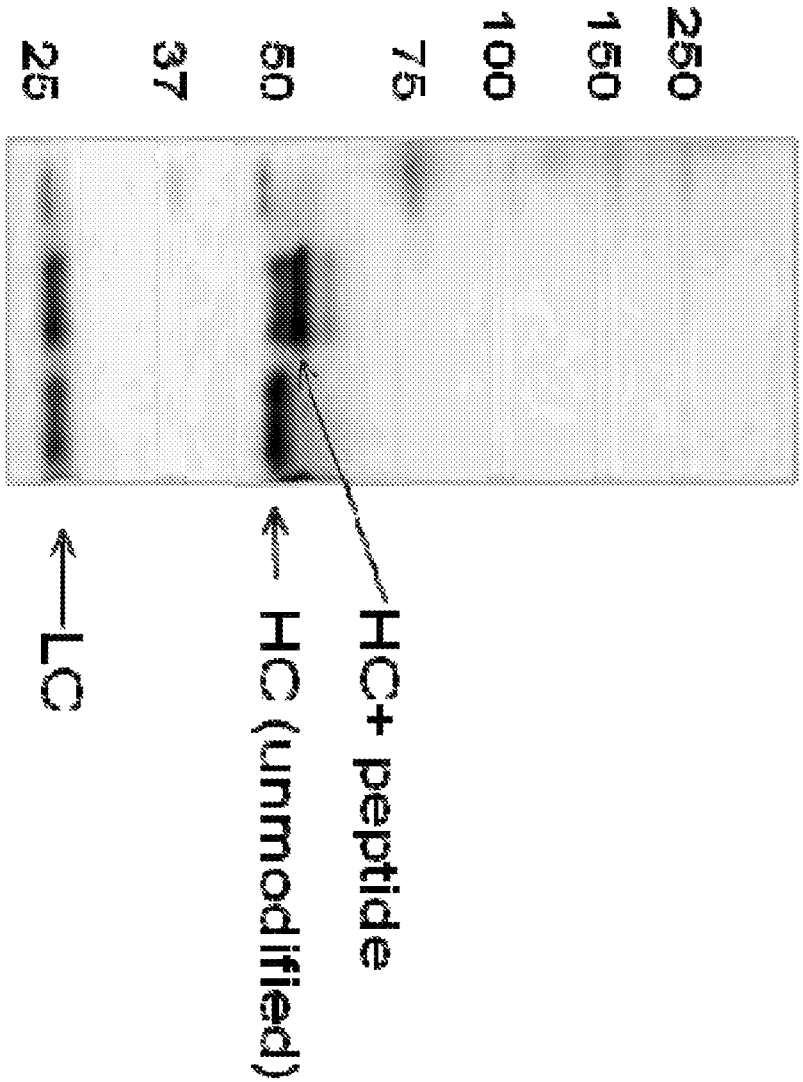

250
150
100
75
50
37
25
+ peptide
No peptide
HC+ peptide
HC (unmodified)
LC

FIG. 82

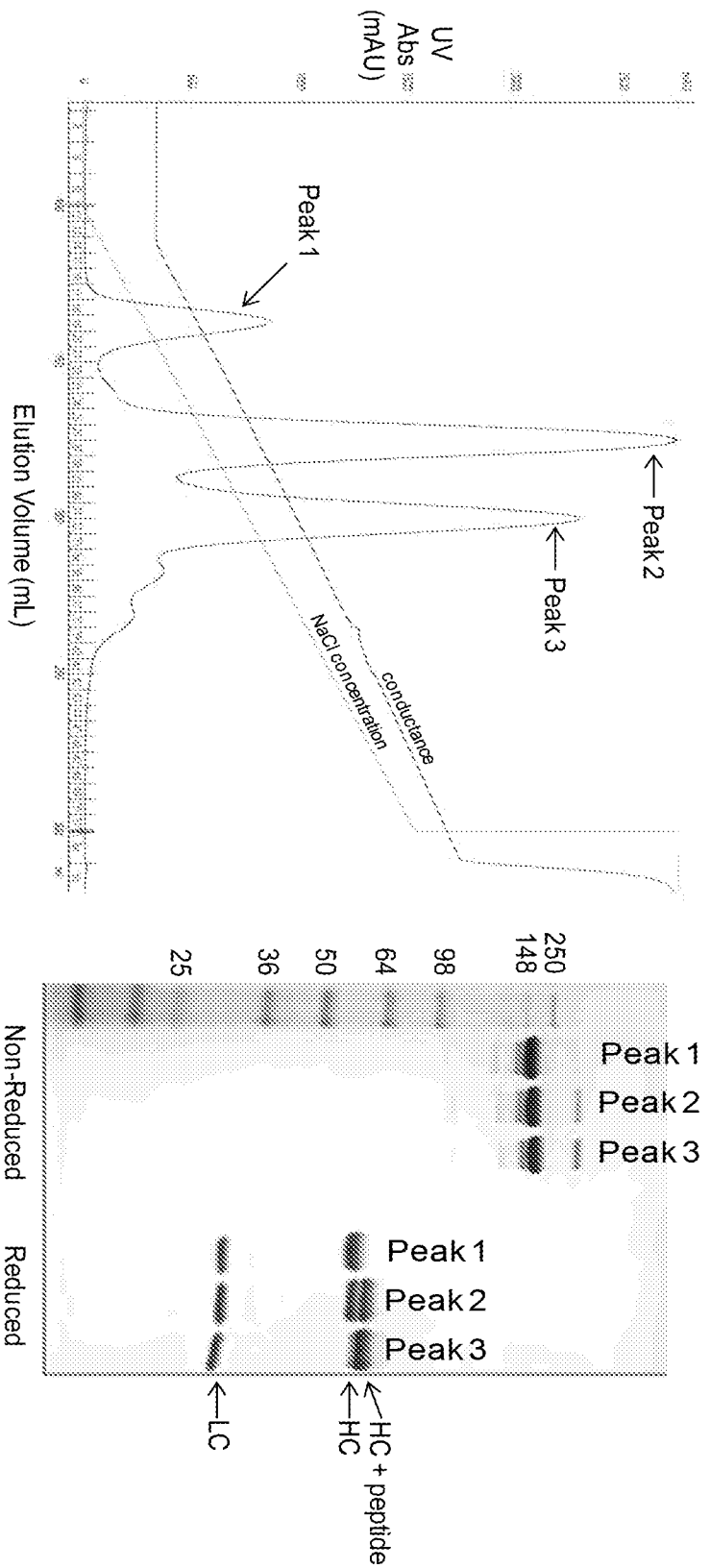

UV Abs (mAU)
Peak 1
Peak 2
Peak 3
conductance
NaCl concentration
Elution Volume (mL)
250
148
98
64
50
36
25
Non-Reduced
Peak 1
Peak 2
Peak 3
Reduced
Peak 1
Peak 2
Peak 3
LC
HC
HC + peptide

FIG. 83

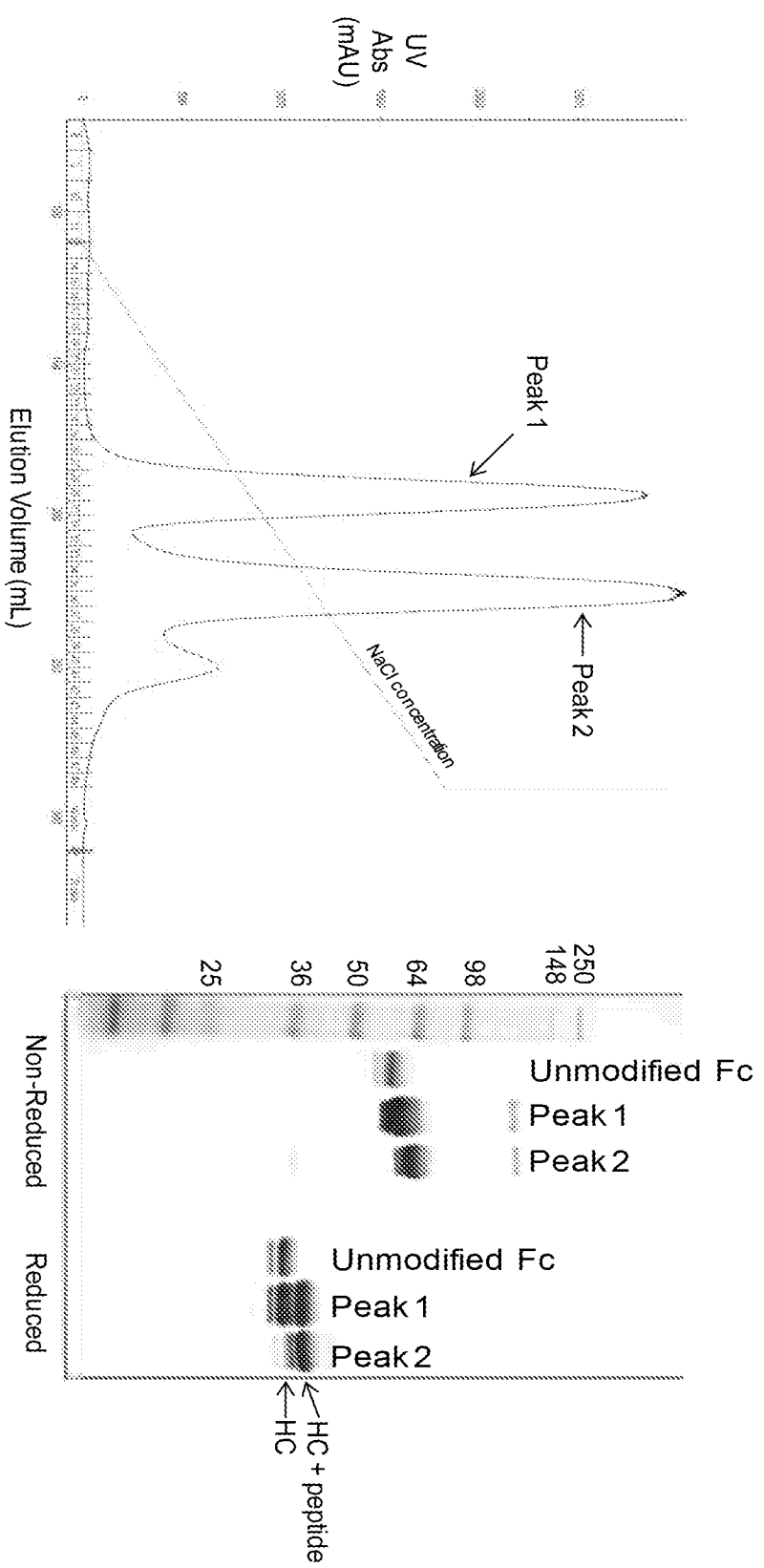

UV Abs (mAU)
Elution Volume (mL)
Peak 1
Peak 2
NaCl concentration
25
36
50
64
98
250
148
Non-Reduced
Unmodified Fc
Peak 1
Peak 2
Reduced
Unmodified Fc
Peak 1
Peak 2
HC
HC + peptide

FIG. 84

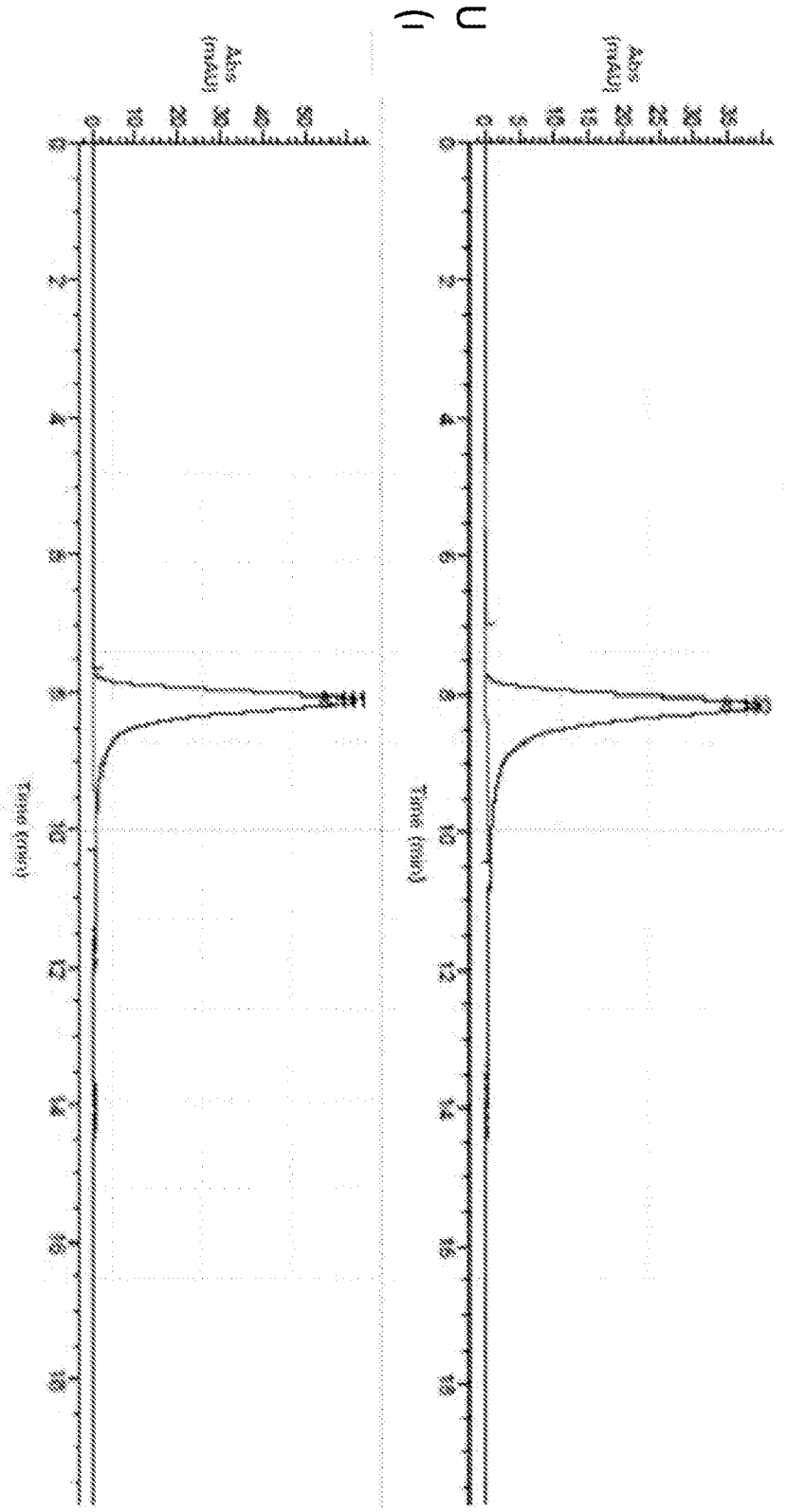
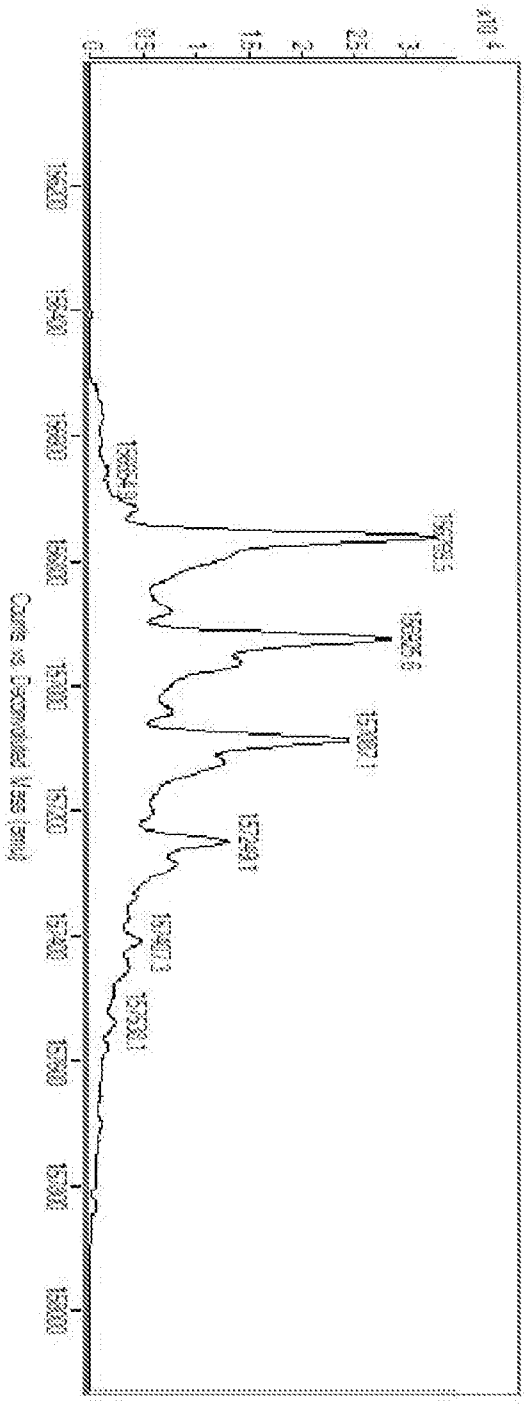


FIG. 85


Counts vs. Deconvoluted Mass (Neutral)
15000
15500
16000
16500
17000
17500
18000
18500
19000
19500
20000
20500
21000
21500
22000
22500
23000
23500
24000
24500
25000
25500
26000
26500
27000
27500
28000
28500
29000
29500
30000
30500
31000
31500
32000
32500
33000
33500
34000
34500

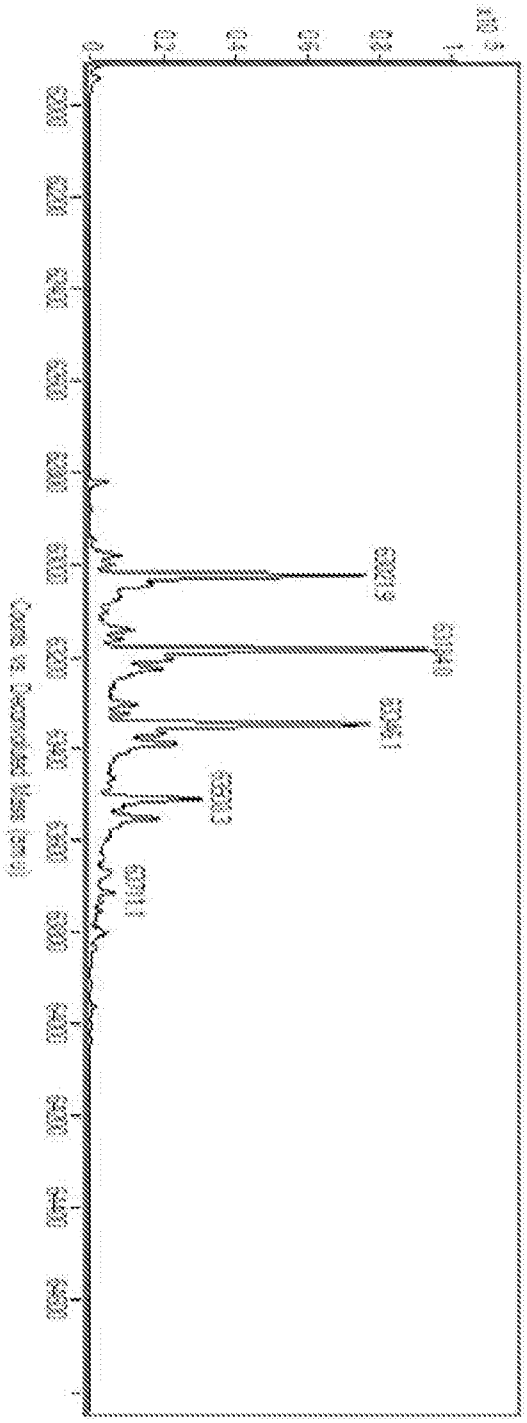


FIG. 87

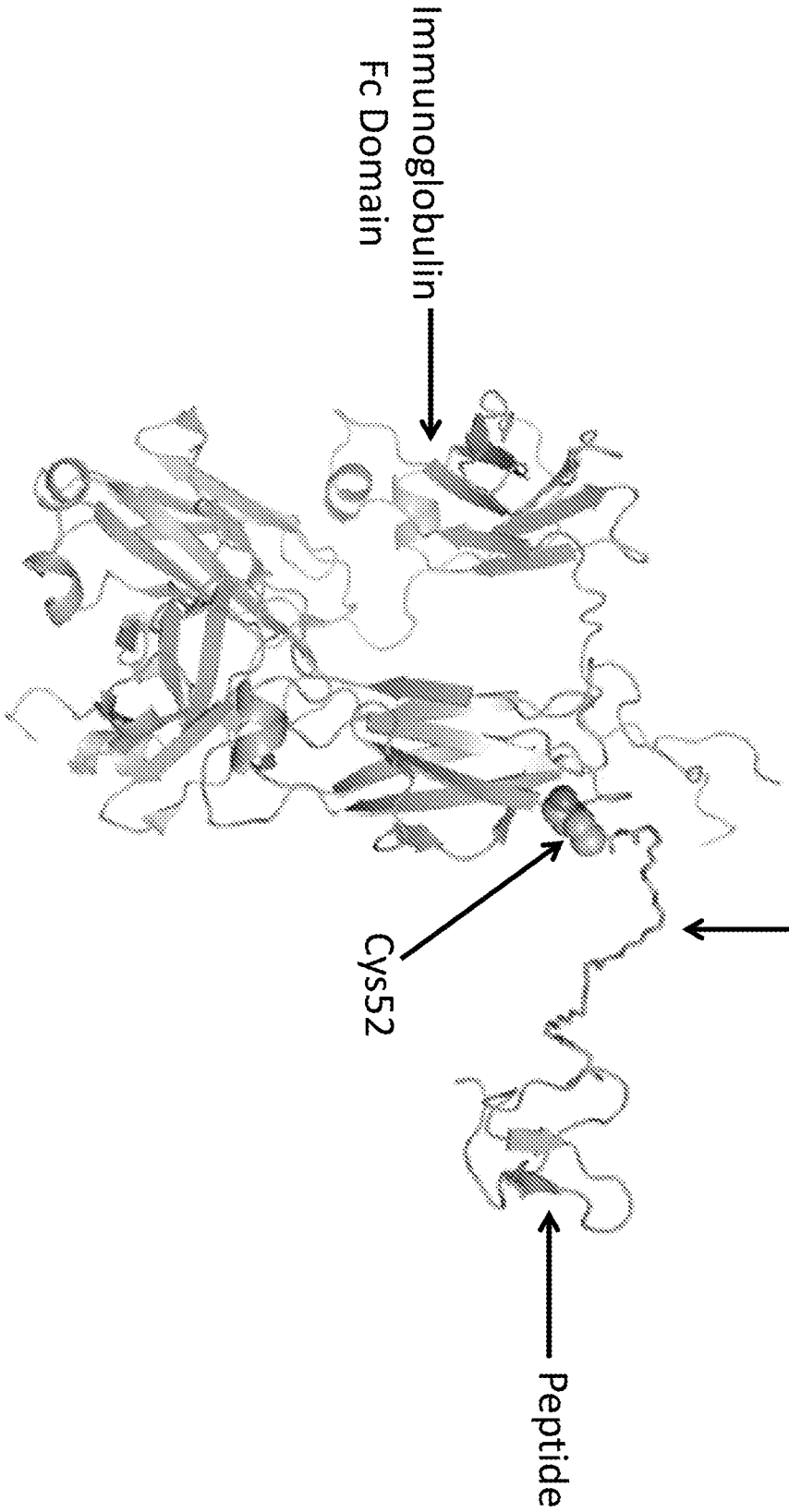


FIG. 88

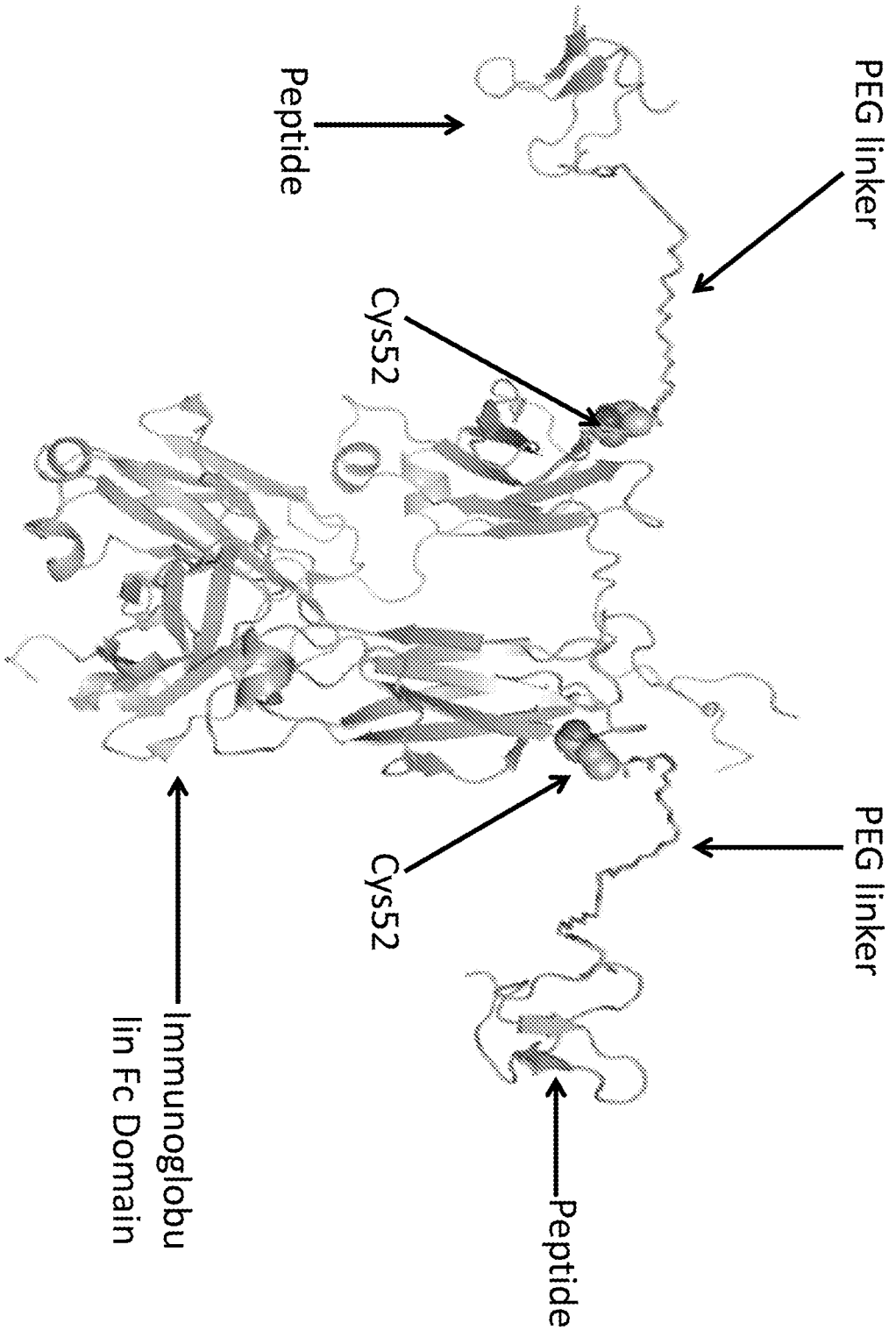

Peptide
PEG linker
Cys52
Cys52
PEG linker
Immunoglobu
lin Fc Domain
Peptide

FIG. 89

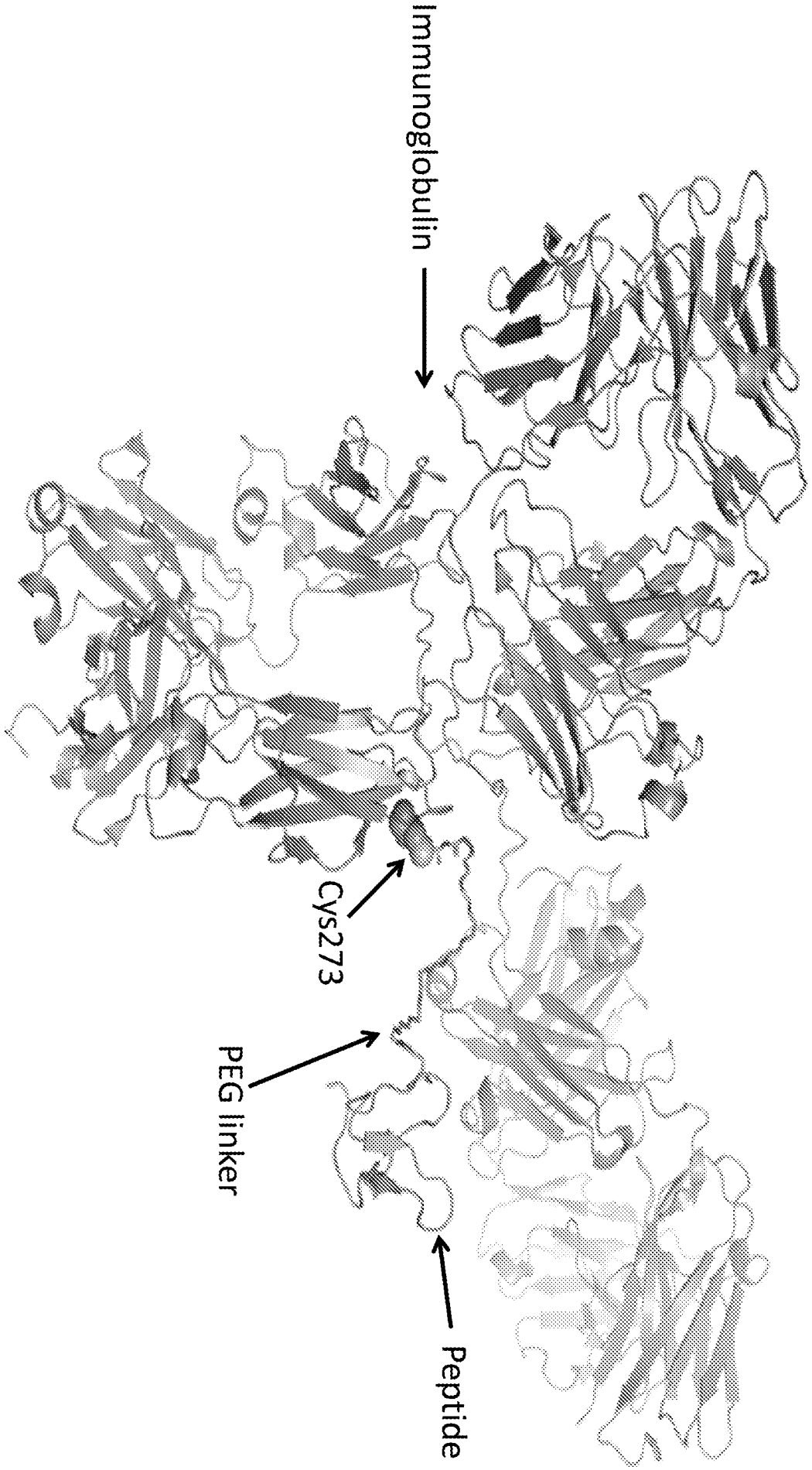


FIG. 90

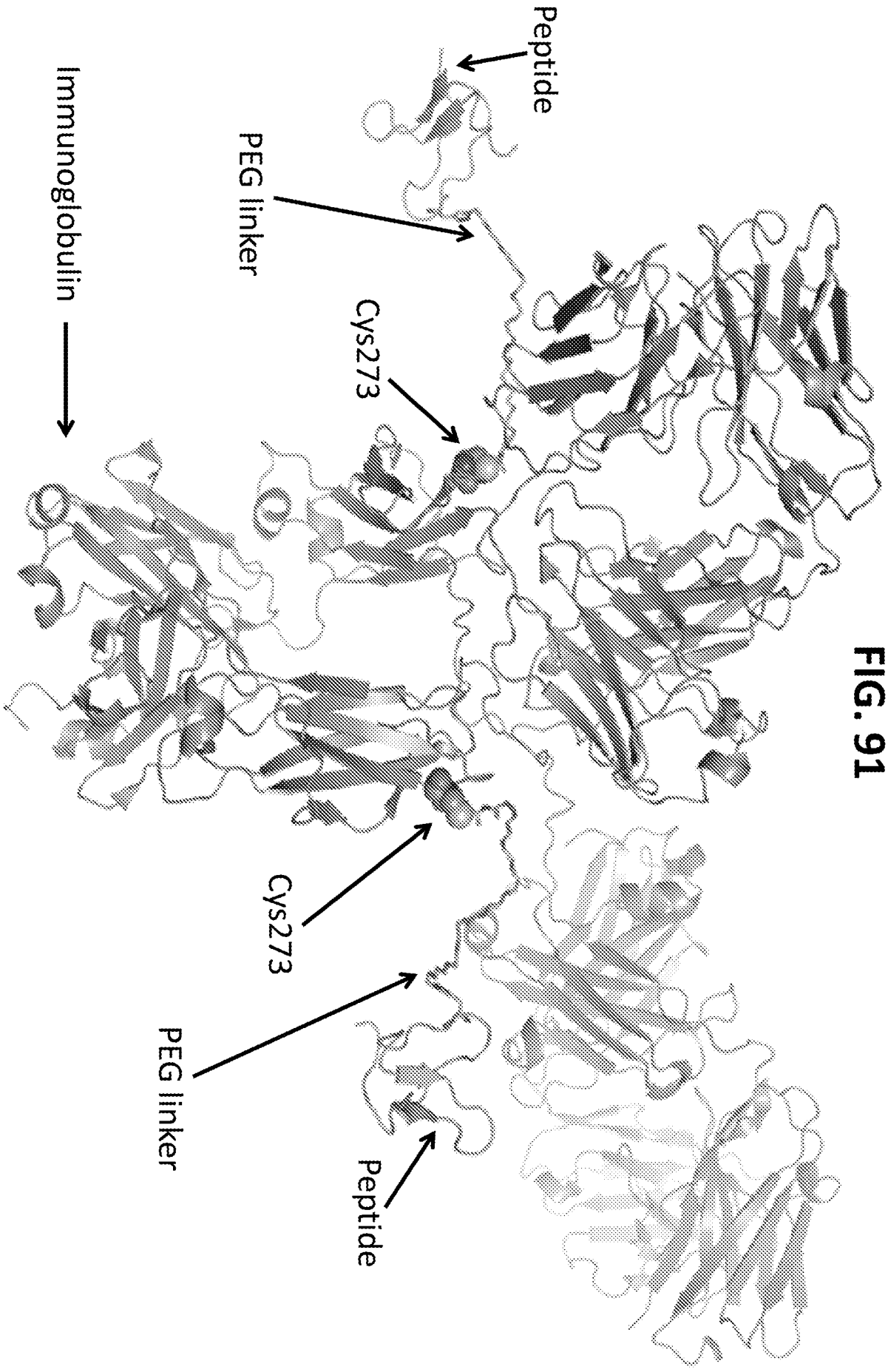

Peptide
PEG linker
Immunoglobulin
Cys273
Cys273
PEG linker
Peptide

FIG. 91

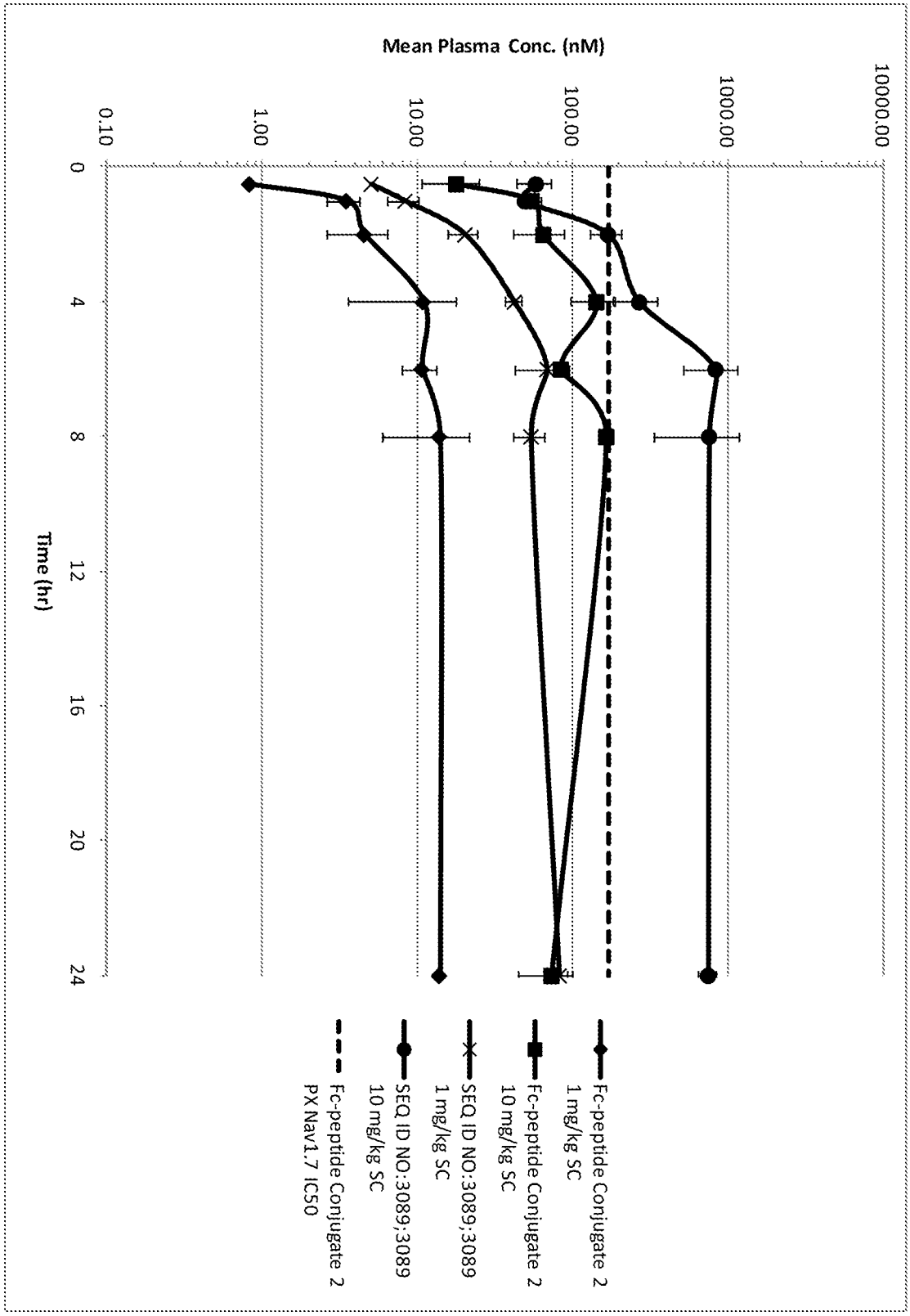

Mean Plasma Conc. (nM)
10000.00
1000.00
100.00
10.00
1.00
0.10
0
4
8
12
16
20
24
Time (hr)
Fc-peptide Conjugate 2 1 mg/kg SC
Fc-peptide Conjugate 2 10 mg/kg SC
SEQ ID NO:3089;3089 1 mg/kg SC
SEQ ID NO:3089;3089 10 mg/kg SC
Fc-peptide Conjugate 2 PX Nav1.7 IC50

FIG. 92

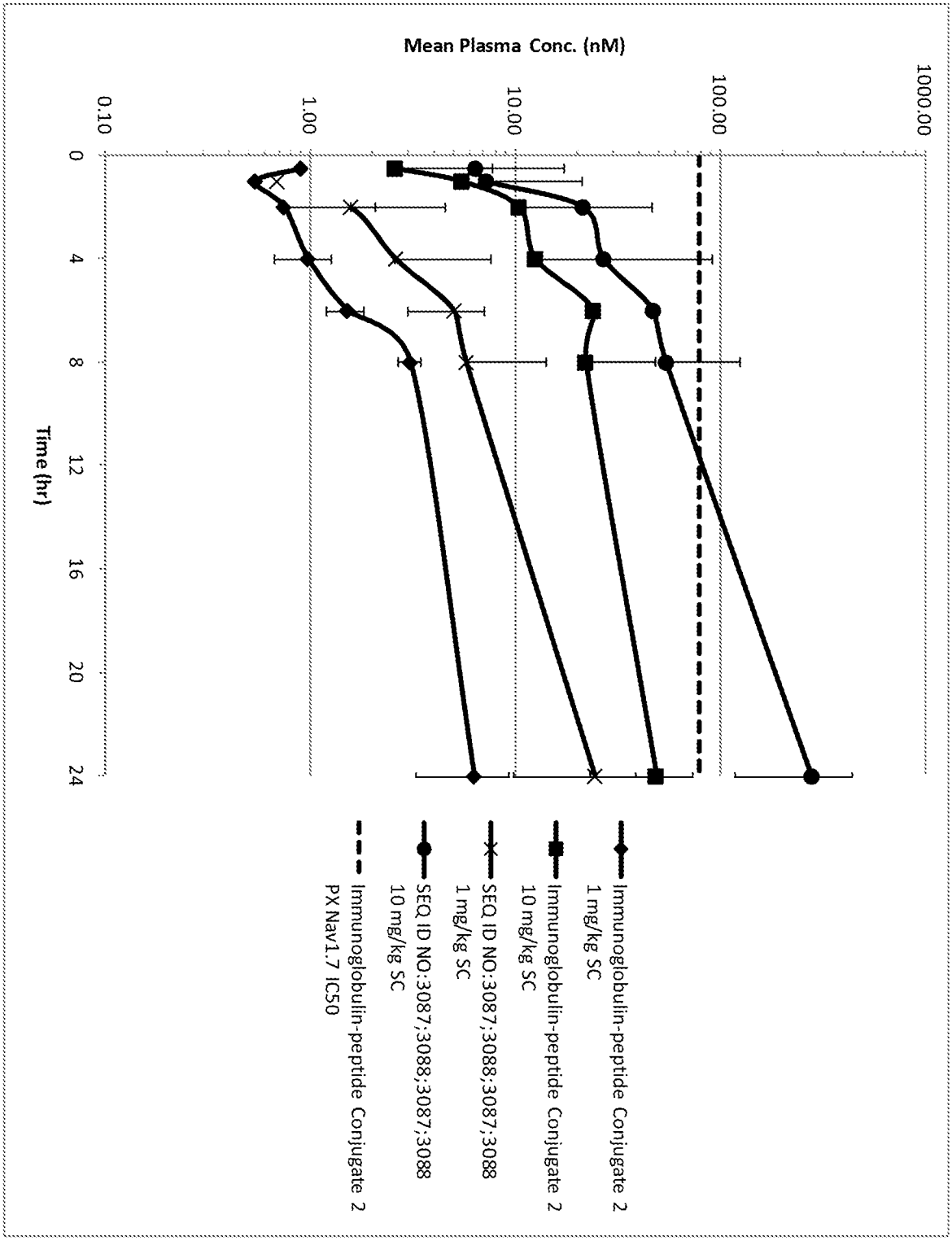

Mean Plasma Conc. (nM)
1000.00
100.00
10.00
1.00
0.10
0
4
8
12
16
20
24
Time (hr)
Immunoglobulin-peptide Conjugate 2 1 mg/kg SC
Immunoglobulin-peptide Conjugate 2 10 mg/kg SC
SEQ ID NO:3087;3088;3087;3088 1 mg/kg SC
SEQ ID NO:3087;3088;3087;3088 10 mg/kg SC
Immunoglobulin-peptide Conjugate 2 PX Nav1.7 IC50

FIG. 93

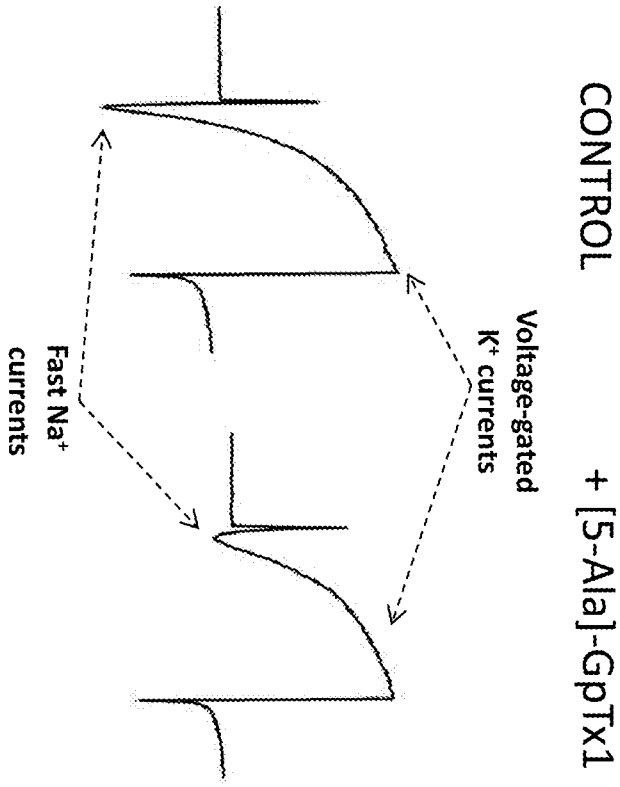
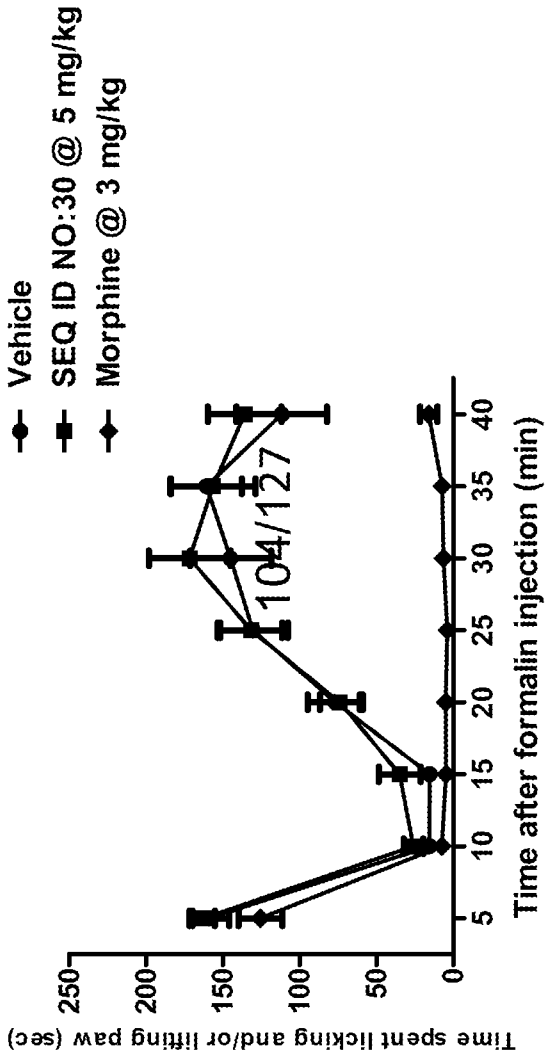

CONTROL
+ [5-Ala]-GpTx1
Voltage-gated
K+ currents
Fast Na+
currents

FIG. 94

FIG. 95



104/127

FIG. 96

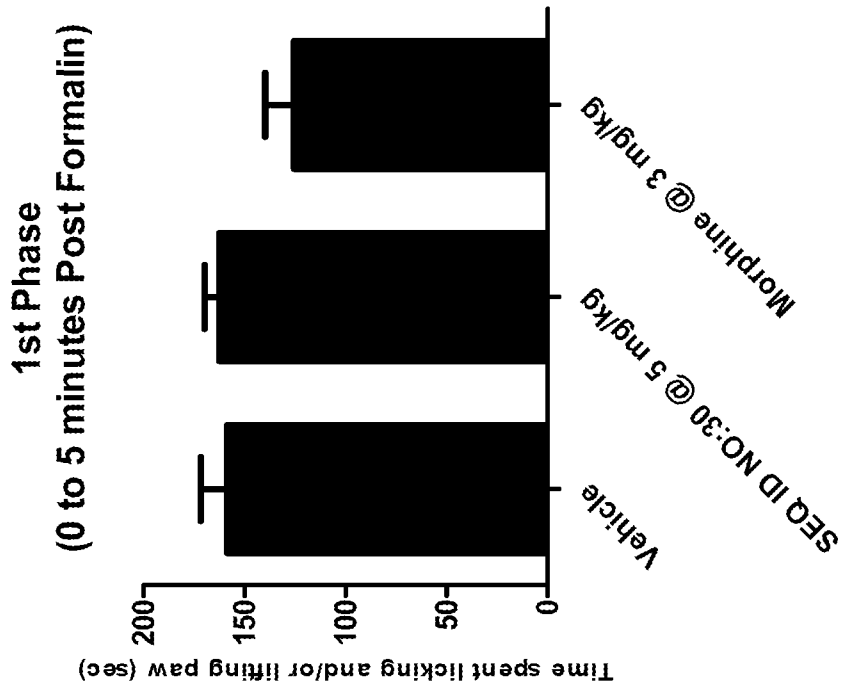

1st Phase
(0 to 5 minutes Post Formalin)
Time spent licking and/or lifting paw (sec)
200
150
100
50
0
Vehicle
SEQ ID NO:30 @ 5 mg/kg
Morphine @ 3 mg/kg

FIG. 97

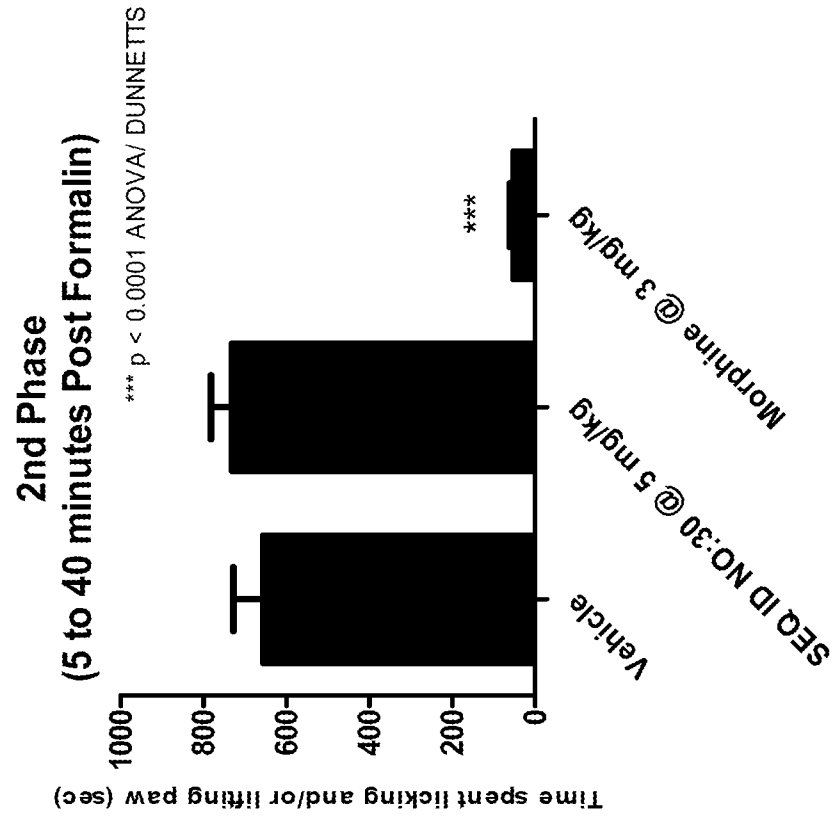

2nd Phase
(5 to 40 minutes Post Formalin)
*** p < 0.0001 ANOVA/ DUNNETTS
Time spent licking and/or lifting paw (sec)
1000
800
600
400
200
0
***
Vehicle
SEQ ID NO:30 @ 5 mg/kg
Morphine @ 3 mg/kg

FIG. 98

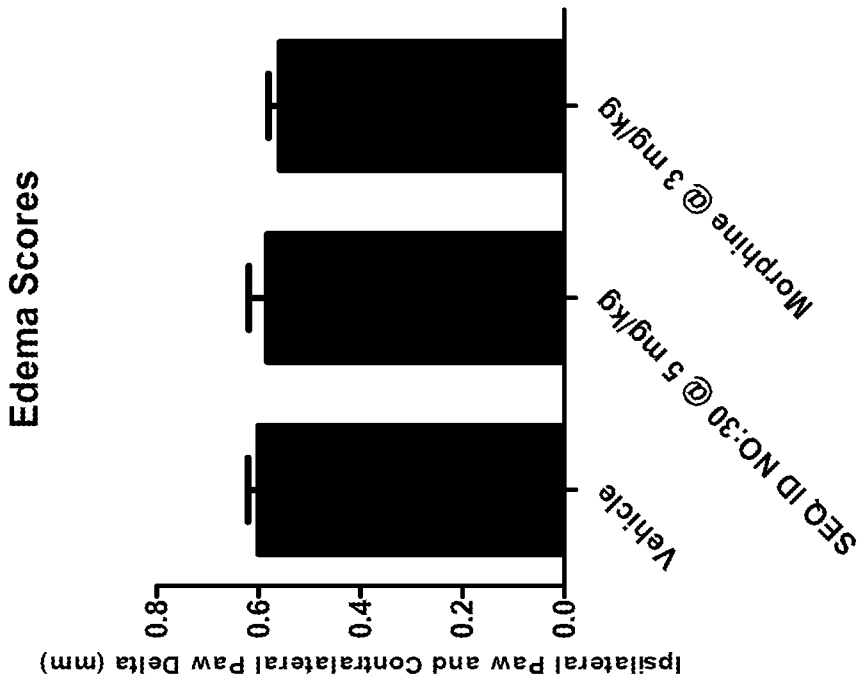

Edema Scores
Ipsilateral Paw and Contralateral Paw Delta (mm)
0.0
0.2
0.4
0.6
0.8
Vehicle
SEQ ID NO:30 @ 5 mg/kg
Morphine @ 3 mg/kg

FIG. 99

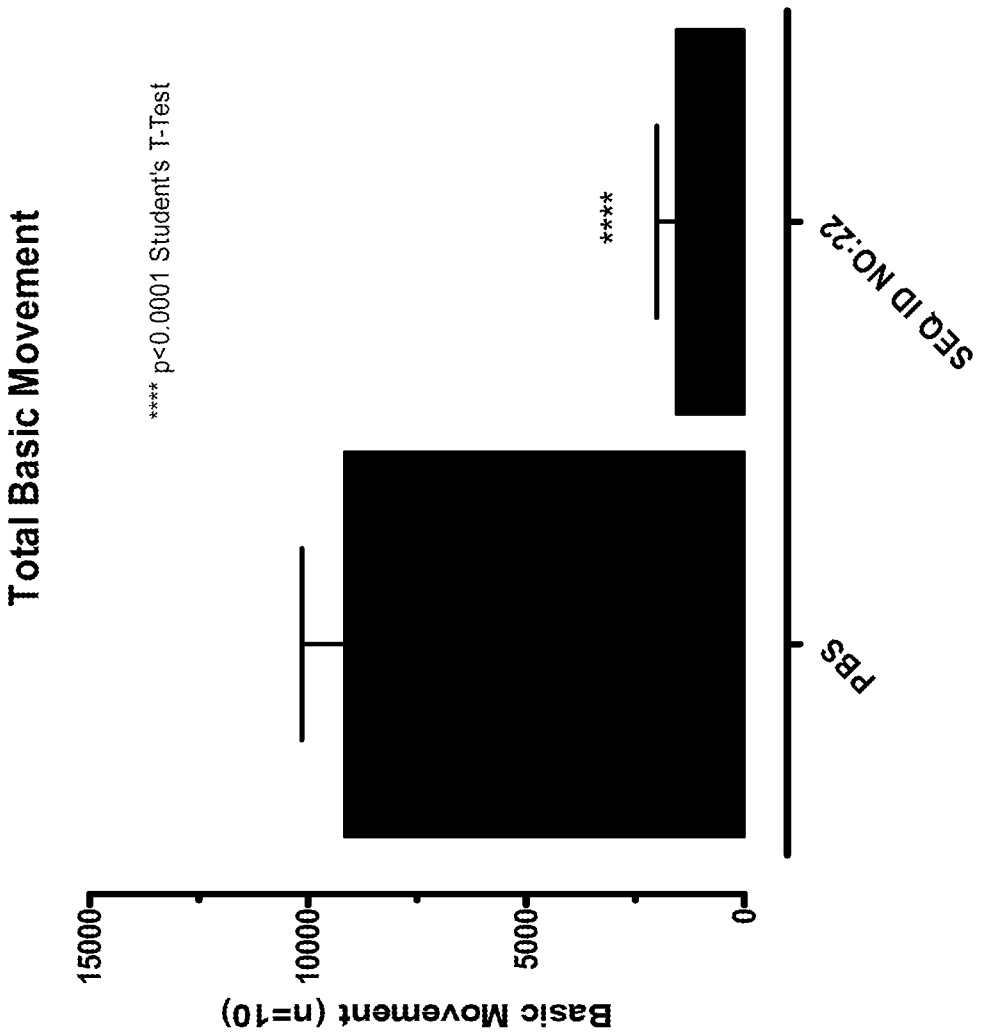
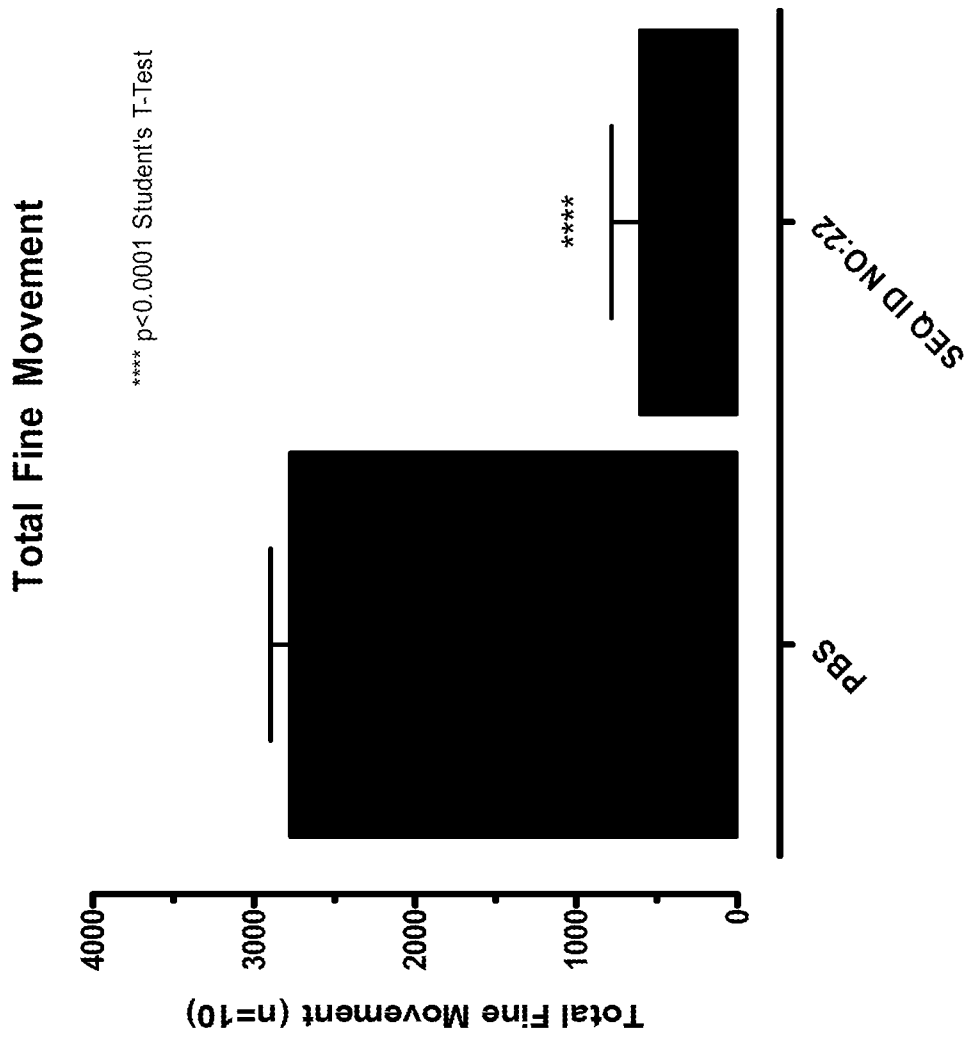
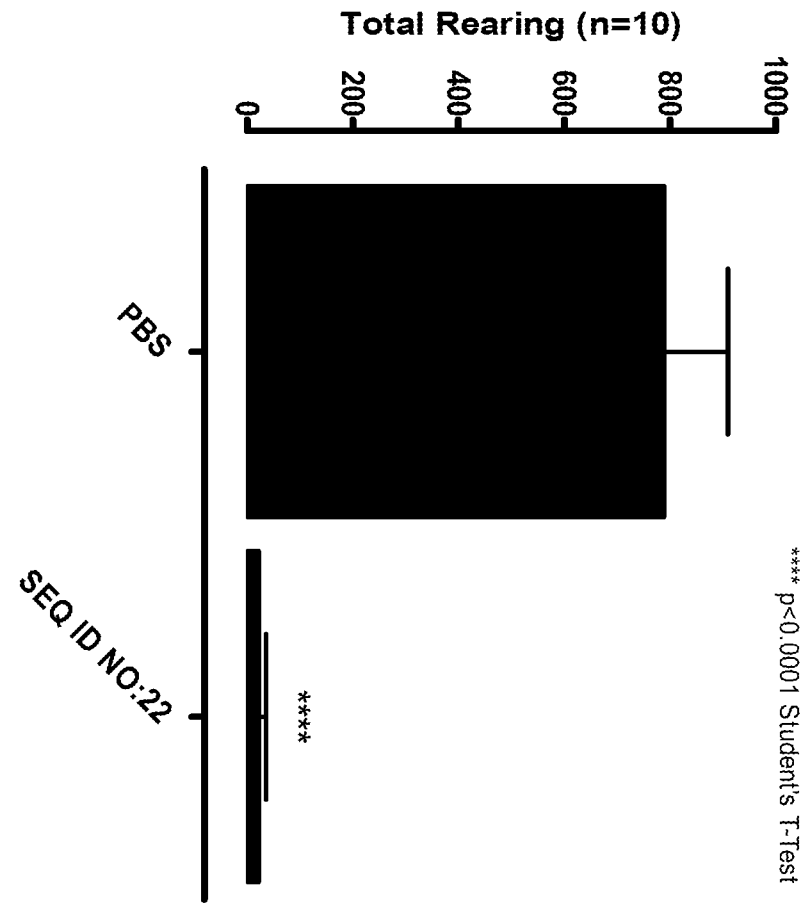

Total Basic Movement
**** p<0.0001 Student's T-Test
Basic Movement (n=10)
15000
10000
5000
0
****
PBS
SEQ ID NO:22

FIG. 100


Total Fine Movement
**** p<0.0001 Student's T-Test
****
Total Fine Movement (n=10)
4000
3000
2000
1000
0
PBS
SEQ ID NO:22



Total Rearing

**** p<0.0001 Student's T-Test

FIG. 101

FIG. 102

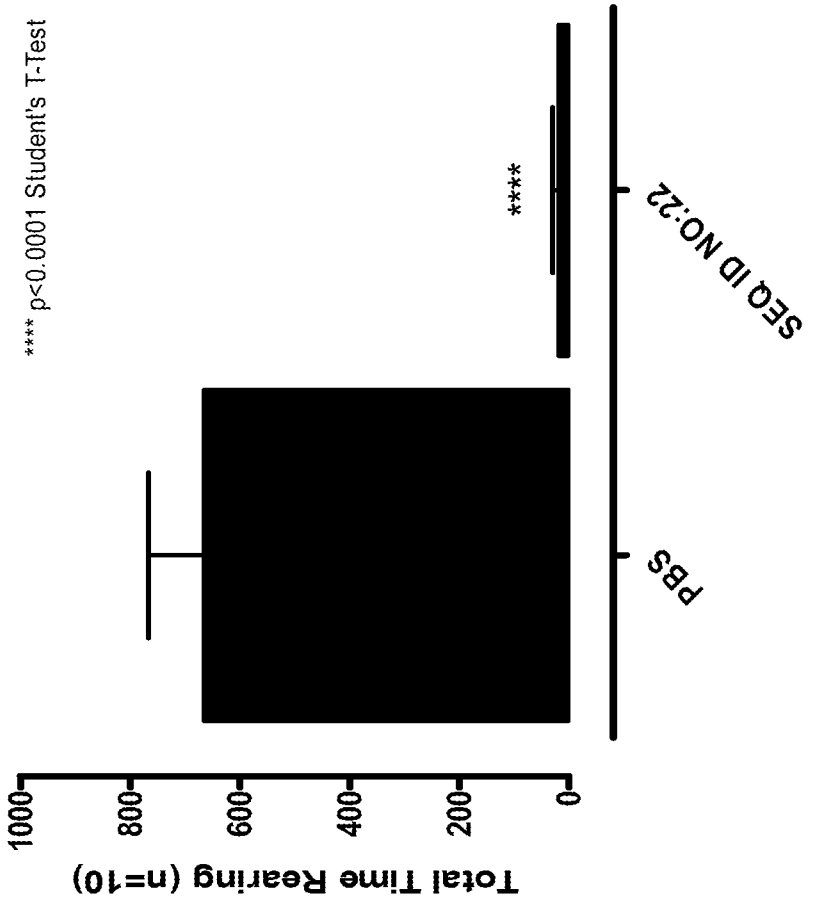

Total Time Rearing
**** p<0.0001 Student's T-Test
****
Total Time Rearing (n=10)
1000
800
600
400
200
0
PBS
SEQ ID NO:22

FIG. 103

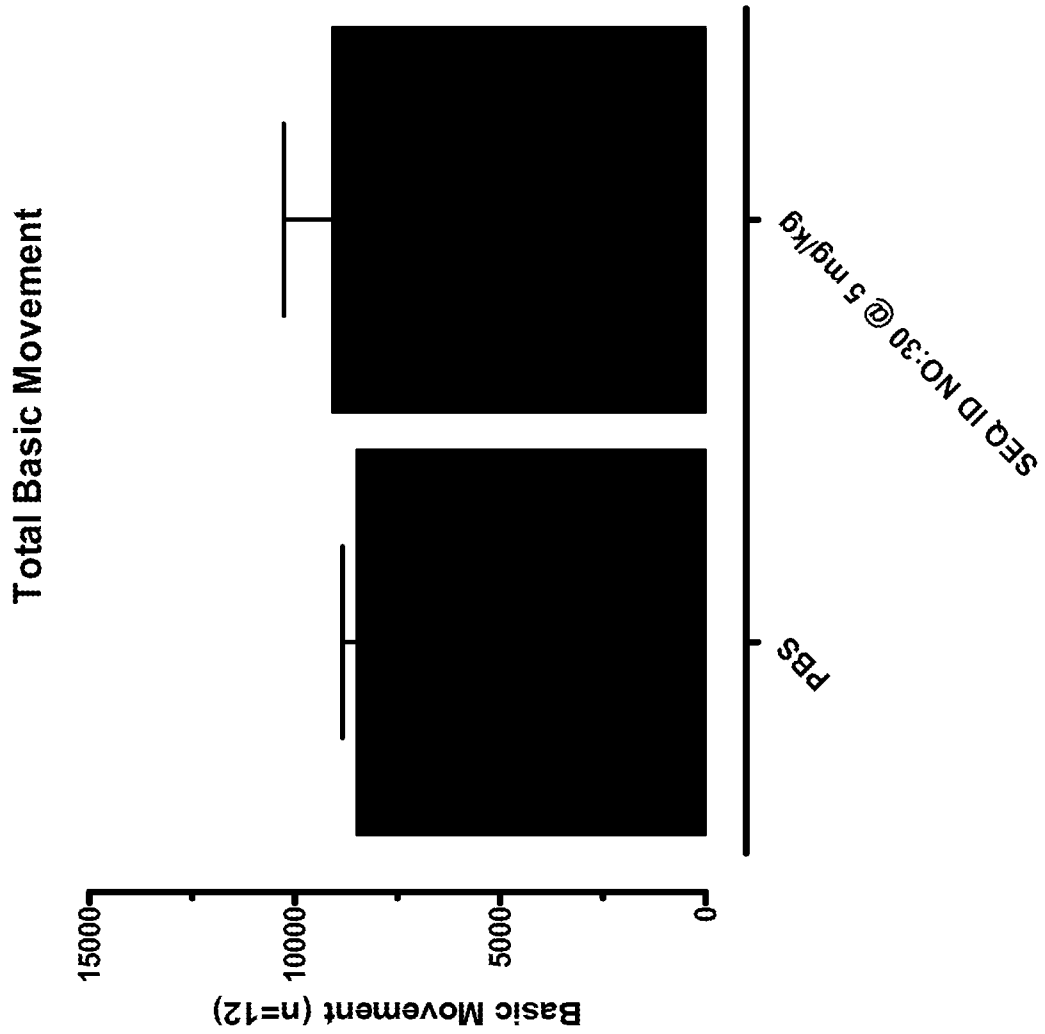

Total Basic Movement
Basic Movement (n=12)
15000
10000
5000
0
PBS
SEQ ID NO:30 @ 5 mg/kg

FIG. 104

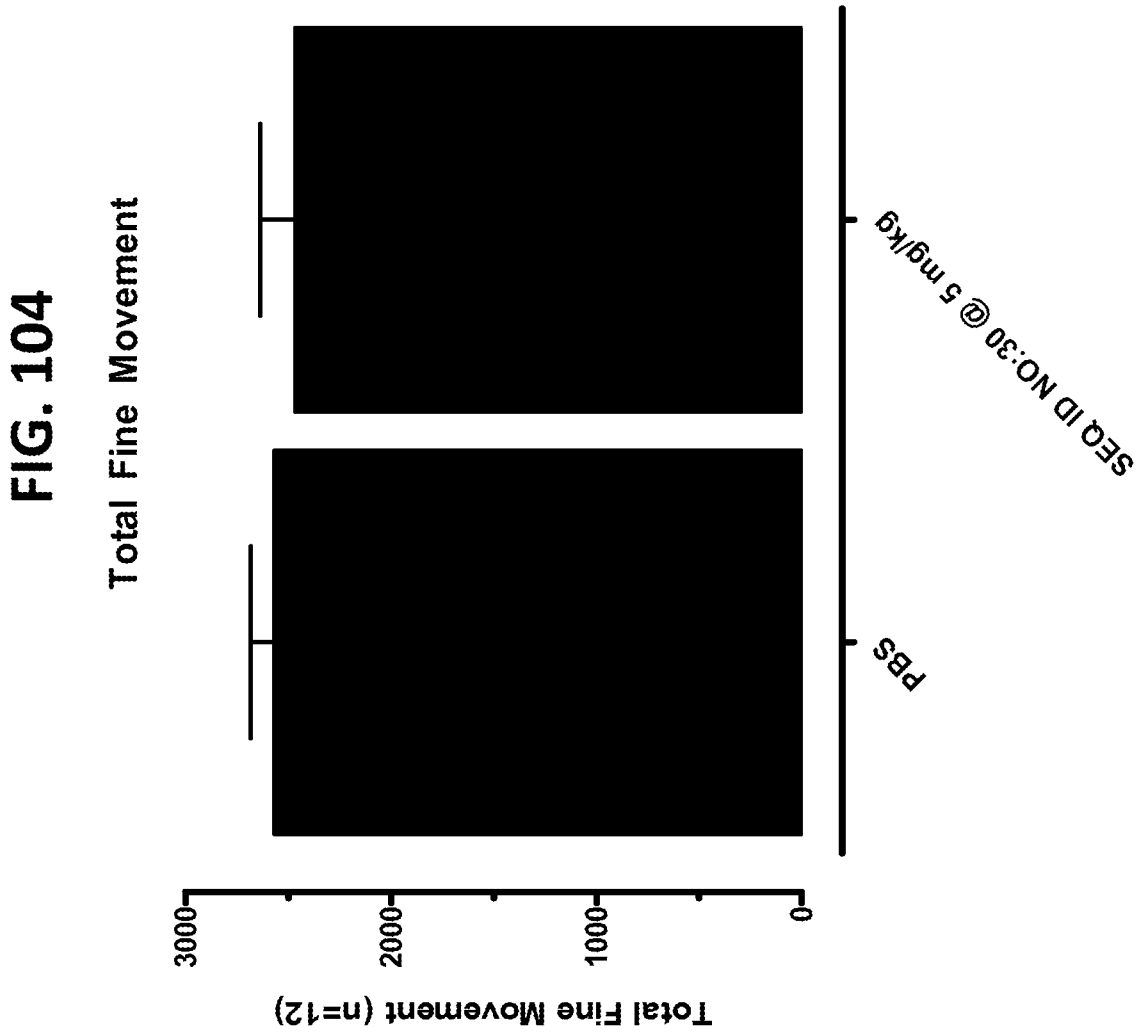

Total Fine Movement
Total Fine Movement (n=12)
3000
2000
1000
0
PBS
SEQ ID NO:30 @ 5 mg/kg

FIG. 105

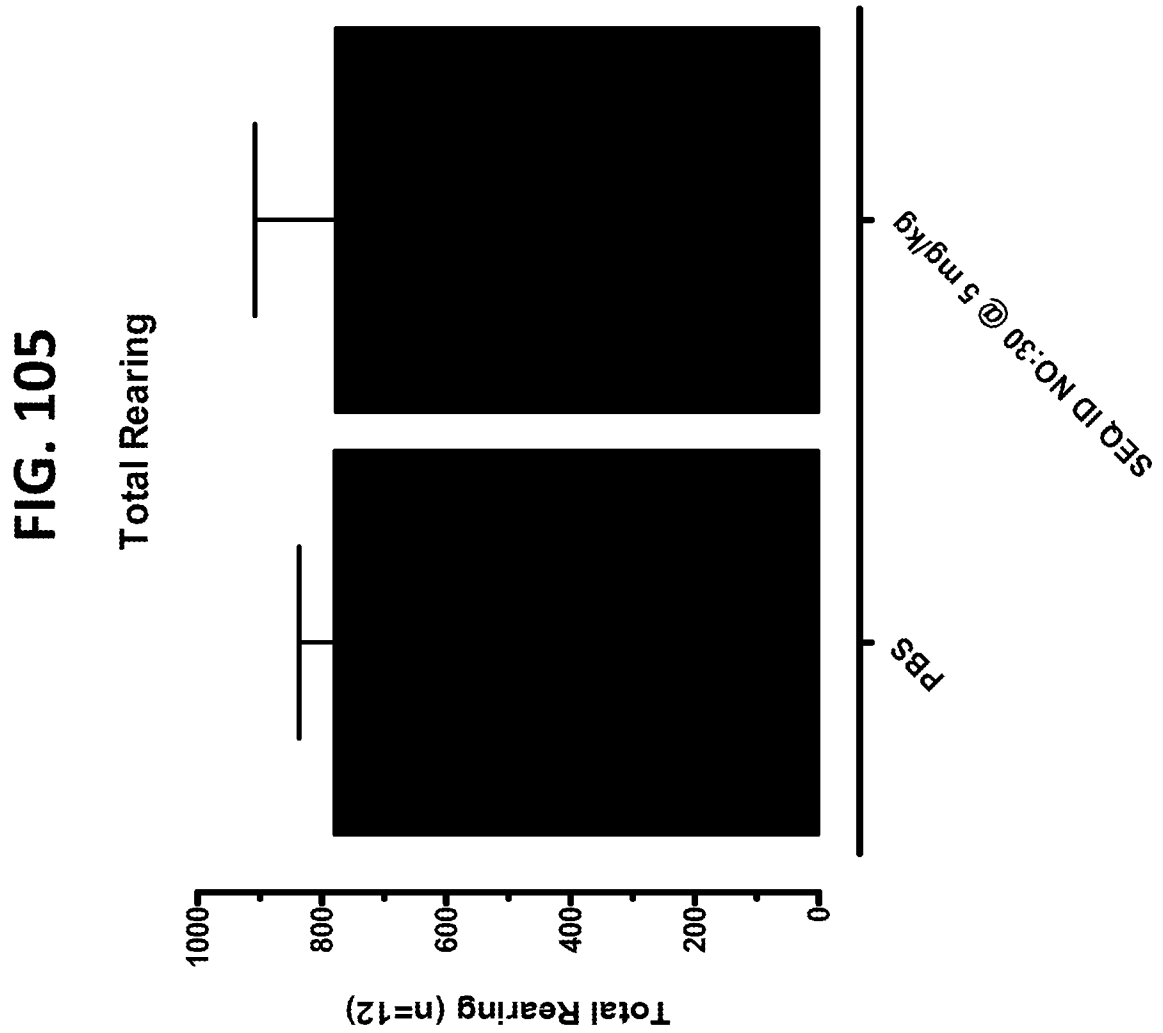

Total Rearing
Total Rearing (n=12)
1000
800
600
400
200
0
PBS
SEQ ID NO:30 @ 5 mg/kg

FIG. 106

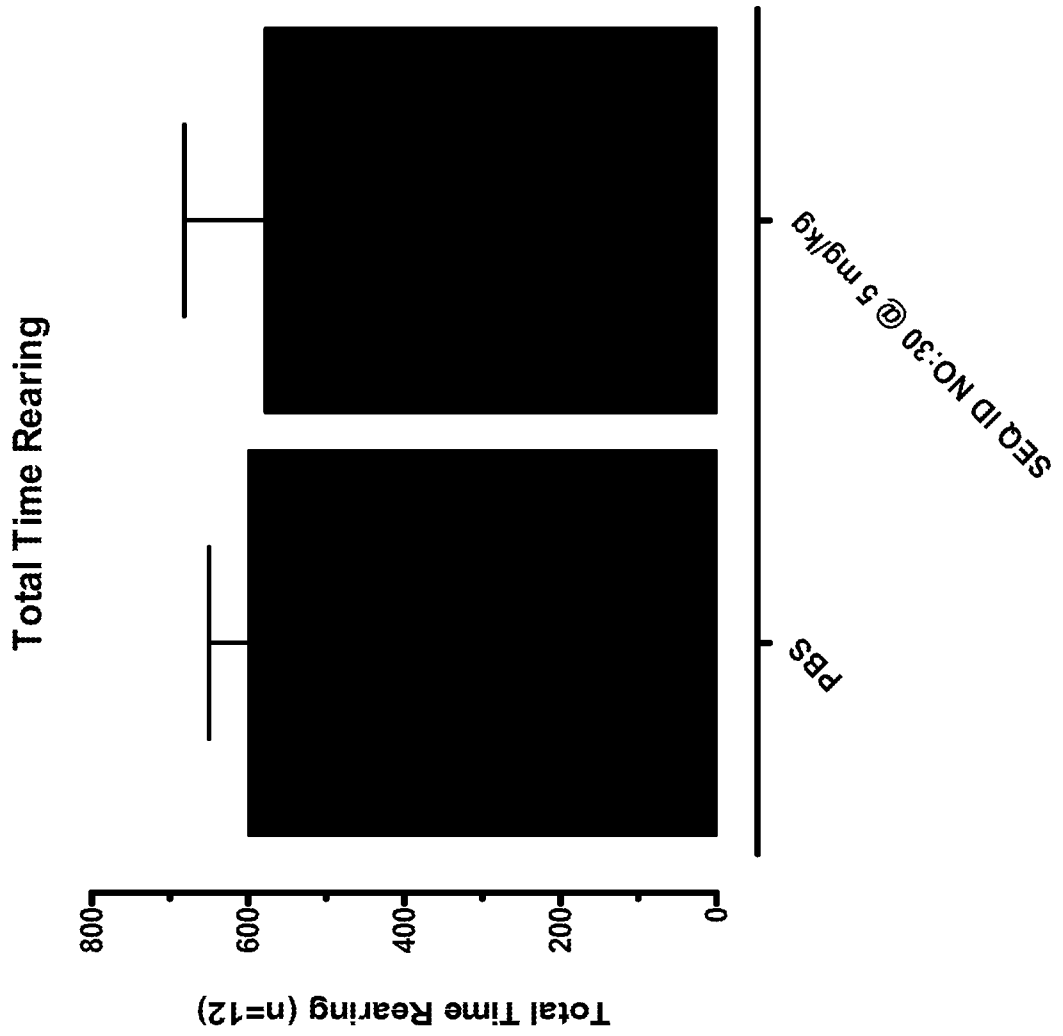

Total Time Rearing
Total Time Rearing (n=12)
800
600
400
200
0
PBS
SEQ ID NO:30 @ 5 mg/kg

FIG. 107

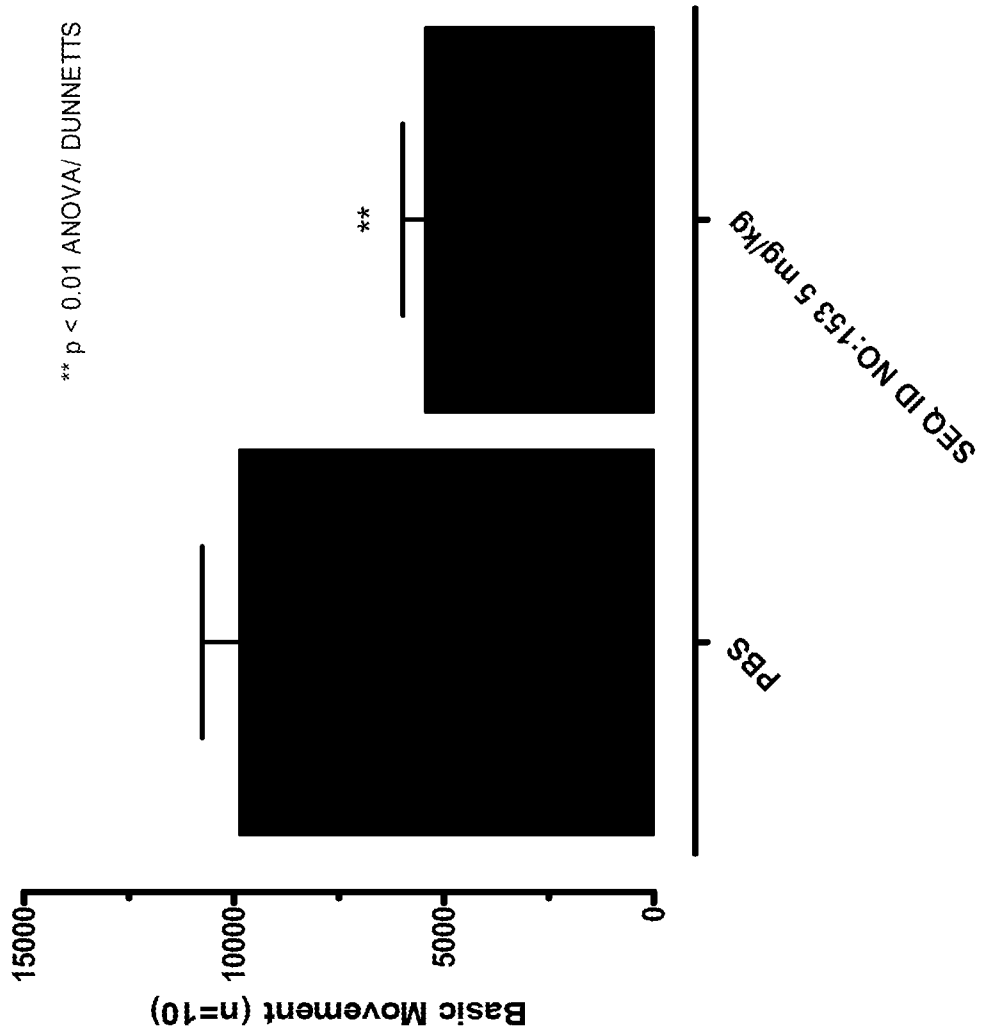

Total Basic Movement
** p < 0.01 ANOVA/ DUNNETTS
**
Basic Movement (n=10)
15000
10000
5000
0
PBS
SEQ ID NO:153 5 mg/kg

FIG. 108

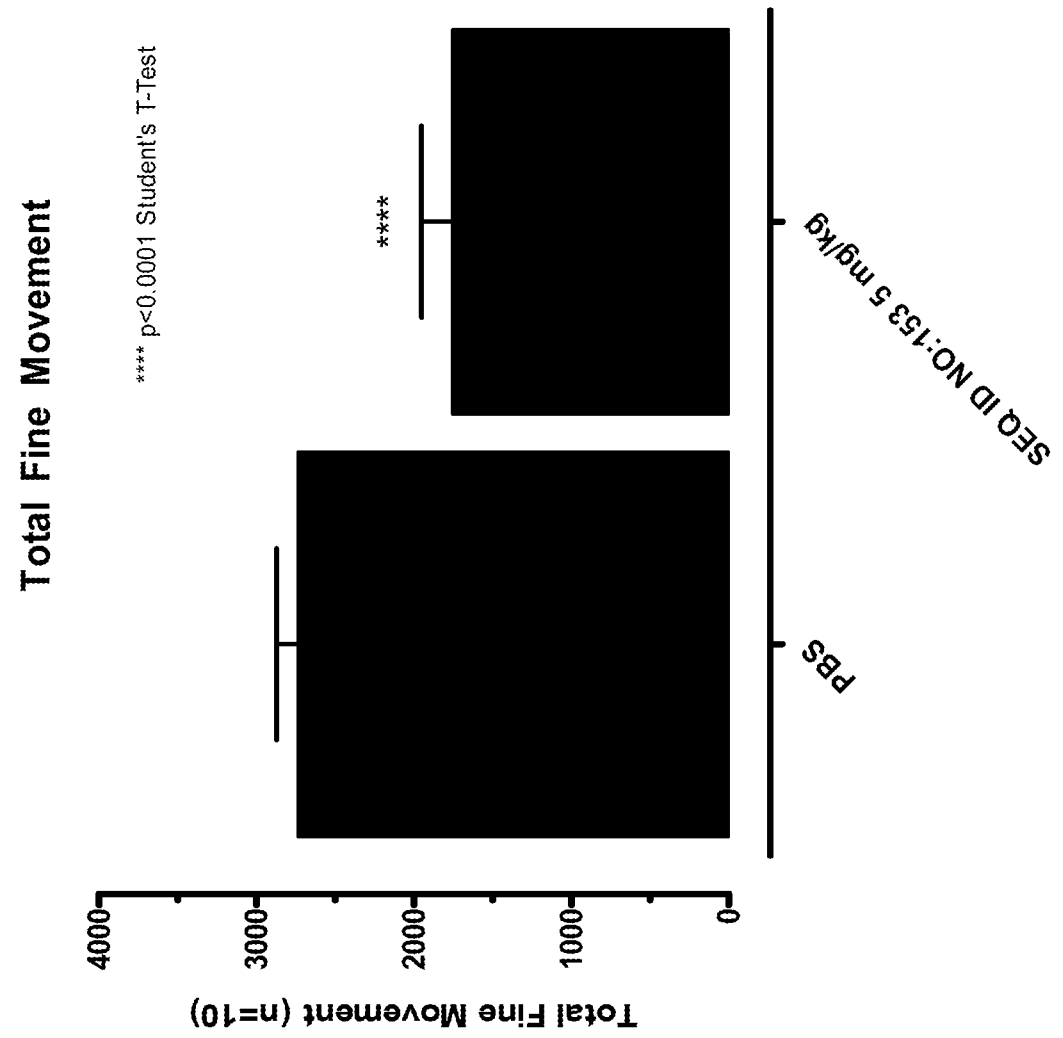

Total Fine Movement
**** p<0.0001 Student's T-Test
****
Total Fine Movement (n=10)
4000
3000
2000
1000
0
PBS
SEQ ID NO:153 5 mg/kg

FIG. 109

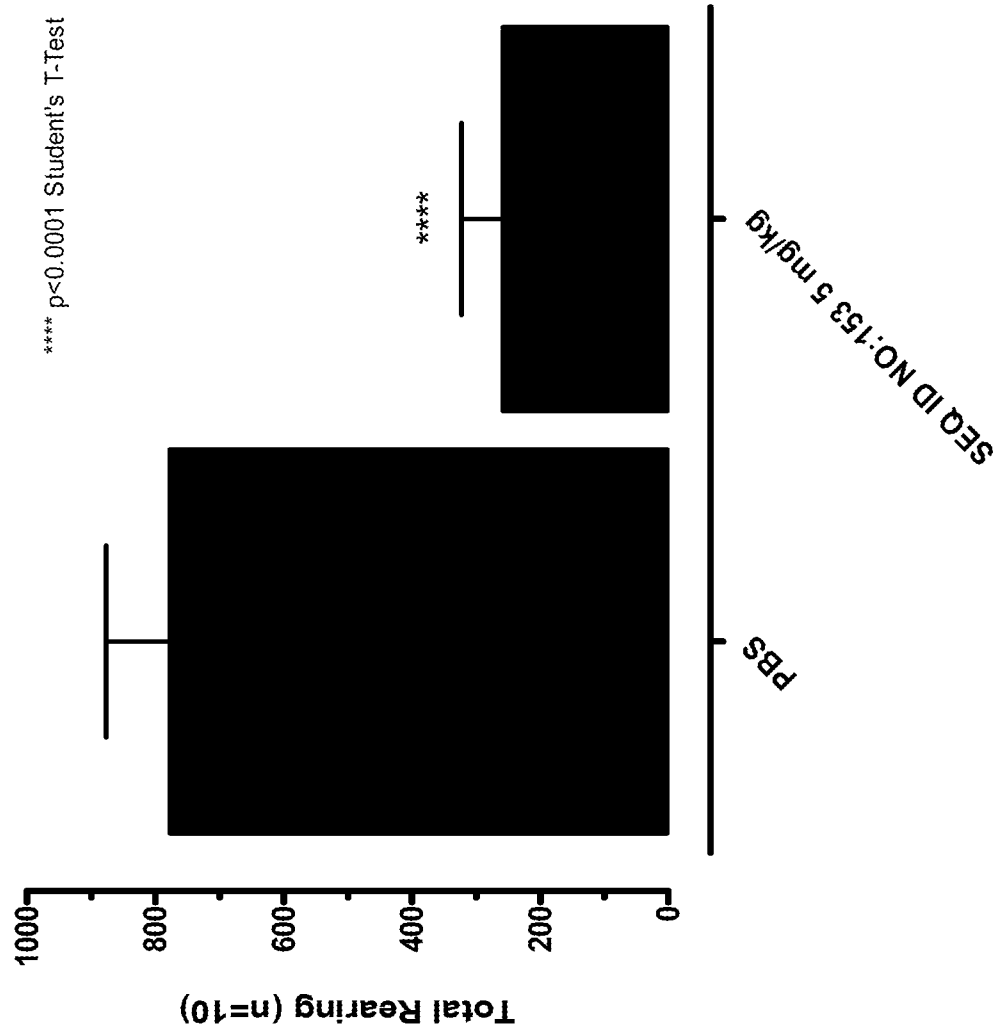

Total Rearing
**** p<0.0001 Student's T-Test
****
Total Rearing (n=10)
1000
800
600
400
200
0
PBS
SEQ ID NO:153 5 mg/kg

FIG. 110

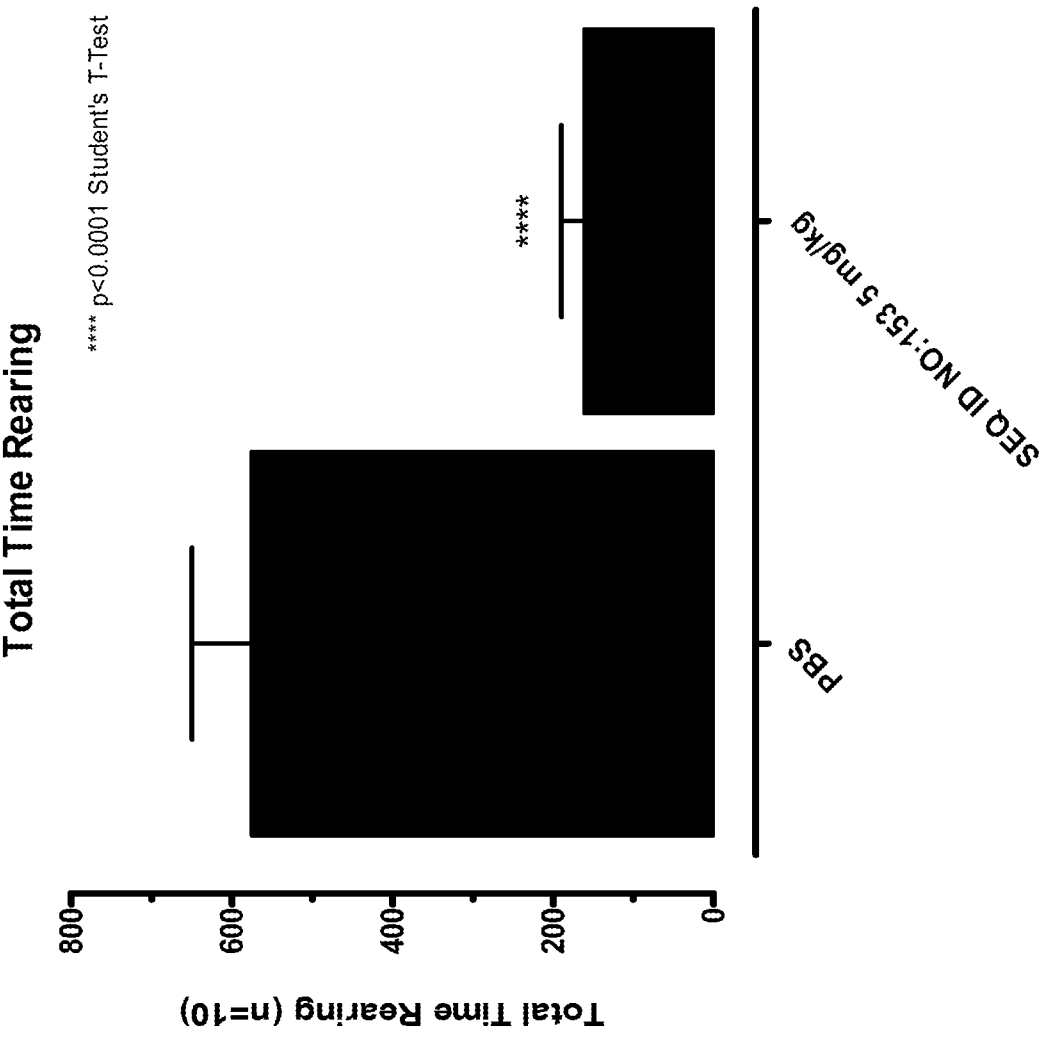

Total Time Rearing
**** p<0.0001 Student's T-Test
****
PBS
SEQ ID NO:153 5 mg/kg
Total Time Rearing (n=10)
800
600
400
200
0

FIG. 111

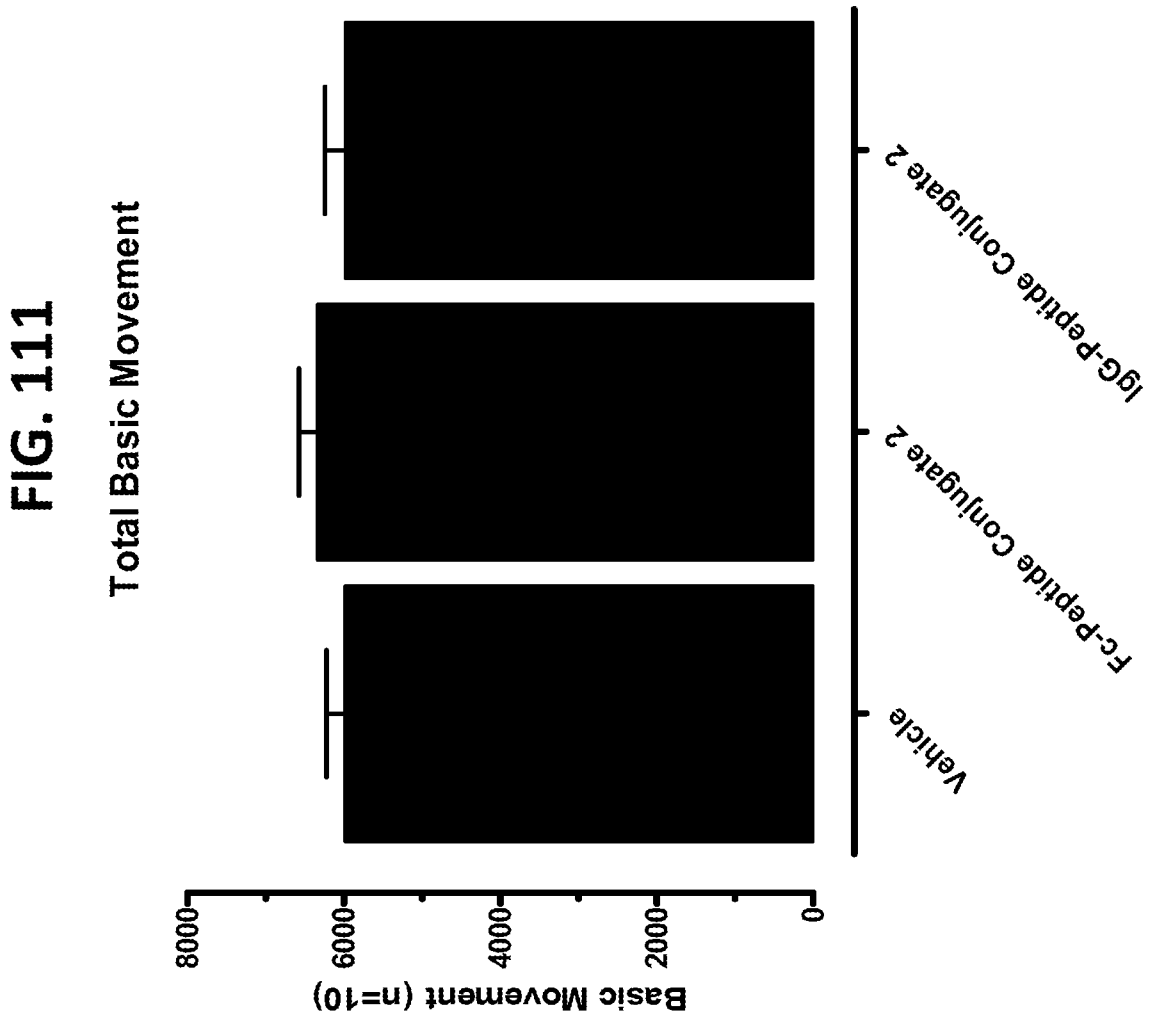

Total Basic Movement
Basic Movement (n=10)
8000
6000
4000
2000
0
Vehicle
Fc-Peptide Conjugate 2
IgG-Peptide Conjugate 2

FIG. 112

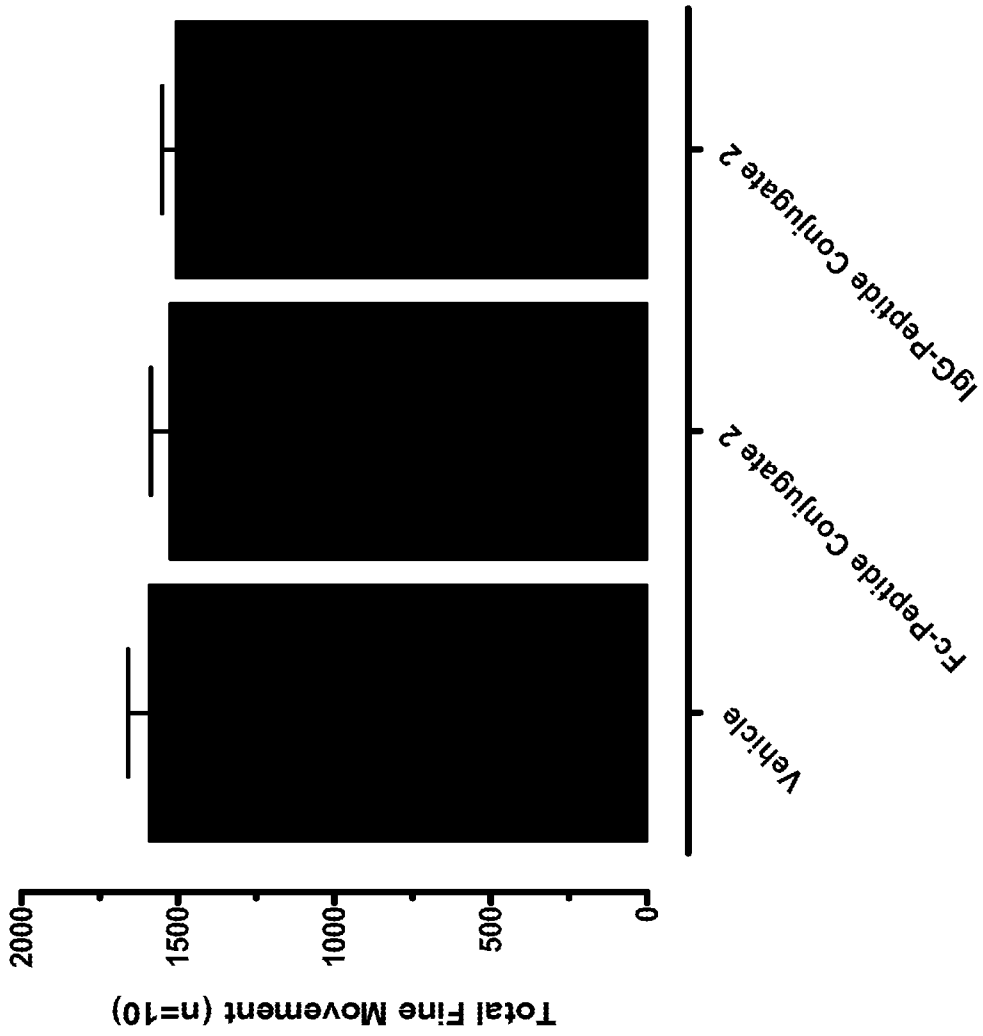

Total Fine Movement
Total Fine Movement (n=10)
2000
1500
1000
500
0
Vehicle
Fc-Peptide Conjugate 2
IgG-Peptide Conjugate 2

FIG. 113

Total Rearing

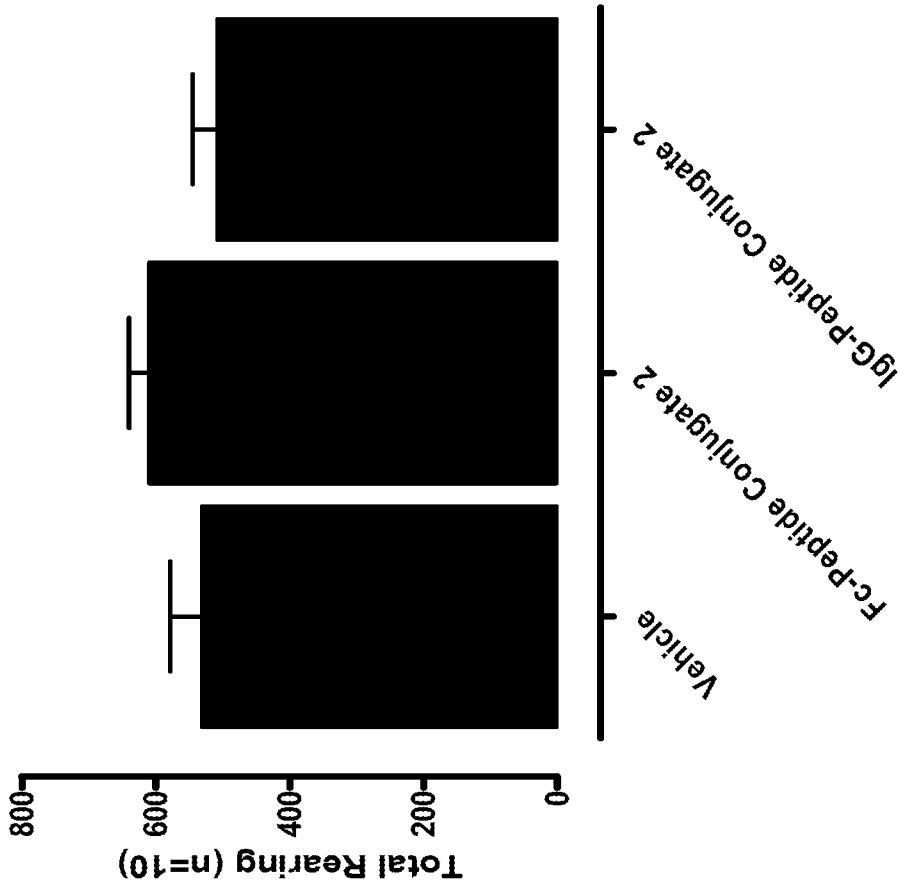


FIG. 114

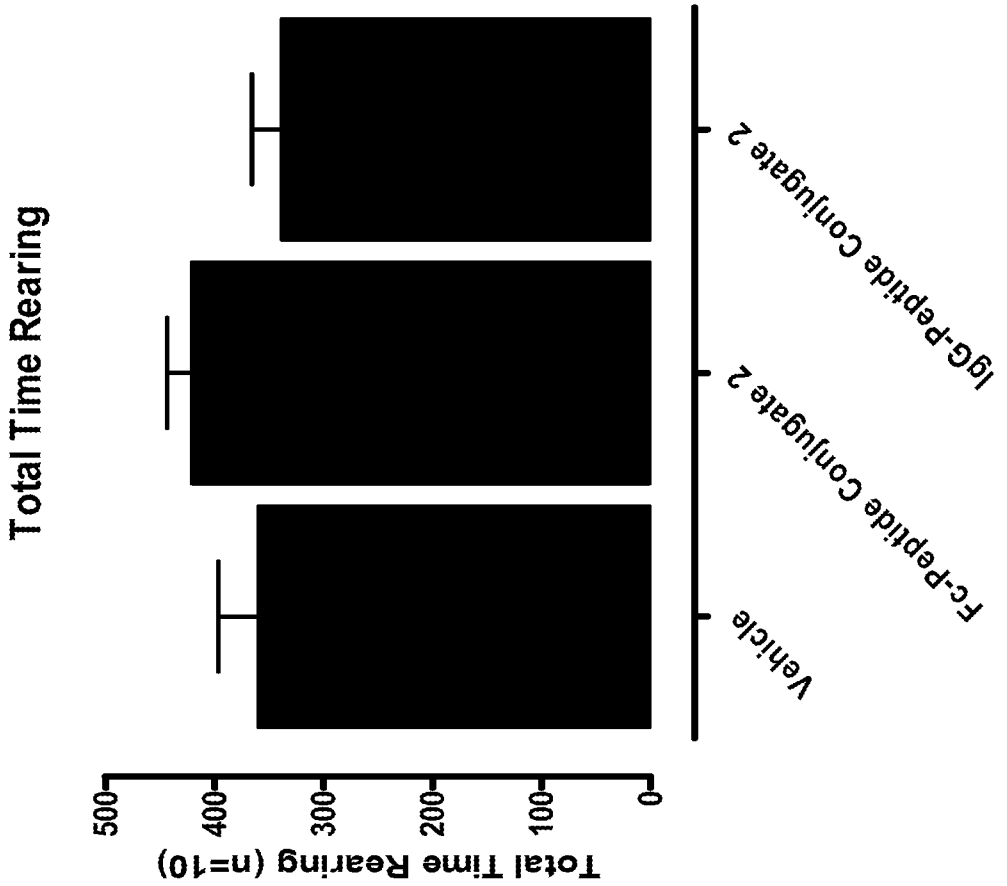

Total Time Rearing
Total Time Rearing (n=10)
0
100
200
300
400
500
Vehicle
Fc-Peptide Conjugate 2
IgG-Peptide Conjugate 2

FIG. 115

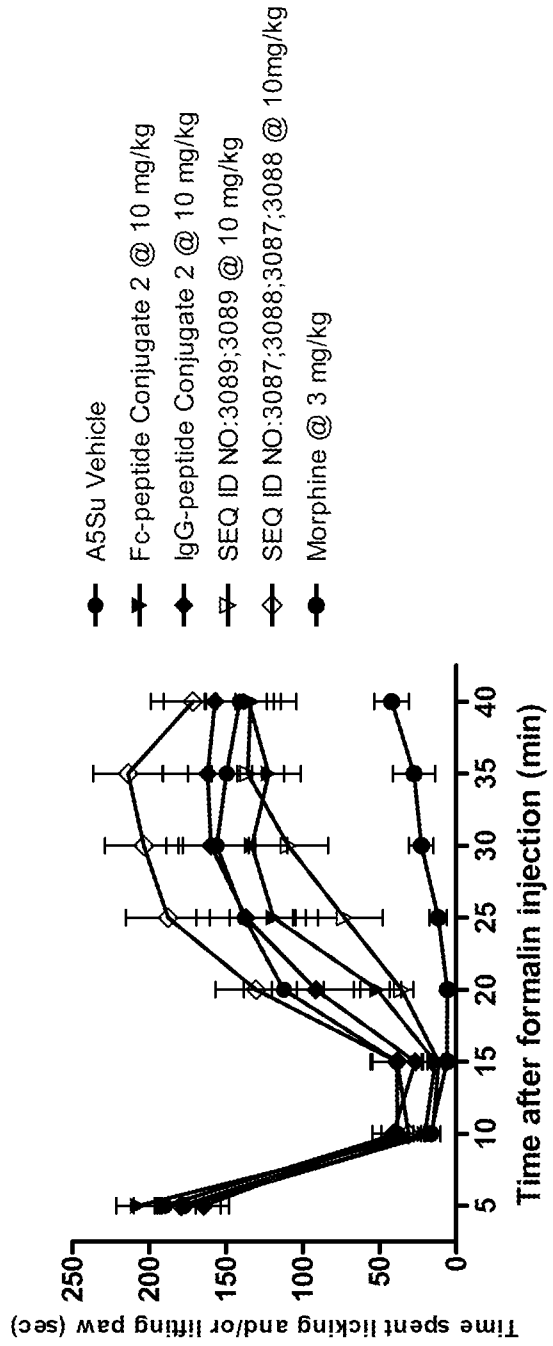

A5Su Vehicle
Fc-peptide Conjugate 2 @ 10 mg/kg
IgG-peptide Conjugate 2 @ 10 mg/kg
SEQ ID NO:3089;3089 @ 10 mg/kg
SEQ ID NO:3087;3088;3087;3088 @ 10mg/kg
Morphine @ 3 mg/kg
Time spent licking and/or lifting paw (sec)
0
50
100
150
200
250
5
10
15
20
25
30
35
40
Time after formalin injection (min)

FIG. 116

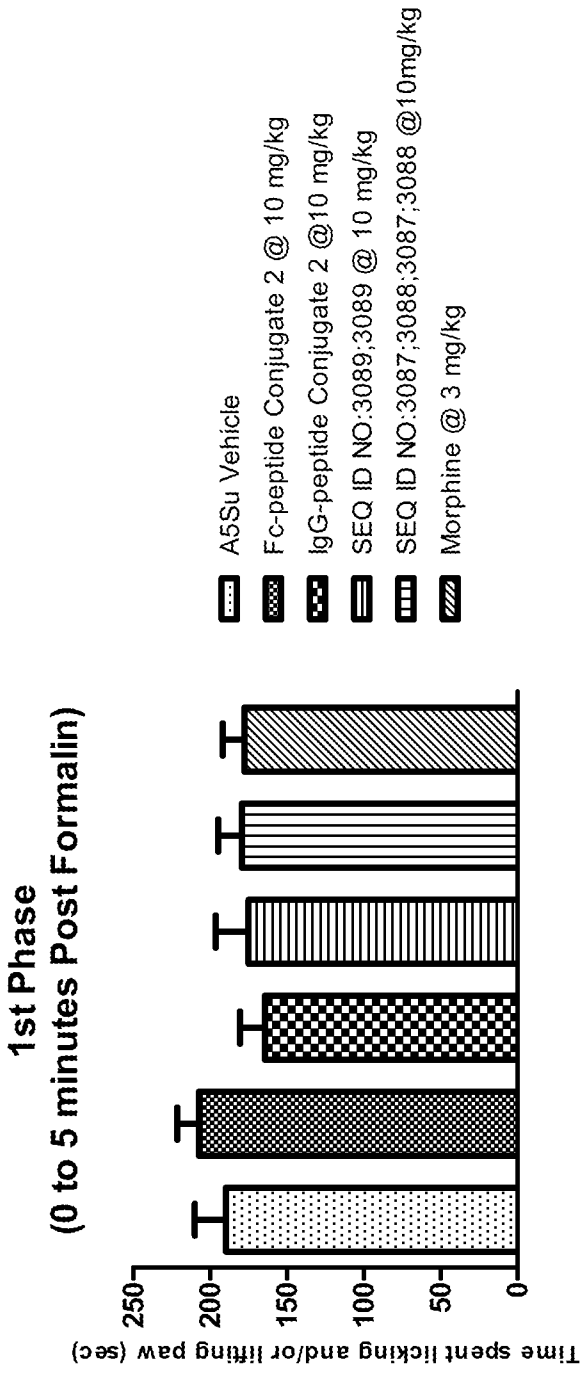
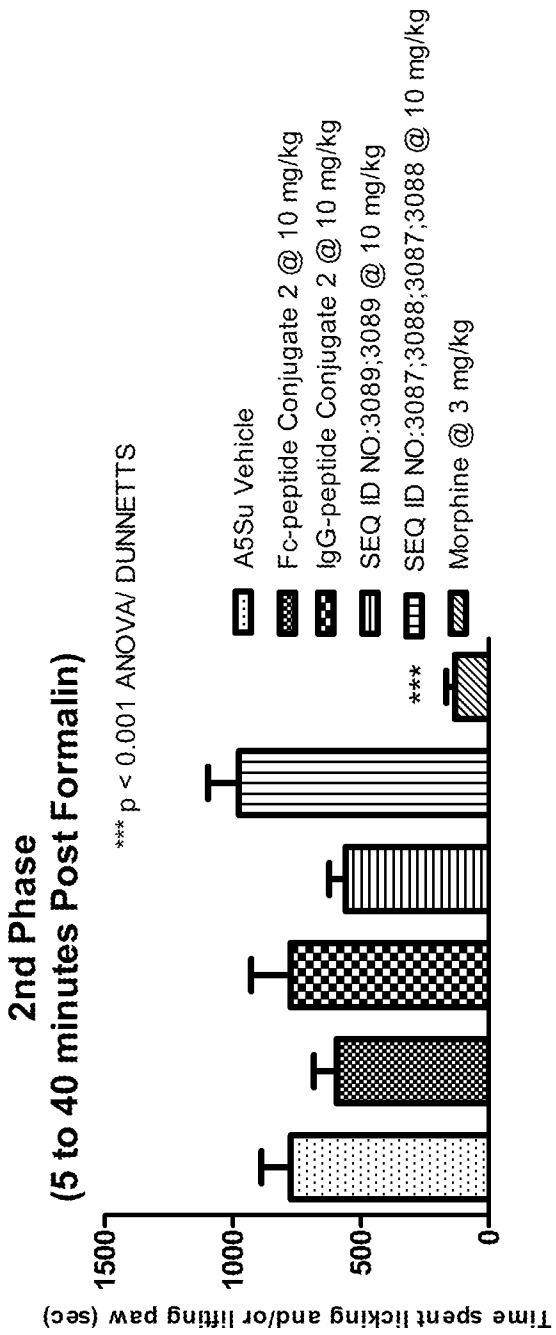

1st Phase
(0 to 5 minutes Post Formalin)
Time spent licking and/or lifting paw (sec)
250
200
150
100
50
0
A5Su Vehicle
Fc-peptide Conjugate 2 @ 10 mg/kg
IgG-peptide Conjugate 2 @10 mg/kg
SEQ ID NO:3089;3089 @ 10 mg/kg
SEQ ID NO:3087;3088;3087;3088 @10mg/kg
Morphine @ 3 mg/kg

FIG. 117


2nd Phase
(5 to 40 minutes Post Formalin)
*** p < 0.001 ANOVA/ DUNNETTS
Time spent licking and/or lifting paw (sec)
1500
1000
500
0
***
A5Su Vehicle
Fc-peptide Conjugate 2 @ 10 mg/kg
IgG-peptide Conjugate 2 @ 10 mg/kg
SEQ ID NO:3089;3089 @ 10 mg/kg
SEQ ID NO:3087;3088;3087;3088 @ 10 mg/kg
Morphine @ 3 mg/kg

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(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **MURRAY, Justin K.** [US/US]; 6879 Pecan Avenue, Moorpark, California 93021 (US). **MIRANDA, Leslie P.** [AU/US]; 3586 Mapleknoll Place, Thousand Oaks, California 91362 (US). **MCDONOUGH, Stefan I.** [US/US]; 12 Concord Avenue, #3, Cambridge, Massachusetts 02138 (US).

(74) Agent: **STEINBERG, Nisan A.**; One Amgen Center Drive, M/S 28-2-C, Thousand Oaks, California 91320-1799 (US).

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(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

— *with sequence listing part of description (Rule 5.2(a))*

(88) Date of publication of the international search report:
3 January 2013

(54) Title: POTENT AND SELECTIVE INHIBITORS OF NAV1.3 AND NAV1.7

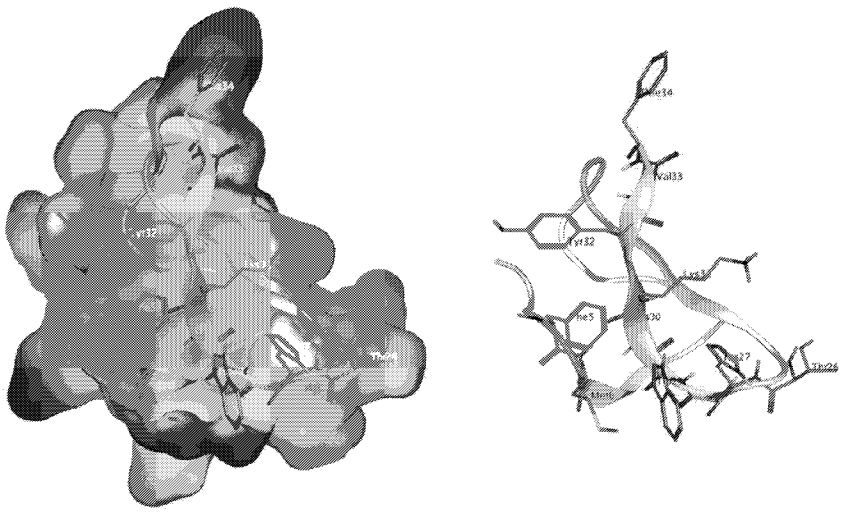


FIG. 10

(57) Abstract: Disclosed is a composition of matter comprising an isolated polypeptide, which is a peripherally-restricted Nav1.7 inhibitor. In some disclosed embodiments, the isolated polypeptide is an inhibitor of Nav1.7 and/or Nav1.3. Other embodiments are conjugated embodiments of the inventive composition of matter and pharmaceutical compositions containing the inventive composition of matter. Isolated nucleic acids encoding some embodiments of inventive polypeptides and expression vectors, and recombinant host cells containing them are disclosed. A method of treating or preventing pain is also disclosed.

WO 2012/125973 A3

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/029537

A. CLASSIFICATION OF SUBJECT MATTER
INV. C07K14/435
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C07K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data, BIOSIS, EMBASE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	WO 2011/033358 A2 (BIOSEARCH 2007 LTD [IL]; MEIR ALON [IL]; CHERKI RONIT SIMCHA [IL]; KOL) 24 March 2011 (2011-03-24)	1-29, 58-69
Y,P	abstract page 4, line 6 - page 8, line 13 page 9, line 12 - page 11, line 22; claims 1-10,29,32,35	30-57, 70-72
X	WO 2010/104114 A1 (NAT INST OF ADVANCED IND SCIEN [JP]; KUBO TAI [JP]; KIMURA TADASHI [JP]) 16 September 2010 (2010-09-16)	1-29,64
Y	abstract	58-63
A	see SEQ ID NO:1; paragraph [0006] - paragraph [0011]	65-69

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 October 2012	31/10/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Mossier, Birgit

4

Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2010/104115 A1 (NAT INST OF ADVANCED IND SCIEN [JP]; KUBO TAI [JP]; KIMURA TADASHI [JP]) 16 September 2010 (2010-09-16)	1-29,64
Y	abstract; figures 2,3	58-63
A	see Grammostola rosea toxin (A1-4) peptide sequence SEQ ID NO:1	65-69

X	JP 2008 000011 A (NAT INST OF ADV IND & TECHNOL) 10 January 2008 (2008-01-10)	1-29,64
Y	abstract	58-63
A	see SEQ ID NO:2; paragraph [0004] paragraph [0013] paragraph [0035]	65-69

X	F. BOSMANS: "Four Novel Tarantula Toxins as Selective Modulators of Voltage-Gated Sodium Channel Subtypes", MOLECULAR PHARMACOLOGY, vol. 69, no. 2, 1 January 2005 (2005-01-01), pages 419-429, XP55031555, ISSN: 0026-895X, DOI: 10.1124/mol.105.015941 abstract figures 1-6; table 1	1-72

Y	KAY B K ET AL: "Convergent evolution with combinatorial peptides", FEBS LETTERS, ELSEVIER, AMSTERDAM, NL, vol. 480, no. 1, 25 August 2000 (2000-08-25), pages 55-62, XP004597873, ISSN: 0014-5793, DOI: 10.1016/S0014-5793(00)01778-6 abstract figures 1-5	30-57, 70-72

A	WO 2007/109324 A2 (XENON PHARMACEUTICALS INC [CA]; FRASER ROBERT A [CA]; SHERRINGTON ROBI) 27 September 2007 (2007-09-27) cited in the application abstract	1-72

A	WO 2006/014493 A2 (YORK STOR THE RES FOUNDATION O [US]; SACHS FREDERICK [US]; SUCHYNA THO) 9 February 2006 (2006-02-09) abstract	1-72

	-/--	

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	TIFFANY S. HAN ET AL: "Disulfide-Depleted Selenoconopeptides: Simplified Oxidative Folding of Cysteine-Rich Peptides", ACS MEDICINAL CHEMISTRY LETTERS, vol. 1, no. 4, 8 July 2010 (2010-07-08), pages 140-144, XP55031546, ISSN: 1948-5875, DOI: 10.1021/ml900017q abstract	1-72
A	NORTON R S ET AL: "THE CYSTINE KNOT STRUCTURE OF ION CHANNEL TOXINS AND RELATED POLYPEPTIDES", TOXICON, ELMSFORD, NY, US, vol. 36, no. 11, 1 November 1998 (1998-11-01), pages 1573-1583, XP002929406, ISSN: 0041-0101, DOI: 10.1016/S0041-0101(98)00149-4 abstract	1-72
A	KRAFTE ET AL: "Sodium channels and nociception: recent concepts and therapeutic opportunities", CURRENT OPINION IN PHARMACOLOGY, ELSEVIER SCIENCE PUBLISHERS, NL, vol. 8, no. 1, 26 October 2007 (2007-10-26), pages 50-56, XP022450582, ISSN: 1471-4892, DOI: 10.1016/J.COPH.2007.09.007 abstract; tables 1-3	1-72
A	ZULIANI: "Recent advances in the medicinal chemistry of sodium channel blockers and their therapeutic potential", CURRENT TOPICS IN MEDICINAL CHEMISTRY, vol. 9, no. 4, 1 January 2009 (2009-01-01) , page 396, XP55041770, ISSN: 1568-0266, DOI: 10.2174/156802609788317856 abstract page 405, column 2, paragraph 3 - page 411	1-72
A	HEDVIG BÃLCSKEI ET AL: "Voltage-gated sodium channel blockers, 2001-2006: An overview", MEDICINAL CHEMISTRY RESEARCH, BIRKHÄUSER-VERLAG, BO, vol. 17, no. 2-7, 18 December 2007 (2007-12-18), pages 356-368, XP019631110, ISSN: 1554-8120 abstract	1-72

-/--

4

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	SEIGO ONO ET AL: "Characterization of voltage-dependent calcium channel blocking peptides from the venom of the tarantula", TOXICON, ELMSFORD, NY, US, vol. 58, no. 3, 15 June 2011 (2011-06-15), pages 265-276, XP028250541, ISSN: 0041-0101, DOI: 10.1016/J.TOXICON.2011.06.006 [retrieved on 2011-06-28] abstract page 271, column 1, paragraph 2 - page 275; figures 5-7; table 1 -----	1-29

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/029537

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-29, 58-69(all partially)

   A composition of matter comprising the polypeptide comprising the amino acid sequence of the formula set forth in claim 1 wherein the polypeptide is the peptide designated GpTx-1 (SEQ ID NO:1) and the subject-matter relating thereto.

   ---

2. claims: 30-53, 70-72(completely); 1-29, 54-69(partially)

   A composition of matter comprising the polypeptide comprising the amino acid sequence of the formula set forth in claim 1 wherein said peptide is an GpTx-1 toxin analog and the subject-matter relating thereto.

   ---

3. claims: 54-69(partially)

   A composition of matter comprising the amino acid sequences set forth in claim 54 as far as not covered by Invention 2 and the subject-matter relating thereto.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2012/029537

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2011033358 A2	24-03-2011	AR 078374 A1	02-11-2011
		AU 2010296994 A1	19-04-2012
		CA 2774350 A1	24-03-2011
		CN 102573884 A	11-07-2012
		EP 2504023 A2	03-10-2012
		SG 179101 A1	30-05-2012
		US 2011065647 A1	17-03-2011
		WO 2011033358 A2	24-03-2011
WO 2010104114 A1	16-09-2010	NONE	
WO 2010104115 A1	16-09-2010	NONE	
JP 2008000011 A	10-01-2008	JP 4742345 B2	10-08-2011
		JP 2008000011 A	10-01-2008
WO 2007109324 A2	27-09-2007	NONE	
WO 2006014493 A2	09-02-2006	US 2006014691 A1	19-01-2006
		WO 2006014493 A2	09-02-2006

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(71)申请人 安姆根有限公司
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(74)专利代理机构 中国专利代理(香港)有限公司 72001
代理人 罗文锋 李进
(51)Int.Cl.
C07K 14/435(2006.01)

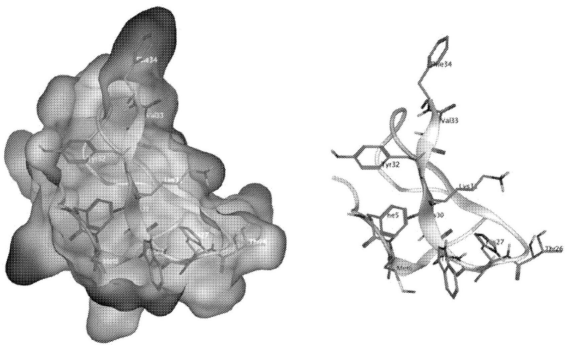
权利要求书9页 说明书365页
序列表(电子公布) 附图116页

(54)发明名称

Nav1.3和Nav1.7的强效及选择性抑制剂

(57)摘要

本发明公开了一种物质组合物,所述物质组合物包含分离的多肽,所述分离的多肽为外周限制性Nav1.7抑制剂。在一些公开的实施方案中,所述分离的多肽为Nav1.7和/或Nav1.3抑制剂。其他实施方案为本发明的物质组合物和包含本发明物质组合物的药物组合物的偶联实施方案。公开了编码本发明多肽的一些实施方案的分离核酸和表达载体,以及包含它们的重组宿主细胞。还公开了治疗或预防疼痛的方法。



CN 103930437 A

1. 一种物质组合物，所述物质组合物包含具有下式的氨基酸序列的分离多肽：

$X_{aa}^{1}X_{aa}^{2}$ $X_{aa}^{3}X_{aa}^{4}X_{aa}^{5}X_{aa}^{6}X_{aa}^{7}X_{aa}^{8}X_{aa}^{9}X_{aa}^{10}X_{aa}^{11}X_{aa}^{12}X_{aa}^{13}X_{aa}^{14}Asp^{15}$ X_{aa}^{16} X_{aa}^{17}

$X_{aa}^{18}X_{aa}^{19}$ X_{aa}^{20} $X_{aa}^{21}X_{aa}^{22}X_{aa}^{23}$ $X_{aa}^{24}X_{aa}^{25}$ $X_{aa}^{26}X_{aa}^{27}X_{aa}^{28}X_{aa}^{29}X_{aa}^{30}$

$X_{aa}^{31}Lys^{32}X_{aa}^{33}X_{aa}^{34}X_{aa}^{35}$ $X_{aa}^{36}X_{aa}^{37}X_{aa}^{38}$//SEQ ID NO:475

或其药学上可接受的盐，

其中：

$X_{aa}^{1}X_{aa}^{2}$ 不存在；或者 X_{aa}^{1} 为任何氨基酸残基并且 X_{aa}^{2} 为任何氨基酸残基；或者 X_{aa}^{1} 不存在并且 X_{aa}^{2} 为任何氨基酸残基；

X_{aa}^{3} 在 X_{aa}^{18} 为 Cys 时为 Cys；或者 X_{aa}^{3} 在 X_{aa}^{18} 为 SeCys 时为 SeCys；或者 X_{aa}^{3} 在 X_{aa}^{18} 为烷基氨基酸残基时为烷基氨基酸残基；

X_{aa}^{4} 为酸性、疏水性、碱性或中性亲水性氨基酸残基；

X_{aa}^{5} 为 Gly、Ala、疏水性或碱性氨基酸残基；

X_{aa}^{6} 为 Gly、Ala、2-Abu、Nle、Nva 或疏水性氨基酸残基；

X_{aa}^{7} 为 Gly、Ala、芳族或疏水性氨基酸残基；

X_{aa}^{8} 为碱性、酸性或中性亲水性氨基酸残基，或 Ala 残基；

X_{aa}^{9} 为碱性或中性亲水性氨基酸残基；

X_{aa}^{10} 在 X_{aa}^{24} 为 Cys 时为 Cys；或者 X_{aa}^{10} 在 X_{aa}^{24} 为 SeCys 时为 SeCys；

X_{aa}^{11} 为任何氨基酸残基；

X_{aa}^{12} 为 Pro、酸性、中性或疏水性氨基酸残基；

X_{aa}^{13} 为任何氨基酸残基；

X_{aa}^{14} 为任何氨基酸残基；

X_{aa}^{16} 为碱性、中性亲水性或酸性氨基酸残基，或 Ala 残基；

X_{aa}^{17} 在 X_{aa}^{31} 为 Cys 时为 Cys；或者 X_{aa}^{17} 在 X_{aa}^{31} 为 SeCys 时为 SeCys；

X_{aa}^{18} 为 Cys、SeCys 或烷基氨基酸残基；

X_{aa}^{19} 为任何氨基酸残基；

X_{aa}^{20} 为 Pro、Gly、碱性或中性亲水性残基；

X_{aa}^{21} 为碱性、疏水性或中性亲水性氨基酸残基；

X_{aa}^{22} 为疏水性或碱性氨基酸残基；

X_{aa}^{23} 为疏水性、碱性或中性亲水性氨基酸残基；

X_{aa}^{24} 为 Cys 或 SeCys 残基；

X_{aa}^{25} 为 Ser、Ala 或中性亲水性氨基酸残基；

X_{aa}^{26} 为 Ala、酸性、碱性或中性亲水性氨基酸残基；

X_{aa}^{27} 为酸性、碱性、中性亲水性或疏水性残基；

X_{aa}^{28} 为芳族或碱性氨基酸残基；

X_{aa}^{29} 为酸性、碱性或中性亲水性氨基酸残基；

X_{aa}^{30} 为 Trp、5-溴代 Trp、6-溴代 Trp、5-氯代 Trp、6-氯代 Trp、1-Nal、2-Nal 或硫代 Trp 残基；

X_{aa}^{31} 为 Cys 或 SeCys；

X_{aa}^{33} 为疏水性或芳族氨基酸残基；

X_{aa}^{34} 为任何氨基酸残基；

X_{aa}^{35} 为疏水性氨基酸残基；

X_{aa}^{36}、X_{aa}^{37} 和 X_{aa}^{38} 的每一者独立地不存在或独立地为中性、碱性或疏水性氨基酸残基；

并且其中：

如果 X_{aa}^{3} 和 X_{aa}^{18} 均为 Cys 残基，则在残基 X_{aa}^{3} 与残基 X_{aa}^{18} 之间存在二硫键；或者如果 X_{aa}^{3} 和 X_{aa}^{18} 均为 SeCys 残基，则在残基 X_{aa}^{3} 与残基 X_{aa}^{18} 之间存在二硒键；

如果 X_{aa}^{10} 和 X_{aa}^{24} 均为 Cys 残基，则在残基 X_{aa}^{10} 与残基 X_{aa}^{24} 之间存在二硫键；或者如果 X_{aa}^{10} 和 X_{aa}^{24} 均为 SeCys 残基，则在残基 X_{aa}^{10} 与残基 X_{aa}^{24} 之间存在二硒键；

如果 X_{aa}^{17} 和 X_{aa}^{31} 均为 Cys 残基，则在残基 X_{aa}^{17} 与残基 X_{aa}^{31} 之间存在二硫键；或者如果 X_{aa}^{17} 和 X_{aa}^{31} 均为 SeCys 残基，则在残基 X_{aa}^{17} 与残基 X_{aa}^{31} 之间存在二硒键；

氨基末端残基任选地被乙酰化、生物素酰化或 4- 戊炔酰化或聚乙二醇化；并且

羧基末端残基任选地被酰胺化。

2. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{4} 选自 Ala、Glu、Asp、Phe、Pro、Ile、Leu、Met、Val、Trp、Tyr、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、4- 苯基 - 苯丙氨酸 (Bip)、Gln、Asn、Ser、Thr、磷酸丝氨酸、磷酸酪氨酸、γ- 羧基谷氨酸和 Cit 残基。

3. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{5} 选自 Ala、Phe、Ile、Leu、Met、Val、Trp、Tyr、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1' NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

4. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{6} 选自 Ala、Gly、2-Abu、Phe、Ile、Leu、Met、Val、Trp、Tyr、脯氨酸、硫杂脯氨酸、蛋氨酸、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1' NMe-Trp、环戊基甘氨酸 (Cpg)、苯基甘氨酸、N- 甲基亮氨酸、N- 甲基苯丙氨酸、N- 甲基缬氨酸、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、2- 氯苯丙氨酸、4- 氯苯丙氨酸、3,4- 二氯苯丙氨酸、4- 三氟甲基 - 苯丙氨酸和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

5. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{7} 选自 Gly、Ala、Phe、Ile、Leu、Met、Val、Trp、Tyr、正亮氨酸、正缬氨酸、Pro、2- 吡啶基丙氨酸、1-Nal、2-Nal、1' NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、2- 氯苯丙氨酸、4- 氯苯丙氨酸、3,4- 二氯苯丙氨酸、4- 三氟甲基 - 苯丙氨酸和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

6. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{8} 选自 Ala、Arg、Lys、His、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、Ser、Thr、Asn、Gln、Cit、Asp、磷酸丝氨酸、磷酸酪氨酸、γ- 羧基谷氨酸和 Glu 残基。

7. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{9} 选自 Ala、Pro、Met、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、Gln、Asn、Ser、

Thr 和 Cit 残基。

8. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{11} 选自 Ala、Asp、Glu、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、Pra、Atz、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω - 氨基精氨酸、ω - 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

9. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{12} 选自丙氨酸、缬氨酸、亮氨酸、异亮氨酸、脯氨酸、丝氨酸、苏氨酸、天冬氨酸、谷氨酸、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1' NMe-Trp、Cha 和 4- 苯基 - 苯丙氨酸 (Bip)、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、天冬酰胺、谷氨酰胺、蛋氨酸、羟基脯氨酸、苯丙氨酸、色氨酸和酪氨酸。

10. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{13} 选自 Ala、Asp、Glu、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、Pra、Atz、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω - 氨基精氨酸、ω - 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

11. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{14} 选自 Ala、Asp、Glu、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、Pra、Atz、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω - 氨基精氨酸、ω - 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

12. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{16} 选自 Ala、Pro、Met、Arg、Lys、His、Pra、Atz、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω - 氨基精氨酸、ω - 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、Gln、Asn、Ser、Thr、Cit、Asp、磷酸丝氨酸、磷酸酪氨酸、γ - 羧基谷氨酸和 Glu 残基。

13. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{19} 选自 Ala、Asp、Glu、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω - 氨基精氨酸、ω - 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

14. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{20} 选自 Ala、Gly、Pro、Met、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω - 氨基精氨酸、ω - 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、Gln、Asn、Ser、Thr 和 Cit 残基。

15. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{21} 选自 Ala、Phe、Pro、Ile、Leu、Met、Val、Trp、Tyr、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω - 氨基精氨酸、ω - 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、4- 苯基 - 苯丙氨酸 (Bip)、Gln、Asn、Ser、Thr 和 Cit 残基。

16. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{22} 选自 Ala、Phe、Ile、Leu、Met、Val、

Trp、Tyr、Arg、Lys、His、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1'NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

17. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{23} 选自 Ala、Phe、Pro、Ile、Leu、Met、Val、Trp、Tyr、Arg、Lys、His、Pra、Atz、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、4- 苯基 - 苯丙氨酸 (Bip)、Gln、Asn、Ser、Thr 和 Cit 残基。

18. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{25} 选自 Ala、Gly Pro、Met、Gln、Asn、Ser、Thr 和 Cit 残基。

19. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{26} 选自 Ala、Pro、Met、Arg、Lys、His、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、甘氨酸、Glu、Asp、磷酸丝氨酸、磷酸酪氨酸、γ - 羧基谷氨酸、Gln、Asn、Ser、Thr 和 Cit 残基。

20. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{27} 选自 Thr、Leu、Ile、Val、Ser、Met、Gln、Asn、Phe、Tyr、Trp、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、4- 苯基 - 苯丙氨酸 (Bip)、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、Asp、Glu、磷酸丝氨酸、磷酸酪氨酸、γ - 羧基谷氨酸和 Gly 残基。

21. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{28} 选自 Phe、Trp、Tyr、Arg、Lys、His、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、1-Nal、2-Nal、2- 吡啶基 - 丙氨酸、3- 吡啶基 - 丙氨酸、4- 吡啶基 - 丙氨酸、4- 哌啶基 - 丙氨酸和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

22. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{29} 选自 Ala、Asp、Glu、磷酸丝氨酸、磷酸酪氨酸、γ - 羧基谷氨酸、Phe、Gly、His、Lys、Asn、Pro、Gln、Arg、Ser、Thr、Tyr、Pra、Atz、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸和 Dab 残基。

23. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{33} 选自 Phe、Ile、Leu、Met、Val、Trp、Tyr、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1' NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、2- 氯苯丙氨酸、4- 氯苯丙氨酸、3,4- 二氯苯丙氨酸、4- 三氟甲基 - 苯丙氨酸、2- 吡啶基 - 丙氨酸、3- 吡啶基 - 丙氨酸、4- 吡啶基 - 丙氨酸、4- 哌啶基 - 丙氨酸和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

24. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{34} 选自 Ala、Asp、Glu、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、Pra、Atz、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、

2-Nal、1’NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、2- 氯苯丙氨酸、4- 氯苯丙氨酸、3,4- 二氯苯丙氨酸、4- 三氟甲基 - 苯丙氨酸、2- 吡啶基 - 丙氨酸、3- 吡啶基 - 丙氨酸、4- 羧基 - 苯丙氨酸和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

25. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{35} 选自 Phe、Ile、Leu、Met、Val、Trp、Tyr、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1’NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、2- 氯苯丙氨酸、4- 氯苯丙氨酸、3,4- 二氯苯丙氨酸、4- 三氟甲基 - 苯丙氨酸和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

26. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{36}、X_{aa}^{37} 和 X_{aa}^{38} 的每一者独立地不存在或独立地选自 Ala、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

27. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{3} 和 X_{aa}^{18} 为烷基残基。

28. 根据权利要求 27 所述的物质组合物，其中 X_{aa}^{3} 和 X_{aa}^{18} 独立地为 Ala 或 2-Abu 残基。

29. 根据权利要求 1 所述的物质组合物，其中所述羧基末端残基被酰胺化。

30. 根据权利要求 1 所述的物质组合物，其中所述分离的多肽包含下式的氨基酸序列：

$X_{aa}^{1}X_{aa}^{2}Cys^{3}X_{aa}^{4}\ X_{aa}^{5}Ala^{6}\ X_{aa}^{7}X_{aa}^{8}X_{aa}^{9}Cys^{10}X_{aa}^{11}X_{aa}^{12}X_{aa}^{13}X_{aa}^{14}Asp^{15}\ X_{aa}^{16}$

$Cys^{17}Cys^{18}X_{aa}^{19}X_{aa}^{20}X_{aa}^{21}X_{aa}^{22}X_{aa}^{23}Cys^{24}X_{aa}^{25}X_{aa}^{26}X_{aa}^{27}X_{aa}^{28}X_{aa}^{29}$

X_{aa}^{30}

$Cys^{31}Lys^{32}X_{aa}^{33}X_{aa}^{34}X_{aa}^{35}\ X_{aa}^{36}X_{aa}^{37}X_{aa}^{38}$// SEQ ID NO:476。

31. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{6} 为 Ala。

32. 根据权利要求 31 所述的物质组合物，其中 X_{aa}^{27} 为 Glu。

33. 根据权利要求 31 所述的物质组合物，其中 X_{aa}^{29} 为 Asp、Glu 或 Gln。

34. 根据权利要求 31 所述的物质组合物，包含选自以下的氨基酸序列：SEQ ID NO:22、252-263、419-439、518-521、524、525、562-580、602、691、692、696-703、715、721-735、737-749、756、757、761、762、764-771、787-796、798、800、802、803、809-812、1028、1030-1040、1043-1047、1062-1065 和 1068-1070。

35. 根据权利要求 31 所述的物质组合物，包含选自以下的氨基酸序列：SEQ ID NO:1082、1096、1110、1124、1135、1146、1157、1165、1173、1181、1192、1203、1214、1222、1230、1238、1249、1260、1271、1279、1287、1295、1306、1317、1328、1336、1344、1352、1360、1368、1376、1384、1392、1400、1408、1416、1424、1432、1440、1448、1456、1464、1472、1480、1488、1496、1504、1512、1520、1528、1536、1544、1552、1560、1568、1576、1584、1592、1600、1608、1616、1624、1632、1640、1658、1672、1686、1700、1711、1722、1733、1741、1749、1757、1768、1779、1790、1798、1806、1814、1825、1836、1847、1855、1863、1871、1882、1893、1904、1912、1920、1928、1936、1944、1952、1960、1968、1976、1984、1992、2000、2008、2016、2024、2032、2040、2048、2056、2064、2072、2080、2088、2096、2104、2112、2120、2128、2136、2144、2152、2160、2168、2176、2184、2192、2200、2208、2216、2234、2248、2262、2276、2287、2298、2309、2317、2325、2333、2344、2355、2366、2374、2382、2390、2401、2412、2423、2431、2439、2447、

2458、2469、2480、2488、2496、2504、2512、2520、2528、2536、2544、2552、2560、2568、2576、2584、2592、2600、2608、2616、2624、2632、2640、2648、2656、2664、2672、2680、2688、2696、2704、2712、2720、2728、2736、2744、2752、2760、2768、2776、2784、2792、2808、2822、2833、2844、2855、2863、2871、2879、2890、2901、2912、2920、2928、2936、2944、2952、2960、2968、2976、2984、2992、3000、3008、3016、3024、3032、3040、3048、3056、3064、3072 和 3080。

36. 根据权利要求 31 所述的物质组合物，包含选自以下的氨基酸序列：SEQ ID NO: 597-601 和 813-1027。

37. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{6} 为 Gly。

38. 根据权利要求 37 所述的物质组合物，其中 X_{aa}^{27} 为 Glu。

39. 根据权利要求 37 所述的物质组合物，其中 X_{aa}^{29} 为 Asp、Glu 或 Gln。

40. 根据权利要求 37 所述的物质组合物，包含选自以下的氨基酸序列：SEQ ID NO: 265、751、752、754、755、1081、1095、1109、1123、1134、1145、1156、1164、1172、1180、1191、1202、1213、1221、1229、1237、1248、1259、1270、1278、1286、1294、1305、1316、1327、1335、1343、1351、1359、1367、1375、1383、1391、1399、1407、1415、1423、1431、1439、1447、1455、1463、1471、1479、1487、1495、1503、1511、1519、1527、1535、1543、1551、1559、1567、1575、1583、1591、1599、1607、1615、1623、1631、1639、1657、1671、1685、1699、1710、1721、1732、1740、1748、1756、1767、1778、1789、1797、1805、1813、1824、1835、1846、1854、1862、1870、1881、1892、1903、1911、1919、1927、1935、1943、1951、1959、1967、1975、1983、1991、1999、2007、2015、2023、2031、2039、2047、2055、2063、2071、2079、2087、2095、2103、2111、2119、2127、2135、2143、2151、2159、2167、2175、2183、2191、2199、2207、2215、2233、2247、2261、2275、2286、2297、2308、2316、2324、2332、2343、2354、2365、2373、2381、2389、2400、2411、2422、2430、2438、2446、2457、2468、2479、2487、2495、2503、2511、2519、2527、2535、2543、2551、2559、2567、2575、2583、2591、2599、2607、2615、2623、2631、2639、2647、2655、2663、2671、2679、2687、2695、2703、2711、2719、2727、2735、2743、2751、2759、2767、2775、2783、2791、2807、2821、2832、2843、2854、2862、2870、2878、2889、2900、2911、2919、2927、2935、2943、2951、2959、2967、2975、2983、2991、2999、3007、3015、3023、3031、3039、3047、3055、3063、3071 和 3079。

41. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{6} 为 2-Abu。

42. 根据权利要求 41 所述的物质组合物，其中 X_{aa}^{27} 为 Glu。

43. 根据权利要求 41 所述的物质组合物，其中 X_{aa}^{29} 为 Asp、Glu 或 Gln。

44. 根据权利要求 41 所述的物质组合物，包含选自以下的氨基酸序列：SEQ ID NO: 605、636、649、706、707、718、753、758、797、799、801、804、807、808、1029、1041、1042、1048、1066、1067、1083、1097、1111、1125、1136、1147、1158、1166、1174、1182、1193、1204、1215、1223、1231、1239、1250、1261、1272、1280、1288、1296、1307、1318、1329、1337、1345、1353、1361、1369、1377、1385、1393、1401、1409、1417、1425、1433、1441、1449、1457、1465、1473、1481、1489、1497、1505、1513、1521、1529、1537、1545、1553、1561、1569、1577、1585、1593、1601、1609、1617、1625、1633、1641、1659、1673、1687、1701、1712、1723、1734、1742、1750、1758、1769、1780、1791、1799、1807、1815、1826、1837、1848、1856、1864、1872、1883、1894、1905、1913、1921、1929、1937、1945、1953、1961、1969、1977、1985、1993、2001、2009、2017、

2025、2033、2041、2049、2057、2065、2073、2081、2089、2097、2105、2113、2121、2129、2137、2145、2153、2161、2169、2177、2185、2193、2201、2209、2217、2235、2249、2263、2277、2288、2299、2310、2318、2326、2334、2345、2356、2367、2375、2383、2391、2402、2413、2424、2432、2440、2448、2459、2470、2481、2489、2497、2505、2513、2521、2529、2537、2545、2553、2561、2569、2577、2585、2593、2601、2609、2617、2625、2633、2641、2649、2657、2665、2673、2681、2689、2697、2705、2713、2721、2729、2737、2745、2753、2761、2769、2777、2785、2793、2809、2823、2834、2845、2856、2864、2872、2880、2891、2902、2913、2921、2929、2937、2945、2953、2961、2969、2977、2985、2993、3001、3009、3017、3025、3033、3041、3049、3057、3065、3073 和 3081。

45. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{6} 为 Nle。

46. 根据权利要求 45 所述的物质组合物，其中 X_{aa}^{27} 为 Glu。

47. 根据权利要求 45 所述的物质组合物，其中 X_{aa}^{29} 为 Asp、Glu 或 Gln。

48. 根据权利要求 45 所述的物质组合物，包含选自以下的氨基酸序列：SEQ ID NO: 607、638、651、1085、1099、1113、1127、1138、1149、1160、1168、1176、1184、1195、1206、1217、1225、1233、1241、1252、1263、1274、1282、1290、1298、1309、1320、1331、1339、1347、1355、1363、1371、1379、1387、1395、1403、1411、1419、1427、1435、1443、1451、1459、1467、1475、1483、1491、1499、1507、1515、1523、1531、1539、1547、1555、1563、1571、1579、1587、1595、1603、1611、1619、1627、1635、1643、1661、1675、1689、1703、1714、1725、1736、1744、1752、1760、1771、1782、1793、1801、1809、1817、1828、1839、1850、1858、1866、1874、1885、1896、1907、1915、1923、1931、1939、1947、1955、1963、1971、1979、1987、1995、2003、2011、2019、2027、2035、2043、2051、2059、2067、2075、2083、2091、2099、2107、2115、2123、2131、2139、2147、2155、2163、2171、2179、2187、2195、2203、2211、2219、2237、2251、2265、2279、2290、2301、2312、2320、2328、2336、2347、2358、2369、2377、2385、2393、2404、2415、2426、2434、2442、2450、2461、2472、2483、2491、2499、2507、2515、2523、2531、2539、2547、2555、2563、2571、2579、2587、2595、2603、2611、2619、2627、2635、2643、2651、2659、2667、2675、2683、2691、2699、2707、2715、2723、2731、2739、2747、2755、2763、2771、2779、2787、2795、2811、2825、2836、2847、2858、2866、2874、2882、2893、2904、2915、2923、2931、2939、2947、2955、2963、2971、2979、2987、2995、3003、3011、3019、3027、3035、3043、3051、3059、3067、3075 和 3083。

49. 根据权利要求 1 所述的物质组合物，其中 X_{aa}^{6} 为 Nva。

50. 根据权利要求 49 所述的物质组合物，其中 X_{aa}^{27} 为 Glu。

51. 根据权利要求 49 所述的物质组合物，其中 X_{aa}^{29} 为 Asp、Glu 或 Gln。

52. 根据权利要求 49 所述的物质组合物，包含选自以下的氨基酸序列：SEQ ID NO: 606、637、650、705、708、717、759、760、805、806、1084、1098、1112、1126、1137、1148、1159、1167、1175、1183、1194、1205、1216、1224、1232、1240、1251、1262、1273、1281、1289、1297、1308、1319、1330、1338、1346、1354、1362、1370、1378、1386、1394、1402、1410、1418、1426、1434、1442、1450、1458、1466、1474、1482、1490、1498、1506、1514、1522、1530、1538、1546、1554、1562、1570、1578、1586、1594、1602、1610、1618、1626、1634、1642、1660、1674、1688、1702、1713、1724、1735、1743、1751、1759、1770、1781、1792、1800、1808、1816、1827、1838、

1849、1857、1865、1873、1884、1895、1906、1914、1922、1930、1938、1946、1954、1962、1970、1978、1986、1994、2002、2010、2018、2026、2034、2042、2050、2058、2066、2074、2082、2090、2098、2106、2114、2122、2130、2138、2146、2154、2162、2170、2178、2186、2194、2202、2210、2218、2236、2250、2264、2278、2289、2300、2311、2319、2327、2335、2346、2357、2368、2376、2384、2392、2403、2414、2425、2433、2441、2449、2460、2471、2482、2490、2498、2506、2514、2522、2530、2538、2546、2554、2562、2570、2578、2586、2594、2602、2610、2618、2626、2634、2642、2650、2658、2666、2674、2682、2690、2698、2706、2714、2722、2730、2738、2746、2754、2762、2770、2778、2786、2794、2810、2824、2835、2846、2857、2865、2873、2881、2892、2903、2914、2922、2930、2938、2946、2954、2962、2970、2978、2986、2994、3002、3010、3018、3026、3034、3042、3050、3058、3066、3074 和 3082。

53. 根据权利要求 1 所述的物质组合物，包含选自以下的氨基酸序列：SEQ ID NO: 3-30、32-72、74-134、136-178、180-211、218-239、241-305、307-363、366-386、388-432、434-474、515-527、532-588、590、591、593-775、777、778、780-788、790-1049 和 1062-3086。

54. 一种物质组合物，包含选自以下的氨基酸序列：SEQ ID NO: 3-134、136-305、307-386、388-474、515-527、532-588、590、591、593-1049 和 1062-3086。

55. 一种分离的核酸，编码不含非规范氨基酸的SEQ ID NO: 3-134、136-305、307-386、388-474、515-527、532-588、590、591、593-1049 或 1062-3086 的任一者。

56. 一种表达载体，包含权利要求 55 所述的核酸。

57. 一种重组宿主细胞，包含权利要求 56 所述的表达载体。

58. 根据权利要求 1、30、31、37、41、45、49、53 或 54 任一项所述的物质组合物，还包含任选的接头部分和药学上可接受的、共价连接的半衰期延长部分。

59. 根据权利要求 58 所述的物质组合物，其中所述半衰期延长部分为分子量为约 1000 Da 至约 100000 Da 的聚乙二醇、IgG Fc 结构域、转甲状腺素蛋白或人血清白蛋白。

60. 根据权利要求 58 所述的物质组合物，其中所述半衰期延长部分包含人免疫球蛋白或人免疫球蛋白 Fc 结构域或两者。

61. 根据权利要求 60 所述的物质组合物，具有如图 12A-N 或图 88-91 任一者中所示的构型。

62. 根据权利要求 60 所述的物质组合物，其中所述组合物包含单价免疫球蛋白 - 肽或 Fc- 肽偶联物。

63. 根据权利要求 60 所述的物质组合物，其中所述组合物包含二价免疫球蛋白 - 肽或 Fc- 肽偶联物。

64. 一种药物组合物，包含权利要求 1、30、31、37、41、45、49、53、54 或 59-63 任一项所述的物质组合物和药学上可接受的载体。

65. 一种预防疼痛的方法，包括施用预防有效量的权利要求 1、30、31、37、41、45、49、53、54 或 59-63 任一项所述的物质组合物。

66. 一种治疗疼痛的方法，包括施用治疗有效量的权利要求 1、30、31、37、41、45、49、53、54 或 59-63 任一项所述的物质组合物。

67. 据权利要求 66 所述的方法，其中所述疼痛为慢性疼痛、急性疼痛或持续性疼痛。

68. 根据权利要求 67 所述的方法，其中所述慢性疼痛与癌症、化疗、骨关节炎、纤维肌

痛、原发性红斑性肢痛、疱疹后神经痛、疼痛性糖尿病神经病变、特发性疼痛性神经病变、神经瘤、阵发性剧痛症、偏头痛、三叉神经痛、颌面痛、丛集性头痛、复杂性局部疼痛综合征(CRPS)、腰椎手术失败综合征、坐骨神经痛、间质性膀胱炎、骨盆痛、下背痛、炎症引起的疼痛或关节痛相关。

69. 根据权利要求 67 所述的方法，其中所述急性或持续性疼痛与创伤、烧伤或手术相关。

70. 根据权利要求 1 或 30 所述的物质组合物，其中 X_{aa}^{29} 为酸性或中性亲水性残基。

71. 根据权利要求 70 所述的物质组合物，其中 X_{aa}^{29} 选自 Ala、Asp、Glu、Gly、Asn、Gln、Ser、Thr、磷酸丝氨酸、磷酸酪氨酸和 γ－羧基谷氨酸残基。

72. 根据权利要求 70 所述的物质组合物，包含选自 SEQ ID NO: 1071-2798 的氨基酸序列。

$Na_v1.3$ 和 $Na_v1.7$ 的强效及选择性抑制剂

[0001] 在整个申请中，在圆括号或方括号内引用了多种出版物。这些出版物的公开内容整体据此以引用方式并入本申请，以便更全面地描述本发明所属的现有技术。

[0002] 发明背景

技术领域

[0003] 本发明涉及生物化学领域，具体地讲，涉及治疗性肽和偶联物。

[0004] 相关领域讨论

[0005] 电压门控钠通道 (VGSC) 是负责诸如中枢和外周神经元、心脏和骨骼肌肌细胞以及神经内分泌细胞的可兴奋细胞中动作电位引发和传播的糖蛋白复合物。哺乳动物钠通道是由中央成孔 alpha(α) 亚基和辅助 beta(β) 亚基组成的异三聚体。alpha 亚基中的突变已与人类中的阵发性障碍诸如癫痫、长 QT 综合征和高钾型周期性麻痹以及小鼠中的运动终板病和小脑共济失调存在关联。(Isom, Sodium channel beta subunits :anything but auxiliary, Neuroscientist7(1) :42-54(2001))。β－亚基调节 α－亚基在 VGSC 中的定位、表达和功能特性。

[0006] 电压门控钠通道包括由 9 种不同的亚型 ($Na_v1.1$-$Na_v1.9$) 组成的家族。如表 1 所示，这些亚型显示出组织特异性定位和功能差异 (参见 Goldin, A.L., Resurgence of sodium channel research, Annu Rev Physiol63 :871-94(2001) ; Wilson 等人, Compositions useful as inhibitors of voltage-gated ion channels, US2005/0187217A1)。该基因家族的三个成员 ($Na_v1.8$, 1.9, 1.5) 能抵抗熟知的钠通道阻滞剂河豚毒素 (TTX) 的阻断，从而证实在该基因家族内的亚型特异性。突变分析已经将谷氨酸 387 鉴定为 TTX 结合的关键残基 (参见 Noda, M., H. Suzuki 等人, A single point mutation confers tetrodotoxin and saxitoxin insensitivity on the sodium channel II" FEBS Lett259(1) :213-6(1989))。

[0007] 表 1. 具有大鼠 TTX IC_{50} 值的 VGSC 家族。缩写 :CNS ＝中枢神经系统，PNS ＝外周神经系统，DRG ＝背根神经节，TG ＝三叉神经节。(参见 Wilson 等人，Compositions useful as inhibitors of Voltage-gated ion channels, US2005/0187217A1 ; Goldin, Resurgence of Sodium Channel Research, Annu Rev Physiol63 :871-94(2001))。

[0008]

VGSC 同种型	组织	TTX IC_{50} (nM)	适应症
$Na_V1.1$	CNS、PNS 神经元胞体	10	疼痛、癫痫、神经变性
$Na_V1.2$	CNS 轴突中高	10	神经变性、癫痫
$Na_V1.3$	CNS、胚胎、受损神经	2-15	疼痛、癫痫
$Na_V1.4$	骨骼肌	5	肌强直
$Na_V1.5$	心脏	2000	心律失常、长QT
$Na_V1.6$	CNS 广泛、丰度最高	1	疼痛、运动障碍
$Na_V1.7$	PNS、DRG、末梢、神经内分泌	4	疼痛、神经内分泌紊乱、前列腺癌
$Na_V1.8$	PNS、DRG与TG中的小神经元	>50,000	疼痛
$Na_V1.9$	PNS、DRG与TG中的小神经元	1000	疼痛

[0009] 一般来讲，电压门控钠通道 (Na_v) 负责引发神经系统的可兴奋组织中动作电位的快速上升，这些电位传递组成并编码正常和异常疼痛感觉的电信号。Na_v 通道的拮抗剂可衰减这些疼痛信号并可用于治疗多种疼痛病症，包括但不限于急性、慢性、炎性和神经性疼痛。已表明，已知的 Na_v 拮抗剂诸如 TTX、利多卡因、布比卡因、苯妥英、拉莫三嗪和卡马西平可用于减轻人类和动物模型中的疼痛。（参见 Mao，J. 和 L.L.Chen，Systemic lidocaine for neuropathic pain relief，Pain87(1)：7-17(2000)；Jensen，T.S.，Anticonvulsants in neuropathic pain：rationale and clinical evidence，Eur J Pain6(Suppl A)：61-68(2002)；Rozen，T.D.，Antiepileptic drugs in the management of cluster headache and trigeminal neuralgia，Headache41Suppl1：S25-32(2001)；Backonja，M.M.，Use of anticonvulsants for treatment of neuropathic pain，Neurology59(5Suppl2)：S14-7(2002))。

[0010] TTX 敏感性、电压门控 $Na_v1.7$ 通道的 α－亚基由 SCN9A 基因编码。$Na_v1.7$ 通道优先地在背根神经节的外周感觉神经元中表达，其中一些神经元涉及疼痛的感知。在人类中，SCN9A 基因中的突变已表明此基因在疼痛通路中的关键作用。例如，通过最近的临床基因连锁分析确立了 $Na_v1.7$ 通道在疼痛感知中的作用，这些分析揭露了 SCN9A 基因中的功能获得性突变作为遗传性疼痛综合征诸如原发性红斑肢痛症 (PE)、遗传性红斑肢痛病 (IEM) 和阵发性剧痛症 (PEPD) 的病因学基础。（参见例如 Yang 等人，Mutations in SCN9A，encoding a sodium channel alpha subunit，in patients with primary erythermalgia，J.Med.Genet.41：171-174(2004)；Harty 等 人，$Na_v1.7$mutant A863P in

erythromelalgia:effects of altered activation and steady-state inactivation on excitability of nociceptive dorsal root ganglion neurons, J.Neurosci.26(48):12566-75(2006);Estacion 等人, $Na_v1.7$gain-of-function mutations as a continuum:A1632E displays physiological changes associated with erythromelalgia and paroxysmal extreme pain disorder mutations and produces symptoms of both disorders, J.Neurosci.28(43):11079-88(2008))。此外, $Na_v1.7$ 的过表达已在强转移性前列腺癌细胞系中检测到。(Diss 等人,A potential novel marker for human prostate cancer:voltage-gated sodium channel expression in vivo, Prostate Cancer and Prostatic Diseases8:266-73(2005);Uysal-Onganer 等人, Epidermal growth factor potentiates in vitro metastatic behavior human prostate cancer PC-3M cells:involvement of voltage-gated sodium channel, Molec.Cancer6:76(2007))。

[0011] SCN9A 基因的功能丧失性突变导致原本健康的个体完全不能感受到任何形式的疼痛。(例如 Ahmad 等人, A stop codon mutation in SCN9A causes lack of pain sensation, Hum.Mol.Genet.16(17):2114-21(2007))。

[0012] 在条件性敲除小鼠中 SCN9A 基因的细胞特异性缺失降低它们感知机械性、热或炎性疼痛的能力。(Nassar 等人, Nociceptor-specific gene deletion reveals a major role for $Na_v1.7$(PN1)in acute and inflammatory pain, Proc.Natl.Acad.Sci, U S A.101(34):12706-12711(2004))。

[0013] 基于此类证据,降低背根神经节 (DRG) 外周感觉神经元中的 $Na_v1.7$ 通道活性或表达水平已被提议为有效的疼痛治疗措施,例如针对慢性疼痛、神经性疼痛和神经痛。(例如 Thakker 等人, Suppression of SCN9A gene expression and/or function for the treatment of pain, WO2009/033027A2;Yeomans 等人, Decrease in inflammatory hyperalgesia by herpes vector-mediated knockdown of $Na_v1.7$sodium channels in primary afferents, Hum.Gene Ther.16(2):271-7(2005);Fraser 等人, Potent and selective $Na_v1.7$sodium channel blockers, WO2007/109324A2;Hoyt 等人, Discovery of a novel class of benzazepinone Na(v)1.7blockers:potential treatments for neuropathic pain, Bioorg.Med.Chem.Lett.17(16):4630-34(2007);Hoyt 等人, Benzazepinone $Na_v1.7$blockers:Potential treatments for neuropathic pain, Bioorg.Med.Chem.Lett.17(22):6172-77(2007))。

[0014] TTX 敏感性、电压门控 $Na_v1.3$ 通道的 α- 亚基由 SCN3A 基因编码。据报道,人 Nav1.3 的四种剪接变体具有不同的生物物理特性。(Thimmapaya 等人, Distribution and functional characterization of human $Na_v1.3$splice variants, Eur.J.Neurosci.22:1-9(2005))。已表明, $Na_v1.3$ 的表达在神经损伤后的 DRG 神经元内以及在脊髓损伤后的丘脑神经元中上调。(Hains 等人, Changes in electrophysiological properties and sodium channel $Na_v1.3$expression in thalamic neurons after spinal cord injury, Brain128:2359-71(2005))。据报道, Nav1.3(K354Q) 中的功能获得性突变与癫痫存在联系。(Estacion 等人,A sodium channel mutation linked to epilepsy increases ramp and persistent current of $Na_v1.3$and induces hyperexcitability in hippocampal neurons, Experimental Neurology224(2):362-368(2010))。

[0015] 由多种生物产生的毒素肽已演变为靶向离子通道。蛇、蝎子、蜘蛛、蜜蜂、蜗牛和海葵是产生毒液的生物的一些实例，这些毒液可作为强效及选择性靶向离子通道和受体的小生物活性毒素肽或“毒素”的丰富来源。在大多数情况下，这些毒素肽已通过结合到通道孔并物理阻断离子传导通路而演变为离子通道的强效拮抗剂或抑制剂。在一些其他情况下，正如狼蛛毒素肽中的一些，据发现该肽通过结合到孔外的区域（例如电压传感器域）而拮抗通道功能。

[0016] 天然毒素肽通常为约 20 到约 80 个氨基酸长，包含 2-5 个二硫键并形成非常紧凑的结构。毒素肽（例如，得自蝎子、海葵和芋螺的毒液）已得到分离并针对它们对离子通道的影响进行了表征。此类肽似乎已从数量相对少的结构框架演变，这些结构框架尤其适合解决效力、稳定性和选择性的关键问题。（参见例如 Dauplais 等人，On the convergent evolution of animal toxins :conservation of a diad of functional residues in potassium channel-blocking toxins with unrelated structures, J.Biol. Chem.272(7) :4302-09(1997) ;Alessandri-Haber 等人，Mapping the functional anatomy of BgK on Kv1.1, Kv1.2, and Kv1.3, J.Biol.Chem.274(50) :35653-61(1999))。蝎子和芋螺毒素肽中的大部分例如含有 10-40 个氨基酸和最多五个二硫键，从而形成通常耐蛋白水解的极其紧凑和受约束的结构（微蛋白）。芋螺毒素和蝎子毒素肽可基于它们的二硫键连接和肽折叠而划分成许多超家族。其中许多的溶液结构已通过核磁共振 (NMR) 光谱加以测定，从而示出了它们的紧凑结构并确认了它们家族折叠模式的保守性。（例如 Tudor 等人，Ionisation behaviour and solution properties of the potassium-channel blocker ShK toxin, Eur.J.Biochem.251(1-2) :133-41(1998) ;Pennington 等人，Role of disulfide bonds in the structure and potassium channel blocking activity of ShK toxin, Biochem.38(44) :14549-58(1999) ;Jaravine 等人，Three-dimensional structure of toxin OSK1from Orthochirus scrobiculosus scorpion venom, Biochem.36(6) : 1223-32(1997) ;del Rio-Portillo 等人，NMR solution structure of Cn12, a novel peptide from the Mexican scorpion Centruroides noxius with a typical beta-toxin sequence but with alpha-like physiological activity, Eur.J.Biochem.271(12) : 2504-16(2004) ;Prochnicka-Chalufour 等人，Solution structure of discrepin, a new K+-channel blocking peptide from the alpha-KTx15subfamily, Biochem.45(6) : 1795-1804(2006))。保守的二硫键结构也可反映毒素家族的各药理学活性。(Nicke 等人 (2004), Eur.J.Biochem.271 :2305-19, 表 1 ;Adams(1999), Drug Develop.Res.46 : 219-34)。例如，α- 芋螺毒素具有定义明确的四个半胱氨酸 / 两个二硫键的环状结构 (Loughnan,2004) 并抑制烟碱型乙酰胆碱受体。相比之下，ω- 芋螺毒素具有六个半胱氨酸 / 三个二硫键的环状结构 (Nielsen,2000) 并阻断钙通道。毒素的结构亚组已演变成抑制电压门控或钙激活钾通道。

[0017] 蜘蛛毒液包含许多肽毒素，它们靶向电压门控离子通道，包括 Kv、Cav 和 Nav 通道。这些肽的其中许多是适形于抑制性胱氨酸结 (inhibitory cystine knot, ICK) 结构基序的门控调节剂。（参见 Norton 等人，The cystine knot structure of ion channel toxins and related polypeptides, Toxicon36(11) :1573-1583(1998) ;Pallaghy 等人，A common structural motif incorporating a cystine knot and a triple-stranded β-sheet in

toxic and inhibitory polypeptides,Prot.Sci.3(10):1833-6,(1994))。与一些蝎子和海葵毒素形成对比,许多蜘蛛毒素不影响失活率,但会通过限制电压传感器运动到开放通道构象而抑制通道活性,从而将它们的激活对电压的依赖性偏移到更正的电位。这些蜘蛛毒素中的许多在电压门控离子通道家族之内和之间是混杂的。

[0018] 已报道了尤其是靶向 VGSC 的多种毒素肽。(参见 Billen 等人,Animal peptides targeting voltage-activated sodium channels,Cur.Pharm.Des.14:2492-2502,(2008))。已经描述了三类肽毒素:1) 位点 1 毒素,μ-芋螺毒素,结合到通道的孔并物理阻塞传导通路;2) 位点 3 毒素,包括 α-蝎子毒素、一些海葵毒素和 δ-芋螺毒素,结合到结构域 IV 的 S3-S4 接头并减缓通道失活;和 3) 位点 4 毒素,包括 β-蝎子毒素,结合到结构域 II 中的 S3-S4 接头并促进通道激活。肽的位点 3 和位点 4 家族均改变 Na_v 通道的打开概率以及影响门控转换并因而称为“门控调节剂”。

[0019] μ-芋螺毒素 KIIIA(SEQ ID NO:530)(一种最初从木下芋螺(Conus kinoshitai)分离而得的位点 1 毒素)为 16 个氨基酸长的 C 端酰胺化肽,它包含 6 个用于构成 3 个分子内二硫键的半胱氨酸残基。其最初在两栖动物背根神经节 (DRG) 神经元中被表征为耐河豚毒素 (TTX) 钠通道的抑制剂。(参见 Bulaj 等人,Novel conotoxins from Conus striatus and Conus kinoshitai selectively block TTX-resistant sodium channels,Biochem.44(19):7259-7265,(2005))。随后在小鼠 DRG 神经元中发现其抑制 TTX 敏感性钠电流比抑制耐 TTX 钠电流更有效。(参见 Zhang 等人,Structure/function characterization of μ-conotoxin KIIIA,an analgesic,nearly irreversible blocker of mammalian neuronal sodium channels,J.Biol.Chem.282(42):30699-30706,(2007))。已发现,KIIIA 通过以下等级次序的效力阻断在非洲爪蟾 (Xenopus laevis) 卵母细胞中表达的克隆哺乳动物(啮齿动物)通道:$Na_v1.2 > Na_v1.4 > Na_v1.6 > Na_v1.7 > Na_v1.3 > Na_v1.5$。KIIIA 的腹膜内注射已在福尔马林诱发的小鼠疼痛试验中以 1.6nmol/小鼠 (0.1mg/kg) 的 ED_{50} 证实了镇痛活性,而未观察到运动损害;在较高的剂量 (10nmol) 下观察到了一些运动损害但无麻痹活性。(参见 Zhang 等人,2007)。用丙氨酸取代 Lys7 和 Arg10 改变了最大阻断,而取代 His12 和 Arg14 则改变了 Nav 同种型特异性。(参见 McArthur 等人,Interactions of key charged residues contributing to selective block of neuronal sodium channels by μ-conotoxin KIIIA,Mol.Pharm.80(4):573-584,(2011))。KIIIA 的“丙氨酸扫描”类似物已将 Lys7、Trp8、Arg10、Asp11、His12 和 Arg14 确定为对于针对 $rNa_v1.4$ 的活性具有重要意义。(参见 Zhang 等人,2007)。KIIIA 的 NMR 溶液结构将这些残基置于靠近分子 C 端的 α-螺旋之内或附近。(参见 Khoo 等人,Structure of the analgesic μ-conotoxin KIIIA and effects on the structure and function of disulfide deletion,Biochem.48(6):1210-1219,(2009))。Cys1 与 Cys9 之间的二硫键可通过取代丙氨酸 (KIIIA[C1A,C9A]) 而移除,而不会在很大程度上降低化合物的活性。(参见 Khoo 等人,2009;Han 等人,Structurally minimized μ-conotoxin analogs as sodium channel blockers:implications for designing conopeptide-based therapeutics,ChemMedChem4(3):406-414,(2009))。将 Cys2 与 Cys16 之间的第二个二硫键替换为硒代半胱氨酸残基之间的二硒键已得到了 KIIIA 的二硫键缺失硒代芋螺肽 (selenoconopeptide)。这些化合物保留了 KIIIA 的活性,但更容易合成。(参

见 Han 等人，Disulfide-depleted selenoconopeptides :simplified oxidative folding of cysteine-rich peptides，ACS Med.Chem.Lett.1(4) :140-144，(2010))。天然结构已被进一步最大程度简化为具有 Nav 抑制活性的内酰胺稳定化螺旋肽支架。(参见 Khoo 等人，Lactam-stabilized helical analogues of the analgesic μ-conotoxin KIIIA，J.Med.Chem.54 :7558-7566(2011))。KIIIA 在 VGSC 传导孔的外庭中结合到神经毒素位点 1 并以全有或全无的方式阻断通道。最经的研究已表明，KIIIA 的一些类似物只部分抑制钠电流并且可能能够同时与 TTX 和蛤蚌毒素 (STX) 结合。(参见 Zhang 等人，Cooccupancy of the outer vestibule of voltage-gated sodium channels by μ-conotoxin KIIIA and saxitoxin or tetrodotoxin，J.Neurophys.104(1) :88-97，(2010) ;French 等 人，The tetrodotoxin receptor of voltage-gated sodium channels-perspectives from interactions with μ-conotoxins，Marine Drugs8 :2153-2161，(2010) ;Zhang 等 人，μ-Conotoxin KIIIA derivatives with divergent affinities versus efficacies in blocking voltage-gated sodium channels.Biochem.49(23) :4804-4812，(2010) ; Zhang 等人，Synergistic and antagonistic interactions between tetrodotoxin and μ-conotoxin in blocking voltage-gated sodium channels，Channels3(1) :32-38，(2009))。

[0020] OD1(SEQ ID NO :589) 是从伊朗黄蝎 Odonthobuthus doriae 的毒液中分离而得的 α 样毒素。(参见 Jalali 等人，OD1，the first toxin isolated from the venom of the scorpion Odonthobuthus doriae active on voltage-gated Na+channels，FEBS Lett.579(19) :4181-4186，(2005))。这种肽为 65 个氨基酸长，其酰胺化 C 端含有 6 个形成 3 个二硫键的半胱氨酸残基。OD1 已被表征为 $Na_v1.7$ 调节剂，其损害快速失活 (EC_{50} ＝ 4.5nM)、增加所有电压下的峰电流并诱导持续电流，具有针对 $Na_v1.8$ 和 $Na_v1.3$ 的选择性。(参见 Maertens 等人，Potent modulation of the voltage-gated sodium channel Nav1.7by OD1，a toxin from the scorpion Odonthobuthus doriae，Mol.Pharm.70(1) : 405-414，(2006))。

[0021] 虎纹捕鸟蛛毒素 -IV(HWTX-IV ;SEQ ID NO :528) 是从中国捕鸟蜘蛛虎纹捕鸟蛛 (Selenocosmia huwena) 中分离而得的 35 个残基 C 段肽酰胺，在 6 个半胱氨酸残基之间具有 3 个二硫桥。(参见 Peng 等人，Function and solution structure of huwentoxin-IV，a potent neuronal tetrodotoxin(TTX)-sensitive sodium channel antagonist from chinese bird spider Selenocosmia huwena，J.Biol.Chem.277(49) :47564-47571，(2002))。二硫键模式 (C1-C4、C2-C5、C3-C6) 和 NMR 溶液结构将 HWTX-IV 置于 ICK 结构家族中，因为 C3-C6 二硫键穿过由其他两个二硫桥 (C1-C4 和 C2-C5) 形成的 16 个残基的环。HWTX-IV 以 30nM 的 IC_{50} 值抑制成年大鼠 DRG 神经元中的 TTX 敏感性钠电流，但在高达 100nM 的浓度下也对耐 TTX VGSC 无影响。(参见 Peng 等人，2002)。另外，HWTX-IV 针对大鼠海马神经元中的中枢神经元钠通道的效力为十二分之一，从而表明其可能对 $Na_v1.7$ 具有选择性。(参见 Xiao 等人，Synthesis and characterization of huwentoxin-IV，a neurotoxin inhibiting central neuronal sodium channels，Toxicon51(2) :230-239，(2008))。针对 VGSC 亚型测试 HWTX-IV 确定了相对灵敏性为 hNav1.7(IC_{50} ＝ 26nM) ＞ rNav1.2 ＞＞ rNav1.3 ＞ rNav1.4 ≥ hNav1.5。(参见 Xiao 等人，Tarantula huwentoxin-IV inhibits

neuronal sodium channels by binding to receptor site4and trapping the domain II voltage sensor in the closed configuration,J.Biol.Chem.283(40):27300-27313,(2008))。蛋白定点诱变标测了 HWTX-IV 与神经毒素位点 4(结构域 II 之间的胞外 S3-S4 接头)的结合,并且其响应电压变化和通道激活的行为与结合到 Nav1.7 的电压传感器并将其捕获在静息构型一致。(参见 Xiao 等人,2008)。虎纹捕鸟蛛毒素 -I(HWTX-I ;SEQ ID NO:529)(一个相关的家族成员)对 VGSC 的效力较低,但对 N 型 Ca_v 通道具有活性。(参见 Wang等人,The cross channel activities of spider neurotoxin huwentoxin I on rat dorsal root ganglion neurons,Biochem.Biophys.Res.Comm.357(3):579-583,(2007);Chen 等人,Antinociceptive effects of intrathecally administered huwentoxin-I,a selective N-type calcium channel blocker,in the formalin test in conscious rats,Toxicon45(1):15-20,(2005);Liang 等人,Properties and amino acid sequence of huwentoxin-I,a neurotoxin purified from the venom of the Chinese bird spider Selenocosmia huwena,Toxicon31(8):969-78,(1993))。

[0022] 从狼蛛智利绿丝绒 (Thixopelma pruriens) 的毒液中分离而得的 ProTx-II(SEQ ID NO:531) 是一种 30 个氨基酸的多肽,具有 C 端游离酸和 6 个形成 3 个二硫键的半胱氨酸残基。ProTx-II 不同于 ICK 家族的其他成员,因为它在第五与第六个半胱氨酸残基之间只含三个残基而不是正常的 4-11 个。ProTx-II 是若干 Na_v 通道亚型(包括 $Na_v1.2$、$Na_v1.7$(IC_{50} < 1nM)、$Na_v1.5$ 和 $Na_v1.8$) 以及 Cav3.1 通道的强效抑制剂,但不包括 K_v 通道。(参见 Middleton 等人,Two tarantula peptides inhibit activation of multiple sodium channels,Biochem.41(50):14734-14747,(2002);Priest 等 人,ProTx-I and ProTx-II:gating modifiers of voltage-gated sodium channels,Toxicon49(2):194-201,(2007);Edgerton等人,Inhibition of the activation pathway of the T-type calcium channel CaV3.1by ProTxII,Toxicon56(4):624-636,(2010))。针对 Nav1.5 测试了 ProTx-II 的“丙氨酸扫描”类似物,从而确定了 Met6、Trp7、Arg13、Met19、Val20、Arg22、Leu23、Trp24、Lys27、Leu29 和 Trp30 对于活性具有重要的意义。(参见 Smith 等人,Molecular interactions of the gating modifier toxin ProTx-II with Nav1.5:implied existence of a novel toxin binding site coupled to activation,J.Biol.Chem.282(17):12687-12697,(2007))。生物物理表征表明,ProTx-II 与 HwTx-IV 的不同之处在于其与脂质膜相互作用的能力。(参见 Smith 等人,Differential phospholipid binding by site3and site4toxins:implications for structural variability between voltage-sensitive sodium channel comains,J.Biol.Chem.280(12):11127-11133,(2005))。0.01 和 0.1mg/kg 的 ProTx-II 静注剂量在大鼠中耐受良好,但 1mg/kg 的剂量是致命的。ProTx-II 在机械性痛觉过敏研究中没有效果。(参见 Schmalhofer 等人,ProTx-II,a selective inhibitor of NaV1.7sodium channels,blocks action potential propagation in nociceptors,Mol.Pharm.74(5):1476-1484,(2008))。 以 0.1mg/kg 进行鞘内施用是致命的,而以较低的剂量在痛觉过敏研究中无效。将 ProTx-II 涂在去鞘皮神经上完全阻断了 C 纤维复合动作电位,但对完整纤维的动作电位传播影响极低。(参见 Schmalhofer 等人,2008)。据信,ProTx-II 结合到 $Na_v1.7$ 的结构域 II 的 S3-S4 接头以抑制通道激活,但在较高的浓度下也可与结构域 IV 电压传感器相互作用并影

响钠通道激活。(参见 Xiao 等人,The tarantula toxins ProTx-II and huwentoxin-IV differentially interact with human Nav1.7voltage sensors to inhibit channel activation and inactivation,Mol.Pharm.78(6):1124-1134,(2010);Sokolov 等 人,Inhibition of sodium channel gating by trapping the domain II voltage sensor with protoxin II,Mol.Pharm.73(3):1020-1028,(2008);Edgerton 等 人,Evidence for multiple effects of ProTxII on activation gating in NaV1.5,Toxicon52(3):489-500,(2008))。

[0023] 毒素肽的产生在有毒生物中是一个复杂的过程,并在合成上是甚至更复杂的过程。由于它们的保守二硫键结构以及对有效氧化重折叠的需要,因此肽的合成存在挑 战。(参 见 Steiner 和 Bulaj,Optimization of oxidative folding methods for cysteine-rich peptides:a study of conotoxins containing three disulfide bridges,J.Pept.Sci.17(1):1-7,(2011);Góngora-Benítez 等 人,Optimized Fmoc solid-phase synthesis of the cysteine-rich peptide Linaclotide,Biopolymers Pept.Sci.96(1):69-80,(2011))。虽然毒素肽已用作离子通道的高选择性药理学抑制剂数年,但是毒素肽的高合成和重折叠成本以及它们在体内的短半衰期已阻碍了将这些肽用作治疗模式。对于鉴定作为离子通道治疗性拮抗剂的小分子抑制剂所作出的努力远比给予毒素肽本身的努力要多。一个例外是批准了将小 ω- 芋螺毒素 MVIIA 肽(Prialt®,齐考诺肽)用于治疗难治性疼痛,这种肽是神经元特异性 N 型电压敏感性钙通道的抑制剂。然而,齐考诺肽的合成和重折叠制备过程成本高昂,并且只产生具有极短体内半衰期(约 4 个小时)的小肽产物。

[0024] 在人类中开展的小型临床试验表明,局部、非全身性注射非肽类河豚毒素在因癌症和 / 或化疗而遭受疼痛的患者中产生了疼痛缓解 (Hagen 等人,J Pain Symp Manag34:171-182(2007))。河豚毒素是一种非中枢神经系统渗透性钠通道(包括 $Na_v1.3$ 和 $Na_v1.7$)抑制剂;虽然其由于在钠通道亚型之中缺乏选择性而无法全身性使用,但是其功效对于在外周神经元中使用 $Na_v1.7$ 和 / 或 $Na_v1.3$ 抑制剂治疗慢性疼痛综合征可提供进一步的验证。

[0025] 多肽通常表现出比小分子特有的靶标选择性更高的选择性的优点。Nav1.7 和 / 或 Nav1.3 选择性的非中枢神经系统渗透性毒素肽和肽类似物是所需的,并通过本发明提供。

发明概要

[0026] 本发明涉及物质组合物,该物质组合物包含分离的多肽,该分离的多肽为外周限制性 $Na_v1.7$ 抑制剂。在一个实施方案中,如本文所述,该分离的多肽为具有氨基酸序列 DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-NH_2(SEQ ID NO:1) 的 $Na_v1.7$ 和 $Na_v1.3$ 双重抑制剂,其为我们命名为“GpTx-1”的多肽,并且其从狼蛛智利红玫瑰 (Grammostola porteri) 中分离而得。本发明的其他实施方案包括 GpTx-1 的肽类似物。在其他实施方案中,本发明涉及物质组合物,该物质组合物包含具有下式的氨基酸序列的分离多肽:

[0027] $X_{aa}{}^{1}X_{aa}{}^{2}X_{aa}{}^{3}X_{aa}{}^{4}X_{aa}{}^{5}X_{aa}{}^{6}X_{aa}{}^{7}X_{aa}{}^{8}X_{aa}{}^{9}X_{aa}{}^{10}X_{aa}{}^{11}X_{aa}{}^{12}X_{aa}{}^{13}X_{aa}{}^{14}Asp^{15}X_{aa}{}^{16}X_{aa}{}^{17}X_{aa}{}^{18}X_{aa}{}^{19}X_{aa}{}^{20}X_{aa}{}^{21}X_{aa}{}^{22}X_{aa}{}^{23}X_{aa}{}^{24}X_{aa}{}^{25}X_{aa}{}^{26}X_{aa}{}^{27}X_{aa}{}^{28}X_{aa}{}^{29}X_{aa}{}^{30}X_{aa}{}^{31}Lys^{32}X_{aa}{}^{33}X_{aa}{}^{34}X_{aa}{}^{35}X_{aa}{}^{36}X_{aa}{}^{37}X_{aa}{}^{38}$//SEQ ID NO:475

[0028] 或其药学上可接受的盐,

[0029] 其中:

[0030] $X_{aa}^{1}X_{aa}^{2}$ 不存在；或者 X_{aa}^{1} 为任何氨基酸残基并且 X_{aa}^{2} 为任何氨基酸残基；或者 X_{aa}^{1} 不存在并且 X_{aa}^{2} 为任何氨基酸残基；

[0031] X_{aa}^{3} 在 X_{aa}^{18} 为 Cys 时为 Cys；或者 X_{aa}^{3} 在 X_{aa}^{18} 为 SeCys 时为 SeCys；或者 X_{aa}^{3} 在 X_{aa}^{18} 为烷基氨基酸残基时为烷基氨基酸残基；

[0032] X_{aa}^{4} 为酸性、疏水性、碱性或中性亲水性氨基酸残基；

[0033] X_{aa}^{5} 为 Gly、Ala、疏水性或碱性氨基酸残基；

[0034] X_{aa}^{6} 为 Gly、Ala、2-Abu、Nle、Nva 或疏水性氨基酸残基；

[0035] X_{aa}^{7} 为 Gly、Ala、芳族或疏水性氨基酸残基；

[0036] X_{aa}^{8} 为碱性、酸性或中性亲水性氨基酸残基，或 Ala 残基；

[0037] X_{aa}^{9} 为碱性或中性亲水性氨基酸残基；

[0038] X_{aa}^{10} 在 X_{aa}^{24} 为 Cys 时为 Cys；或者 X_{aa}^{10} 在 X_{aa}^{24} 为 SeCys 时为 SeCys；

[0039] X_{aa}^{11} 为任何氨基酸残基；

[0040] X_{aa}^{12} 为 Pro、酸性、中性或疏水性氨基酸残基；

[0041] X_{aa}^{13} 为任何氨基酸残基；

[0042] X_{aa}^{14} 为任何氨基酸残基；

[0043] X_{aa}^{16} 为碱性、中性亲水性或酸性氨基酸残基，或 Ala 残基；

[0044] X_{aa}^{17} 在 X_{aa}^{31} 为 Cys 时为 Cys；或者 X_{aa}^{17} 在 X_{aa}^{31} 为 SeCys 时为 SeCys；

[0045] X_{aa}^{18} 为 Cys、SeCys 或烷基氨基酸残基；

[0046] X_{aa}^{19} 为任何氨基酸残基；

[0047] X_{aa}^{20} 为 Pro、Gly、碱性或中性亲水性残基；

[0048] X_{aa}^{21} 为碱性、疏水性或中性亲水性氨基酸残基；

[0049] X_{aa}^{22} 为疏水性或碱性氨基酸残基；

[0050] X_{aa}^{23} 为疏水性、碱性或中性亲水性氨基酸残基；

[0051] X_{aa}^{24} 为 Cys 或 SeCys 残基；

[0052] X_{aa}^{25} 为 Ser、Ala 或中性亲水性氨基酸残基；

[0053] X_{aa}^{26} 为 Ala、酸性、碱性或中性亲水性氨基酸残基；

[0054] X_{aa}^{27} 为酸性、碱性、中性亲水性或疏水性残基；

[0055] X_{aa}^{28} 为芳族或碱性氨基酸残基；

[0056] X_{aa}^{29} 为酸性、碱性或中性亲水性氨基酸残基；

[0057] X_{aa}^{30} 为 Trp、5- 溴代 Trp、6- 溴代 Trp、5- 氯代 Trp、6- 氯代 Trp、1-Nal、2-Nal 或硫代 Trp 残基；

[0058] X_{aa}^{31} 为 Cys 或 SeCys；

[0059] X_{aa}^{33} 为疏水性或芳族氨基酸残基；

[0060] X_{aa}^{34} 为任何氨基酸残基；

[0061] X_{aa}^{35} 为疏水性氨基酸残基；

[0062] X_{aa}^{36}、X_{aa}^{37} 和 X_{aa}^{38} 的每一者独立地不存在或独立地为中性、碱性或疏水性氨基酸残基；

[0063] 并且其中：

[0064] 如果 X_{aa}^{3} 和 X_{aa}^{18} 均为 Cys 残基，则在残基 X_{aa}^{3} 与残基 X_{aa}^{18} 之间存在二硫键；或者如

果 X_{aa}^{3} 和 X_{aa}^{18} 均为 SeCys 残基，则在残基 X_{aa}^{3} 与残基 X_{aa}^{18} 之间存在二硒键；

[0065] 如果 X_{aa}^{10} 和 X_{aa}^{24} 均为 Cys 残基，则在残基 X_{aa}^{10} 与残基 X_{aa}^{24} 之间存在二硫键；或者如果 X_{aa}^{10} 和 X_{aa}^{24} 均为 SeCys 残基，则在残基 X_{aa}^{10} 与残基 X_{aa}^{24} 之间存在二硒键；

[0066] 如果 X_{aa}^{17} 和 X_{aa}^{31} 均为 Cys 残基，则在残基 X_{aa}^{17} 与残基 X_{aa}^{31} 之间存在二硫键；或者如果 X_{aa}^{17} 和 X_{aa}^{31} 均为 SeCys 残基，则在残基 X_{aa}^{17} 与残基 X_{aa}^{31} 之间存在二硒键；

[0067] 氨基末端残基任选地被乙酰化、生物素酰化或 4- 戊炔酰化或聚乙二醇化；并且

[0068] 羧基末端残基任选地被酰胺化。

[0069] 在特定实施方案中，该物质组合物包含选自以下的氨基酸序列：SEQ ID NO：3-30、32-72、74-134、136-178、180-211、218-239、241-305、307-363、366-386、388-432、434-474、515-527、532-588、590、591、593-775、777、778、780-788、790-1049 和 1062-3086。

[0070] 本发明包括物质组合物，该物质组合物包含选自以下的氨基酸序列：SEQ ID NO：3-134、136-305、307-386、388-474、515-527、532-588、590、591、593-1049 和 1062-3086。

[0071] 本发明还涵盖编码不含非规范氨基酸的 SEQ ID NO：3-134、136-305、307-386、388-474、515-527、532-588、590、591、593-1049 和 1062-3086 任一者的核酸（例如 DNA 或 RNA）；包含该核酸的表达载体；以及包含该表达载体的重组宿主细胞。本发明的组合物提供治疗或预防疼痛例如持续性或慢性疼痛的有效方法。例如，Nav1.7 和 Nav1.3 双重抑制剂可在一些形式的慢性疼痛中有效，尤其是在单独的 Nav1.7 抑制不够的情况下。针对脱靶钠通道尤其是控制心肌兴奋性 (Nav1.5) 和骨骼肌兴奋性 (NaV1.4) 的那些通道的敏感性是任何全身递送性治疗剂的基本要素。这种选择性对于双重抑制剂而言是一项特别高的障碍。本发明的组合物提供针对 Nav1.5 和 Nav1.4 的这种选择性。例如，GpTx-1 肽 (SEQ ID NO：1) 是 Nav1.4 的弱抑制剂。此外，Nav1.4 的抑制强烈依赖于状态，使得 GpTx-1 对 Nav1.4 的生理、非失活状态产生可以忽略的作用。（这是 GpTx-1 与河豚毒素之间的关键区别，河豚毒素具有对 Nav1.4 的极低选择性，并且等同地抑制 Nav1.4 的失活和非失活状态）。

[0072] 因此，本发明还涉及包含本发明的物质组合物和药学上可接受的载体的药物组合物或药物。

[0073] GpTx-1 和 GpTx-1 肽类似物还可用作研究工具。迄今为止，还没有可用的 Nav1.7 或 Nav1.3 特异性生化探针，尤其是没有针对活细胞质膜中正确折叠的功能性 Nav1.7 的探针。由于 GpTx-1 及其同类物抑制 Nav1.7/Nav1.3，因此它们显然以高效力和选择性结合到通道分子。如通过 NMR 以及通过残基取代所限定在 GpTx-1 的非活性位点用荧光或其他示踪基团进行标记可提供适用于但不限于对钠通道进行定位、对表达钠通道的细胞进行分类以及对结合到 Nav1.7 或 Nav1.3 的肽进行筛选或淘选的研究工具。

[0074] 附图简述

[0075] 图 1（上图）显示了从智利红玫瑰提取的粗毒液的反相 (RP)HPLC 分离。沿着 x 轴的刻度线表示分级分离的时间片。图 1（下图）显示在 $Na_v1.7$Ion Works® Quatrro(IWQ) 测定中分离的毒液级分的活性（对照百分比，POC）。级分 31（以矩形框表示）包含 RP-HPLC 色谱图中的主峰，在离子通道测定中表现出 > 80％的抑制，并随后进行解卷积处理得到 GpTx-1(SEQ ID NO：1)。

[0076] 图 2（插图）显示对得自智利红玫瑰毒液初步分离的指定级分 (31) 进行的高分辨率电喷雾电离质谱 (ESI-MS) 分析。箭头表明最终鉴定为 GpTx-1 的分子量为 4071Da 的肽

不同电离状态所观测的 (m/z) 比。质谱中的附加峰表明毒液级分为至少四种不同肽的混合物。

[0077] 图 3 显示对从智利红玫瑰毒液分离中获得的级分 31 进行的基质辅助激光解吸电离飞行时间质谱 (MALDI-TOF MS) 分析。插图显示低和中间质量范围。m/z 比为 4074.9 的峰最终被鉴定为 GpTx-1,但是该级分为至少四种不同肽的混合物。

[0078] 图 4(上图) 显示对得自智利红玫瑰毒液初步分离的级分 31 中的材料进行的 RP-HPLC 分离 (次分级分离)。沿着 x 轴的刻度线表示次分级分离的时间片。图 4(下图) 显示在 $Na_v1.7$Ion Works® Quatrro(IWQ) 测定中分离的窄级分的活性 (POC)。RP-HPLC 色谱图中的主峰在 $Na_v1.7$ 测定中活性最高,并经解卷积处理鉴定出 GpTx-1。

[0079] 图 5 显示合成的 GpTx-1 的 LC-MS 分析。上图显示在 214nm 处的紫外吸收的 RP-HPLC 色谱图。下图显示 ESI-MS 检测器的总离子计数 (TIC)。

[0080] 图 6 显示在图 5 中保留时间 (r_t) 为 6.75 分钟的峰的 ESI-MS 分析。m/z 比为 1358.8 和 1019.4 的峰分别表示 GpTx-1 的 $[M+3H]^{3+}$ 和 $[M+3H]^{4+}$ 电荷态,GpTx-1 具有 4071.9Da 的单一同位素分子量。

[0081] 图 7 显示得自 GpTx-1 的 NMR 光谱结构测定的 20 个能量最低构象 ($RMSD = 0.1 \pm 0.05 Å$) 的肽主链的重叠。

[0082] 图 8 显示得自 GpTx-1 的 NMR 光谱结构测定的 20 个能量最低构象 ($RMSD = 0.74 \pm 0.12 Å$) 的肽重原子的重叠。

[0083] 图 9 显示得自 GpTx-1 的 NMR 光谱结构测定的肽主链和二硫键 (编号对应于半胱氨酸残基) 的带状图示。

[0084] 图 10 显示由 C 端 β 链以及残基 Phe5 和 Met6 形成的疏水性推定结合面朝向读者取向而取向的 GpTx-1。右侧是肽主链的带状图示,其中示出了关键残基的侧链,而左侧则显示了分子部分透明的表面的渲染。

[0085] 图 11(左) 显示具有不透明表面的 GpTx-1 的疏水性推定结合面。在右侧,已将分子顺时针旋转了 90° ,以显示出肽的平坦疏水性面与亲水性 (溶剂暴露的) 面之间的拓扑对比。

[0086] 图 12A-N 显示了本发明的组合物的一些实施方案的示意性结构,其包含通过任选的肽基接头部分 (诸如但不限于本文所述的 L5 或 L10) 而与免疫球蛋白的一个或多个结构域融合的药理学活性毒素 (例如 GpTx-1) 或毒素 (例如 GpTx-1) 肽类似物 (花体) 的一个或多个单元。这些示意图显示了更典型的 IgG1,但是它们也旨在适用于 IgG2(其将具有铰链中的 4 个二硫键和不同的连接重链与轻链的二硫键排列) 以及 IgG3 和 IgG4。图 12A 表示单价异二聚 Fc- 毒素肽类似物融合体或偶联物,其中毒素肽类似物融合到或偶联到免疫球蛋白 Fc 结构域单体之一的 C 端末端。图 12B 表示二价同二聚 Fc- 毒素肽类似物融合体或偶联物,其中毒素肽类似物融合到两个免疫球蛋白 Fc 结构域单体的 C 端末端。图 12C 表示单价异二聚 Fc- 毒素肽类似物融合体或偶联物,其中毒素肽类似物融合到或化学偶联到免疫球蛋白 Fc 结构域单体之一的 N 端末端。图 12D 表示二价同二聚毒素肽类似物 -Fc 融合体或偶联物,其中毒素肽类似物融合到两个免疫球蛋白 Fc 结构域单体的 N 端末端。图 12E 表示包含免疫球蛋白重链 (HC)+ 免疫球蛋白轻链 (LC)+ 免疫球蛋白 Fc 单体的单价异

三聚 Fc- 毒素肽类似物 /Ab，其中毒素肽类似物融合到其 C 端末端。图 12F 表示单价异四聚 (HT) 抗体 HC- 毒素肽类似物融合体或偶联物，其中毒素肽类似物融合到 HC 单体之一的 C 端末端。图 12G 表示二价 HT 抗体 Ab HC- 毒素肽类似物融合体或偶联物，其中毒素肽类似物位于两个 HC 单体的 C 端末端上。图 12H 表示单价 HT 毒素肽类似物 -LC Ab，其中毒素肽类似物融合到 LC 单体之一的 N 端末端。图 12I 表示单价 HT 毒素肽类似物 -HC Ab，其中毒素肽类似物融合到 HC 单体之一的 N 端末端。图 12J 表示单价 HT Ab LC- 毒素肽类似物融合体或偶联物 (即 LC- 毒素肽类似物融合体或偶联物 +LC+2(HC))，其中毒素肽类似物融合到 LC 单体之一的 C 端末端。图 12K 表示二价 HT Ab LC- 毒素肽类似物融合体或偶联物 (即 2(LC- 毒素肽类似物融合体或偶联物)+2(HC))，其中毒素肽类似物融合到两个 LC 单体的 C 端末端。图 12L 表示三价 HT Ab LC- 毒素肽类似物 /HC- 毒素肽类似物 (即 2(LC- 毒素肽类似物融合体或偶联物)+HC- 毒素肽类似物融合体或偶联物 +HC)，其中毒素肽类似物融合到两个 LC 单体和一个 HC 单体的 C 端末端。图 12M 表示二价抗体，其中毒素肽类似物部分插入每个 HC 单体的免疫球蛋白 Fc 结构域的内部环。图 12N 表示单价抗体，其中毒素肽类似物部分插入 HC 单体之一的免疫球蛋白 Fc 结构域的内部环。在表达编码单链的脱氧核糖核酸 (DNA) 构建体时，二聚体或三聚体将在某些宿主细胞中自发形成。在其他宿主细胞中，可将细胞置于有利于形成二聚体 / 三聚体的条件下，或者可以在体外形成二聚体 / 三聚体。如果不止一个 HC 单体、LC 单体或免疫球蛋白 Fc 结构域单体构成单个实施方案的一部分，则各个单体可根据需要彼此相同或不同。

[0087] 图 13A-F 示出在人三叉神经节中 (图 13A-B) 以及在人背根神经节中 (图 13C-F) 检测 $Na_v1.7$ 信使 RNA 表达的原位杂交研究。图 13A、图 13C、图 13E 显示苏木精和伊红 (H & E) 染色的细胞 ；图 13B、图 13D 和图 13F 显示通过作为蓝色点的 ^{33}P 标记反义探针的杂交而进行的 Nav1.7 表达。$Na_v1.7$ 特异性染色也在胃和小肠的肠肌丛中检测到。未在人小脑、大脑皮层、肾上腺髓质或垂体中检测到 $Na_v1.7$ 特异性染色，在下丘脑核中只检测到轻微的染色。脊髓中的染色限于腹侧运动区中的轻微染色以及限于脊髓室管膜 (中央管衬里的上皮细胞)。所有染色均在无 RNA 酶的条件下在福尔马林固定石蜡包埋组织上完成。通过以下方法确认了 $Na_v1.7$ 的特异性探针 ：确认在表达克隆人类 $Na_v1.7$ 的 HEK-293T 细胞系上存在正信号以及在表达任何以下钠通道的细胞系上以及在亲本 293T 细胞系上不存在信号 ：$hNa_v1.1$(HEK-293T)、$hNa_v1.2$(CHO)、$hNa_v1.3$(CHO)、$hNa_v1.4$(HEK-293T)、$hNa_v1.5$(HEK-293T)、$hNa_v1.6$(HEK-293T)、$rNa_v1.3$(HEK-293T)。

[0088] 图 14A-E 显示从大鼠感觉神经节急性分离的各个神经元表达异质性钠电流群。各个神经元表达了快速、河豚毒素敏感性钠电流 (可能是 $Na_v1.7$ 和 $Na_v1.3$)，缓慢、耐河豚毒素钠电流 (可能是 $Na_v1.8$) 或混合群 (没有一种电流类型编码的电流大于总钠电流的 90％)。图 14A-C 显示表达快速 TTX-S(图 14A)、混合 (图 14B) 或缓慢 TTX-R(图 14C) 钠电流的神经元的实例。图 14D-E 示出从经历了脊神经结扎 (“SNL”) 手术 (图 14E) 的大鼠的感觉神经节分离的神经元表达的快速 TTX-S 电流的比例比对照大鼠 (图 14D) 大得多。

[0089] 图 15A-B 显示 KIIIA(SEQ ID NO ：530)、GpTx-1(1-34)(SEQ ID NO ：1)、虎纹捕鸟蛛毒素 -IV(SEQ ID NO ：528)、虎纹捕鸟蛛毒素 -I(SEQ ID NO ：529) 和 ProTx II(SEQ ID NO ：531) 的序列比对。

[0090] 图 16 显示在 1mg/kg 皮下 (“s.c.”) 施用后小鼠血浆中 GpTx-1 的浓度 - 时间曲

线。GpTx-1 浓度在三只动物的两只中低于定量下限，并且无法获得曲线。

[0091] 图 17A 显示在 1mg/kg 静脉内（“i.v.”）施用后两只小鼠血浆中 [Ala5]GpTx-1(SEQ ID NO:22) 的浓度－时间曲线。（第三只小鼠中的暴露量低于定量限，并且无法获得曲线）。

[0092] 图 17B 显示在 5mg/kg s.c. 剂量 (n = 3)、1mg/kg s.c. 剂量 (n = 2) 和 1mg/kg 静脉内 (i.v.) 剂量 (n = 2) 后小鼠血浆中 [Ala5]GpTx-1(SEQ ID NO:22) 的平均血浆浓度－时间曲线。对于 5mg/kg 的剂量，血浆中的肽浓度以大约 0.6μM 持续 3 小时，通过 PatchXpress® (PX) 测定是体外 Nav1.7 IC_{50} 的大约 40 倍。

[0093] 图 18 显示针对 hERG 测试的 GpTx-1(SEQ ID NO:1 ;n = 7)、[Ala5]GpTx-1(SEQ ID NO:22 ;n = 8) 和 BSA 对照的剂量反应关系。两种化合物的 IC_{50} 值均＞ 10μM。

[0094] 图 19A 显示针对 hNav1.5 测试的 GpTx-1(SEQ ID NO:1 ;n = 7) 的剂量反应关系。GpTx-1 的 IC_{50} 值为 9.8μM。

[0095] 图 19B 显示针对 hNav1.5 测试的 [Ala5]GpTx-1(SEQ ID NO:22，n = 9) 的剂量反应关系。[Ala5]GpTx-1 的 IC_{50} 值＞ 30μM。

[0096] 图 20 显示 GpTx-1(SEQ ID NO:1) 对 hNav1.7 通道的作用。细胞被保持在 -140mV，峰值内向 hNav1.7 电流在 -10mV 下测量。“基线”迹线显示 GpTx-1 前的 hNav1.7 电流，而‘100nM GpTx-1’曲线则显示添加 GpTx-1 后的 hNav1.7 电流。

[0097] 图 21 显示针对 hNav1.7 通道的 GpTx-1(SEQ ID NO:1) 的剂量反应曲线。峰值内向 hNav1.7 电流在存在渐增浓度的 GpTx-1 时在 -10mV 下测量 ;细胞被保持在 -140mV。将电流通过 100 和 0 归一化，100 表示未添加肽时的 Nav1.7 电流，而 0 则表示完全阻断后的 Nav1.7 电流。针对 hNav1.7 通道的 GpTx-1 的 IC_{50} 为 7.40nM。

[0098] 图 22 显示针对 hNav1.7 通道的渐增浓度的 GpTx-1(SEQ ID NO:1) 的时间进程。峰值内向 hNav1.7 电流在存在渐增浓度的 GpTx-1 时在 -10mV 下每 10 秒测量一次 ;细胞被保持在 -140mV。“基线”表示在不存在 GpTx-1 时的 hNav1.7 电流，而“洗涤”则表示移除 GpTx-1 后的 hNav1.7 电流。

[0099] 图 23 显示 GpTx-1(SEQ ID NO:1) 对 hNav1.3 通道的作用。细胞被保持在 -140mV，峰值内向 hNav1.3 电流在 -10mV 下测量。“基线”迹线显示 GpTx-1 前的 hNav1.3 电流，而‘300nM GpTx-1’曲线则显示添加 GpTx-1 后的 hNav1.3 电流。

[0100] 图 24 显示针对 hNav1.3 通道的 GpTx-1(SEQ ID NO:1) 的剂量反应曲线。峰值内向 hNav1.3 电流在存在渐增浓度的 GpTx-1 时在 -10mV 下测量 ;细胞被保持在 -140mV。将电流通过 100 和 0 归一化，100 表示未添加肽时的 Nav1.3 电流，而 0 则表示完全阻断后的 Nav1.3 电流。针对 hNav1.3 通道的 GpTx-1 的 IC_{50} 为 16.8nM。

[0101] 图 25 显示针对 hNav1.3 通道的渐增浓度的 GpTx-1(SEQ ID NO:1) 的时间进程。峰值内向 hNav1.3 电流在存在渐增浓度的 GpTx-1 时在 -10mV 下每 10 秒测量一次 ;细胞被保持在 -140mV。“基线”表示在不存在 GpTx-1 时的 hNav1.3 电流，而“洗涤”则表示移除 GpTx-1 后的 hNav1.3 电流。

[0102] 图 26 显示 GpTx-1(SEQ ID NO:1) 对 hNav1.4 通道的作用。细胞被保持在 -140mV，峰值内向 hNav1.4 电流在 -10mV 下测量。“基线”迹线显示 GpTx-1 前的 hNav1.4 电流，而‘3μM GpTx-1’曲线则显示添加 GpTx-1 后的 hNav1.4 电流。

[0103] 图 27 显示针对 hNav1.4 通道的 GpTx-1(SEQ ID NO:1) 的剂量反应曲线。峰值内

向 hNav1.4 电流在存在渐增浓度的 GpTx-1 时在 -10mV 下测量 ;细胞被保持在 -140mV。将电流通过 100 和 0 归一化,100 表示未添加肽时的 Nav1.4 电流,而 0 则表示完全阻断后的 Nav1.4 电流。针对 hNav1.4 通道的 GpTx-1 的 IC_{50} 为 2.9μM。

[0104] 图 28 显示针对 hNav1.4 通道的 GpTx-1(SEQ ID NO :1) 的剂量反应曲线。峰值内向 hNav1.4 电流在存在渐增浓度的 GpTx-1 时在 -10mV 下测量 ;细胞被保持在产生约 20％失活的电位下。注意,GpTx-1 在通道部分失活时对 hNav1.4 的效力更高。将电流通过 100 和 0 归一化,100 表示未添加肽时的 Nav1.4 电流,而 0 则表示完全阻断后的 Nav1.4 电流。针对部分失活的 hNav1.4 通道的 GpTx-1 的 IC_{50} 为 0.26μM。

[0105] 图 29 显示针对 hNav1.4 通道的渐增浓度的 GpTx-1(SEQ ID NO :1) 的时间进程。峰值内向 hNav1.4 电流在存在渐增浓度的 GpTx-1 时在 -10mV 下每 10 秒测量一次 ;细胞被保持在 -140mV。“基线”表示在不存在 GpTx-1 时的 hNav1.4 电流,而“洗涤”则表示移除 GpTx-1 后的 hNav1.4 电流。

[0106] 图 30 显示针对 hNav1.4 通道的渐增浓度的 GpTx-1(SEQ ID NO :1) 的时间进程。峰值内向 hNav1.4 电流在存在渐增浓度的 GpTx-1 时在 -10mV 下每 10 秒测量一次 ;细胞被保持在 -140mV(方形) 或产生约 20％失活 (圆形) 的电位下。“基线”表示在不存在 GpTx-1 时的 hNav1.4 电流,而“洗涤”则表示移除 GpTx-1 后的 hNav1.4 电流。注意,GpTx-1 在通道部分失活时对 hNav1.4 的效力更高。

[0107] 图 31 显示 GpTx-1(SEQ ID NO :1) 对 hNav1.5 通道的作用。细胞被保持在 -140mV,峰值内向 hNav1.5 电流在 -10mV 下测量。“基线”迹线显示 GpTx-1 前的 hNav1.5 电流,而‘3μM GpTx-1’曲线则显示添加 GpTx-1 后的 hNav1.5 电流。

[0108] 图 32 显示针对 hNav1.5 通道的 GpTx-1(SEQ ID NO :1) 的剂量反应曲线。峰值内向 hNav1.5 电流在存在渐增浓度的 GpTx-1 时在 -10mV 下测量 ;细胞被保持在 -140mV。将电流通过 100 和 0 归一化,100 表示未添加肽时的 Nav1.5 电流,而 0 则表示完全阻断后的 Nav1.5 电流。针对 hNav1.5 通道的 GpTx-1 的 IC_{50} 为 8.9μM。

[0109] 图 33 显示针对 hNav1.5 通道的渐增浓度的 GpTx-1(SEQ ID NO :1) 的时间进程。峰值内向 hNav1.5 电流在存在渐增浓度的 GpTx-1 时在 -10mV 下每 10 秒测量一次 ;细胞被保持在 -140mV。“基线”表示在不存在 GpTx-1 时的 hNav1.5 电流,而“洗涤”则表示移除 GpTx-1 后的 hNav1.5 电流。

[0110] 图 34 显示 [Ala5]GpTx-1(SEQ ID NO :22) 对 hNav1.7 通道的作用。细胞被保持在 -140mV,峰值内向 hNav1.7 电流在 -10mV 下测量。“基线”迹线显示添加 [Ala5]GpTx-1 前的 hNav1.7 电流,而“300nM[Ala5]GpTx-1”迹线则显示添加 [Ala5]GpTx-1 后的 hNav1.7 电流。细胞被保持在产生约 20％失活的电位下。

[0111] 图 35 显示针对 hNav1.7 通道的 [Ala5]GpTx-1(SEQ ID NO :22) 的剂量反应曲线。峰值内向 hNav1.7 电流在存在渐增浓度的 [Ala5]GpTx-1 时在 -10mV 下测量 ;细胞被保持在产生约 20％失活的电位下。将电流通过 100 和 0 归一化,100 表示未添加肽时的 Nav1.7 电流,而 0 则表示完全阻断后的 Nav1.7 电流。针对部分失活的 hNav1.7 通道的 [Ala5]GpTx-1 的 IC_{50} 为 13.2nM。

[0112] 图 36 显示针对 hNav1.7 通道的渐增浓度的 [Ala5]GpTx-1(SEQ ID NO :22) 的时间进程。峰值内向 hNav1.7 电流在存在渐增浓度的 [Ala5]GpTx-1 时在 -10mV 下每 10 秒测量

一次；细胞被保持在 -140mV（方形）或产生约 20％失活（圆形）的电位下。“基线”表示在不存在 [Ala5]GpTx-1 时的 hNav1.7 电流，而“洗涤”则表示移除 [Ala5]GpTx-1 后的 hNav1.7 电流。

[0113] 图 37 显示在小鼠背根神经节 (DRG) 神经元中针对 TTX 敏感性 Nav 通道的渐增浓度的 GpTx-1(SEQ ID NO：1) 的时间进程。峰值内向 Nav 电流在存在渐增浓度的 GpTx-1 时在 -10mV 下每 10 秒测量一次；细胞被保持在 -140mV。“对照”表示在不存在 GpTx-1 时的 Nav 电流，‘TTX’表示在存在 300nM TTX 时的 Nav 电流，而“洗涤”则表示在移除 GpTx-1 和 TTX 后的 Nav 电流。注意，GpTx-1 阻断了几乎所有 TTX 敏感性 Nav 电流。在该研究中测得的电流几乎均为基于失活的快速动力学在记录开始时鉴定的 TTX 敏感性电流。

[0114] 图 38 显示在小鼠 DRG 神经元中针对 TTX 敏感性 Nav 通道的 GpTx-1(SEQ ID NO：1) 的代表性剂量反应曲线。峰值内向 Nav 电流在存在渐增浓度的 GpTx-1 时在 -10mV 下测量；细胞被保持在 -140mV。在 mDRG 神经元中针对 TTX 敏感性钠通道的 GpTx-1 的 IC_{50} 值经测得为 7.1nM。将电流通过 100 和 0 归一化，100 表示未添加肽时的 TTX 敏感性电流，而 0 则表示完全阻断后的 TTX 敏感性电流。

[0115] 图 39 显示在小鼠 DRG 神经元中单一浓度的 GpTx-1(SEQ ID NO：1) 对 TTX 敏感性 Nav 通道的作用。细胞被保持在 -140mV，峰值内向 Nav 电流在 -10mV 下测量。“基线”迹线显示添加 GpTx-1 前的 Nav 电流，而“200nM GpTx-1”迹线则显示添加 GpTx-1 后的 Nav 电流。注意，对照电流在几毫秒内完全失活，其将 TTX 敏感性电流与耐 TTX 电流区分开来。

[0116] 图 40 显示在小鼠 DRG 神经元中针对 TTX 敏感性 Nav 通道的渐增浓度的 GpTx-1(SEQ ID NO：1) 的时间进程。峰值内向 Nav 电流在存在渐增浓度的 GpTx-1 时在 -10mV 下每 10 秒测量一次；细胞被保持在产生约 20％失活的电位下。“对照”表示在不存在 GpTx-1 时的 Nav 电流，“TTX”表示在存在 300nM TTX 时的 Nav 电流，而“洗涤”则表示在移除 GpTx-1 和 TTX 后的 Nav 电流。注意，GpTx-1 阻断了所有 TTX 敏感性 Nav 电流，因为 300nM 的 TTX 未额外阻断电流。

[0117] 图 41 显示在小鼠 DRG 神经元中针对 TTX 敏感性 Nav 通道的 GpTx-1(SEQ ID NO：1) 的代表性剂量反应曲线，如通过快速失活动力学所限定。峰值内向 Nav 电流在存在渐增浓度的 GpTx-1 时在 -10mV 下测量；细胞被保持在产生约 20％失活的电位下。在 mDRG 神经元中针对 TTX 敏感性钠通道的 GpTx-1 的 IC_{50} 值经测得为 4.7nM。将电流通过 100 和 0 归一化，100 表示未添加肽时的 TTX 敏感性电流，而 0 则表示完全阻断后的 TTX 敏感性电流。

[0118] 图 42 显示在小鼠 DRG 神经元中 GpTx-1(SEQ ID NO：1) 对 TTX 敏感性 Nav 通道的作用。细胞被保持在产生约 20％失活的电位下，峰值内向 Nav 电流在 -10mV 下测量。“基线”迹线显示添加 GpTx-1 前的 Nav 电流，而“200nM GpTx-1”迹线则显示添加 GpTx-1 后的 Nav 电流。

[0119] 图 43 显示在小鼠 DRG 神经元中针对 TTX 敏感性 Nav 通道的渐增浓度的 [Ala5]GpTx-1(1-34)(SEQ ID NO：22) 的时间进程。峰值内向 Nav 电流在存在渐增浓度的 [Ala5]GpTx-1(1-34)(SEQ ID NO：22) 时在 -10mV 下每 10 秒测量一次；细胞被保持在 -140mV。“对照”表示在不存在 [Ala5]GpTx-1(1-34)(SEQ ID NO：22) 时的 Nav 电流，“TTX”’表示在存在 300nM TTX 时的 Nav 电流，而“洗涤”则表示在移除 [Ala5]GpTx-1(1-34)(SEQ ID NO：22) 和 TTX 后的 Nav 电流。注意，[Ala5]GpTx-1(1-34)(SEQ ID NO：22) 阻断了几乎所有 TTX 敏感

性 Nav 电流。

[0120] 图 44 显示在小鼠 DRG 神经元中针对 TTX 敏感性 Nav 通道的 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 的代表性剂量反应曲线。峰值内向 Nav 电流在存在渐增浓度的 [Ala5]GpTx-1(1-34) 时在 -10mV 下测量;细胞被保持在 -140mV。在 mDRG 神经元中针对 TTX 敏感性钠通道的 [Ala5]GpTx-1(1-34) 的 IC_{50} 值经测得为 17.0nM。将电流通过 100 和 0 归一化,100 表示未添加肽时的 TTX 敏感性电流,而 0 则表示完全阻断后的 TTX 敏感性电流。

[0121] 图 45 显示在小鼠 DRG 神经元中 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 对 TTX 敏感性 Nav 通道的作用。细胞被保持在 -140mV,峰值内向 Nav 电流在 -10mV 下测量。“基线”迹线显示在添加 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 前的 Nav 电流,“300nM SEQ ID NO:22”迹线显示在添加 SEQ ID NO:22 后的 Nav 电流,而“300nM SEQ ID NO:22+300nM TTX”迹线则显示在添加 SEQ ID NO:22 和 TTX 后的 Nav 电流。注意,[Ala5]GpTx-1(1-34) 选择性阻断了 TTX 敏感性 Nav 电流,但不阻断耐 TTX Nav 电流。

[0122] 图 46 显示针对 hNav1.7 通道的渐增浓度的肽单体 [Phe6,Atz13]GpTx-1(1-34)(SEQ ID NO:591) 同二聚偶联物 (同二聚偶联物 1) 的时间进程。峰值内向 hNav1.7 电流在存在渐增浓度的同二聚偶联物 1 时在 -10mV 下每 10 秒测量一次;细胞被保持在 -140mV。“对照”表示在不存在同二聚偶联物 1 时的人类 Nav1.7(hNav1.7) 电流,而“洗涤”则表示在移除同二聚偶联物 1 后的 hNav1.7 电流。

[0123] 图 47 显示针对人类 Nav1.7 通道的同二聚偶联物 1 的代表性剂量反应曲线。峰值内向 hNav1.7 电流在存在渐增浓度的同二聚偶联物 1 时在 -10mV 下测量;细胞被保持在 -140mV。针对 hNav1.7 钠通道的同二聚偶联物 1 的 IC_{50} 值经测得为 1.2nM。将电流通过 100 和 0 归一化,100 表示未添加肽时的 Nav1.7 电流,而 0 则表示完全阻断后的 Nav1.7 电流。

[0124] 图 48 显示在洗出同二聚偶联物 1 后 hNav1.7 电流的恢复。峰值内向 hNav1.7 电流在存在 3nM 或 300nM 同二聚偶联物 1 时在 -10mV 下每 10 秒测量一次;细胞被保持在 -140mV。“对照”表示在不存在同二聚偶联物 1 时的 hNav1.7 电流,而“洗涤”则表示在移除同二聚偶联物 1 后的 hNav1.7 电流。注意,hNav1.7 电流在洗出 3nM 同二聚偶联物 1 后部分恢复,但未在洗出 300nM 同二聚偶联物 1 后恢复。

[0125] 图 49 显示同二聚偶联物 1 对 hNav1.7 通道的作用。细胞被保持在 -140mV,峰值内向 hNav1.7 电流在 -10mV 下测量。“基线”迹线显示在添加同二聚偶联物 1 前的 hNav1.7 电流,而“10nM 同二聚偶联物 1”迹线则显示在添加同二聚偶联物 1 后的 hNav1.7 电流。

[0126] 图 50 显示针对 hNav1.7 通道的渐增浓度的同二聚偶联物 1 的时间进程。峰值内向 hNav1.7 电流在存在渐增浓度的同二聚偶联物 1 时在 -10mV 下每 10 秒测量一次;细胞被保持在产生约 20%失活的电位下。“对照”表示在不存在同二聚偶联物 1 时的 hNav1.7 电流,而“洗涤”则表示在移除同二聚偶联物 1 后的 hNav1.7 电流。

[0127] 图 51 显示针对 hNav1.7 通道的同二聚偶联物 1 的代表性剂量反应曲线。峰值内向 hNav1.7 电流在存在渐增浓度的同二聚偶联物 1 时在 -10mV 下测量;细胞被保持在产生约 20%失活的电位下。在 mDRG 神经元中针对 TTX 敏感性钠通道的同二聚偶联物 1 的 IC_{50} 值经测得为 0.66nM。将电流通过 100 和 0 归一化,100 表示未添加肽时的 Nav1.7 电流,而 0 则表示完全阻断后的 Nav1.7 电流。

[0128] 图 52 显示同二聚偶联物 1 对 hNav1.7 通道的作用。细胞被保持在产生约 20％失活的电位下，峰值内向 hNav1.7 电流在 -10mV 下测量。“基线”迹线显示在添加同二聚偶联物 1 前的 hNav1.7 电流，而“3nM 同二聚偶联物 1”迹线则显示在添加同二聚偶联物 1 后的 hNav1.7 电流。

[0129] 图 53 显示针对 hNav1.5 通道的渐增浓度的同二聚偶联物 1 的时间进程。峰值内向 hNav1.5 电流在存在渐增浓度的同二聚偶联物 1 时在 -10mV 下每 10 秒测量一次；细胞被保持在 -140mV。“对照”表示在不存在同二聚偶联物 1 时的 hNav1.5 电流，而“洗涤”则表示在移除同二聚偶联物 1 后的 hNav1.5 电流。注意，hNav1.5 电流在洗出同二聚偶联物 1 后部分恢复。

[0130] 图 54 显示针对 hNav1.5 通道的同二聚偶联物 1 的代表性剂量反应曲线。峰值内向 hNav1.5 电流在存在渐增浓度的同二聚偶联物 1 时在 -10mV 下测量；细胞被保持在 -140mV。针对 hNav1.5 钠通道的同二聚偶联物 1 的 IC_{50} 值经测得为 75.5nM。将电流通过 100 和 0 归一化，100 表示未添加肽时的 Nav1.5 电流，而 0 则表示完全阻断后的 Nav1.5 电流。

[0131] 图 55 显示同二聚偶联物 1 对 hNav1.5 通道的作用。细胞被保持在 -140mV，峰值内向 hNav1.5 电流在 -10mV 下测量。“基线”迹线显示在添加同二聚偶联物 1 前的 hNav1.5 电流，而“2μM 同二聚偶联物 1”迹线则显示在添加同二聚偶联物 1 后的 hNav1.5 电流。

[0132] 图 56 显示针对 hNav1.5 通道的渐增浓度的同二聚偶联物 1 的时间进程。峰值内向 hNav1.5 电流在存在渐增浓度的同二聚偶联物 1 时在 -10mV 下每 10 秒测量一次；细胞被保持在产生约 20％失活的电位下。“对照”表示在不存在同二聚偶联物 1 时的 hNav1.5 电流，而“洗涤”则表示在移除同二聚偶联物 1 后的 hNav1.5 电流。

[0133] 图 57 显示针对 hNav1.5 通道的同二聚偶联物 1 的代表性剂量反应曲线。峰值内向 hNav1.5 电流在存在渐增浓度的同二聚偶联物 1 时在 -10mV 下测量；细胞被保持在产生约 20％失活的电位下。针对 hNav1.5 钠通道的同二聚偶联物 1 的 IC_{50} 值经测得为 57nM。将电流通过 100 和 0 归一化，100 表示未添加肽时的 Nav1.5 电流，而 0 则表示完全阻断后的 Nav1.5 电流。

[0134] 图 58 显示同二聚偶联物 1 对 hNav1.5 通道的作用。细胞被保持在产生约 20％失活的电位下，峰值内向 hNav1.5 电流在 -10mV 下测量。“基线”迹线显示在添加同二聚偶联物 1 前的 hNav1.5 电流，而“2μM 同二聚偶联物 1”迹线则显示在添加同二聚偶联物 1 后的 hNav1.5 电流。

[0135] 图 59 显示在雄性 CD-1 小鼠福尔马林疼痛模型中采用 5mg/kg s.c. 的 1 小时预处理剂量时 [Ala5]GpTx-1(1-34)(SEQ ID NO：22) 的作用的时间进程。肽对第一或急性期（福尔马林注射后 0-5 分钟）无作用。与媒介物 (PBS) 相比，肽显著缩短了在第二期（福尔马林注射后 5-40 分钟，与脊髓敏感化相关）抬起和 / 或舔受影响的爪子所花的时间。在该实验中，用作阳性对照的 1mg/kg 的吗啡皮下剂量不足以显著减轻动物中的疼痛反应，在以下的研究中将其增至 3mg/kg。肽的末期血浆暴露（在福尔马林注射后 45 分钟时的肽血浆浓度）为 0.80±0.21μM。

[0136] 图 60 显示在雄性 CD-1 小鼠福尔马林疼痛模型中采用 5mg/kg s.c. 的 1 小时预处理剂量时 [Ala5]GpTx-1(1-34)(SEQ ID NO：22) 在第一期（福尔马林注射后 0-5 分钟）中的作用。肽和吗啡阳性对照均未显著缩短第一期中抬起和 / 或舔受影响的爪子所花的时

间。在该第一期中畏缩的药理学减轻通常反映对动物运动、意识或健康的非特异性作用，而非疼痛的实际减轻。

[0137] 图 61 显示在雄性 CD-1 小鼠福尔马林疼痛模型中采用 5mg/kg s.c. 的 1 小时预处理剂量时 [Ala5]GpTx-1(1-34)(SEQ ID NO :22) 在第二期（福尔马林注射后 5-40 分钟）中的作用。肽但非吗啡对照显著缩短了第二期中抬起和 / 或舔受影响的爪子所花的时间。同样，吗啡阳性对照不产生作用不能反映试验“失败”，而是反映小鼠对该浓度吗啡的反应的波动。将以后实验的吗啡剂量增至 3mg/kg。

[0138] 图 62 显示在雄性 CD-1 小鼠福尔马林疼痛模型中采用 5mg/kg s.c. 的 1 小时预处理剂量时 [Ala5]GpTx-1(1-34)(SEQ ID NO :22) 对爪子肿胀的作用。相对于媒介物 (PBS)，肽和吗啡阳性对照均未显著减轻福尔马林注射所导致的爪子肿胀。

[0139] 图 63 显示在雄性 CD-1 小鼠福尔马林疼痛重复模型中采用 5、1.67 和 0.5mg/kg s.c. 的 1 小时预处理剂量时 [Ala5]GpTx-1(1-34)(SEQ ID NO :22) 的作用的时间进程。肽在第一期（福尔马林注射后 0-5 分钟）中在任何剂量下均无作用。阳性对照 (3mg/kg 的吗啡皮下剂量）确实显著缩短了第一期中抬起 / 舔受影响的爪子所花的时间。5mg/kg 的 [Ala5]GpTx-1(1-34)(SEQ ID NO :22) 皮下剂量证实了在研究第二期中抬爪 / 舔爪所花的时间的显著缩短，与吗啡阳性对照一样。较低的肽剂量 (1.67 和 0.5mg/kg s.c.）相对于媒介物在第二期中无作用。末期暴露（福尔马林注射后 45 分钟时的肽血浆浓度）对于 5.0、1.67 和 0.5mg/kg 的剂量而言分别为 0.58±0.26μM、0.15±0.05μM 和 0.04±0.2μM。

[0140] 图 64 显示采用 5、1.67 和 0.5mg/kg s.c. 的 1 小时预处理剂量时在雄性 CD-1 小鼠福尔马林疼痛模型第一期中 [Ala5]GpTx-1(1-34)(SEQ ID NO :22) 的作用。肽相对于媒介物在第一期（福尔马林注射后 0-5 分钟）中在任何剂量下均无作用，但阳性对照 (3mg/kg 的吗啡皮下剂量）确实显著缩短了第一期中抬起 / 舔受影响的爪子所花的时间。

[0141] 图 65 显示采用 5、1.67 和 0.5mg/kg s.c. 的 1 小时预处理剂量时在雄性 CD-1 小鼠福尔马林疼痛模型第二期中 [Ala5]GpTx-1(1-34)(SEQ ID NO :22) 的作用。5mg/kg 的肽皮下剂量证实了在研究第二期中抬爪 / 舔爪所花的时间的显著缩短，与吗啡阳性对照一样。较低的肽剂量 (1.67 和 0.5mg/kgs.c.）相对于媒介物在第二期中无作用。

[0142] 图 66 显示采用 5、1.67 和 0.5mg/kg s.c. 的 1 小时预处理剂量时在雄性 CD-1 小鼠福尔马林疼痛模型中 [Ala5]GpTx-1(1-34)(SEQ ID NO :22) 对爪子肿胀的作用。相对于媒介物 (PBS)，肽和吗啡对照均未显著减轻福尔马林注射所导致的爪子肿胀。

[0143] 图 67 显示在雄性 CD-1 小鼠福尔马林疼痛第三平行模型中采用 5、3 和 1mg/kg s.c. 的 1 小时预处理剂量时 [Ala5]GpTx-1(1-34)(SEQ ID NO :22) 的作用的时间进程。5mg/kg 的肽剂量和 3mg/kg 的吗啡皮下剂量 (30 分钟预处理）在第一期（福尔马林注射后 0-5 分钟）中无作用。然而，较低的肽剂量 (1 和 3mg/kg s.c.）似乎相对于媒介物对照增加了抬爪 / 舔爪所花的时间。5mg/kg 的 [Ala5]GpTx-1(1-34)(SEQ ID NO :22) 皮下剂量证实了在研究第二期中抬爪 / 舔爪所花的时间的显著缩短，与吗啡阳性对照一样。然而，较低的肽剂量未在第二期中显示出相对于媒介物对照抬爪 / 舔爪行为的减轻。1mg/kg s.c. 组与媒介物对照并无明显不同，而 3mg/kg s.c. 组似乎显著增加了第二期中抬爪 / 舔爪所花的时间。末期暴露（福尔马林注射后 45 分钟时的肽血浆浓度）对于 5.0、3 和 1mg/kg 的剂量而言分别为 1.84±0.18μM、0.53±0.23μM 和 0.20±0.05μM。

[0144] 图 68 显示采用 5、3 和 1mg/kg s.c. 的 1 小时预处理剂量时在雄性 CD-1 小鼠福尔马林疼痛模型第一期中 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 的作用。5mg/kg 的肽剂量和 3mg/kg 的吗啡皮下剂量在第一期（福尔马林注射后 0-5 分钟）中无作用。然而，较低的肽剂量（1 和 3mg/kg s.c.）似乎相对于对照增加了抬爪 / 舔爪所花的时间。

[0145] 图 69 显示采用 5、3 和 1mg/kg s.c. 的 1 小时预处理剂量时在雄性 CD-1 小鼠福尔马林疼痛模型第二期中 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 的作用。5mg/kg 的肽皮下剂量证实了在研究第二期中抬爪 / 舔爪所花的时间的显著缩短，与吗啡阳性对照一样。然而，较低的肽剂量未在第二期中显示出相对于媒介物对照抬爪 / 舔爪行为的减轻。1mg/kg s.c. 组与媒介物对照并无明显不同，而 3mg/kg s.c. 组似乎显著增加了第二期中抬爪 / 舔爪所花的时间。

[0146] 图 70 显示采用 5、3 和 1mg/kg s.c. 的 1 小时预处理剂量时在雄性 CD-1 小鼠福尔马林疼痛模型中 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 对爪子肿胀的作用。相对于媒介物 (PBS)，肽和吗啡对照均未显著减轻福尔马林注射所导致的爪子肿胀。

[0147] 图 71 显示 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 在 3 和 5mg/kg s.c. 剂量下通过 1 小时的预处理时间对雄性 CD-1 小鼠自主活动的总基本运动分量的作用。没有一种肽剂量相对于媒介物对照显著减少了探索行为。末期暴露（肽注射后 2h 时的肽血浆浓度）对于 5 和 3mg/kg s.c. 剂量而言分别为 1.79±0.38 和 0.89±0.33μM。

[0148] 图 72 显示 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 在 3 和 5mg/kg s.c. 剂量下通过 1 小时的预处理时间对雄性 CD-1 小鼠自主活动的细微运动分量的作用。在 3mg/kg 的剂量下，细微运动未受到显著影响。在 5mg/kg 的剂量下，肽相对于媒介物显著减少了总细微运动。

[0149] 图 73 显示 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 在 3 和 5mg/kg s.c. 剂量下通过 1 小时的预处理时间对雄性 CD-1 小鼠自主活动的总直立分量的作用。没有一种肽剂量相对于媒介物对照显著减少了探索行为。

[0150] 图 74 显示 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 在 3 和 5mg/kg s.c. 剂量下通过 1 小时的预处理时间对雄性 CD-1 小鼠自主活动的总直立时间分量的作用。在 3mg/kg 的剂量下，总直立时间未受到显著影响。在 5mg/kg 的剂量下，肽相对于媒介物显著减少了总直立时间。

[0151] 图 75 显示在注射藜芦定后 20 分钟测得的 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 以 5mg/kg s.c. 剂量通过 1 小时的预处理时间以及美西律以 30mg/kg 腹膜内（“i.p.”）剂量通过 30 分钟的预处理时间对藜芦定诱导的（1μg 背侧爪子注射）雄性 CD-1 小鼠自发疼痛行为的作用。总体上，被美西律明显逆转的媒介物组中存在良好的抬爪反应。在 5mg/kg 下，[Ala5]GpTx-1(1-34)(SEQ ID NO:22) 未明显减少抬爪行为。在所有组中均为爪子肿胀的减轻。

[0152] 图 76 显示 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 以 5mg/kg s.c. 剂量通过 1 小时的预处理时间以及美西律以 30mg/kg i.p. 剂量通过 30 分钟的预处理时间对藜芦定诱导的（1μg 背侧爪子注射）雄性 CD-1 小鼠爪子肿胀的作用。在所有组中均为爪子肿胀的减轻。

[0153] 图 77 显示 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 以 5mg/kg s.c. 剂量通过 1 小时的预处理时间以及美西律以 30mg/kg i.p. 剂量通过 30 分钟的预处理时间对藜芦定诱导

的（1μg背侧爪子注射）雄性CD-1小鼠自发疼痛行为的作用的时间进程。总体上，在整个实验过程中，被美西律明显逆转的媒介物组中存在良好的抬爪反应。在5mg/kg下，[Ala5]GpTx-1(1-34)(SEQ ID NO:22)未能明显减轻整实验过程中的抬爪行为，然而确实倾向于在第10-15和15-20分钟时间区间中减少抬爪和舔爪。末期暴露（肽注射后1.5小时的肽血浆浓度）对于5mg/kg剂量而言为0.70±0.10μM。

[0154] 图78显示[Ala5]GpTx-1(1-34)(SEQ ID NO:22)以1和5mg/kg s.c.剂量通过1小时的预处理时间(n＝9-10)以及美西律以30mg/kg i.p.剂量通过30分钟的预处理时间(n＝10)对藜芦定诱导的(1μg背侧爪子注射)雄性CD-1小鼠自发疼痛行为的重复测试。总体上，被美西律明显逆转的媒介物组中存在良好的抬爪反应。在1和5mg/kg下，[Ala5]GpTx-1(1-34)(SEQ ID NO:22)未明显减少抬爪行为。

[0155] 图79显示[Ala5]GpTx-1(1-34)(SEQ ID NO:22)以1和5mg/kg s.c.剂量通过1小时的预处理时间以及美西律以30mg/kg i.p.剂量通过30分钟的预处理时间对藜芦定诱导的(1μg背侧爪子注射)雄性CD-1小鼠爪子肿胀的作用。在任何组中均无爪子肿胀的减轻。

[0156] 图80显示[Ala5]GpTx-1(1-34)(SEQ ID NO:22)以1和5mg/kg s.c.剂量通过1小时的预处理时间以及美西律以30mg/kg i.p.剂量通过30分钟的预处理时间对藜芦定诱导的(1μg背侧爪子注射)雄性CD-1小鼠自发疼痛行为的作用的时间进程。总体上，在整个实验过程中，被美西律明显逆转的媒介物组中存在良好的抬爪反应。在1和5mg/kg下，[Ala5]GpTx-1(1-34)(SEQ ID NO:22)未在实验过程中的任何时间点显著减少抬爪行为。末期暴露（肽注射后1.5小时的肽血浆浓度）对于5和1mg/kg剂量而言分别为0.72±0.13和0.09±0.05μM。

[0157] 图81A显示通过铜催化的1,3-偶极环加成反应发生的含炔烃的肽[Phe6;Pra13]GpTx-1(1-34)(SEQ ID NO:1049)与2kDa PEG二叠氮化物的反应，以通过将序列中的炔丙基甘氨酸或Pra残基转化成3-(1,2,3-三唑-4-基)丙氨酸或Atz残基而得到具有两个三唑键合的位点特异性同二聚肽。

[0158] 图81B显示两步序列：首先通过铜催化的1,3-偶极环加成反应使含炔烃的肽[Ala5,Phe6,Pra13,Leu26,Arg28]GpTx-1(1-34)(SEQ ID NO:640)与叠氮基-PEG11-溴乙酰胺接头反应，以通过将肽序列中的炔丙基甘氨酸或Pra残基转化成3-(1,2,3-三唑-4-基)丙氨酸或Atz残基而得到具有三唑键合的位点特异性聚乙二醇化的肽-接头构建体(SEQ ID NO:1062)。第二，抗-DNP mAb(E273C)hIgG1(包含免疫球蛋白单体SEQ ID NO:3087、SEQ ID NO:3088、SEQ ID NO:3087、SEQ ID NO:3088)中的经工程改造的游离半胱氨酸与肽-接头中的溴乙酰胺官能团反应，形成具有稳定硫代乙酰胺键合的位点特异性免疫球蛋白-肽偶联物(免疫球蛋白-肽偶联物1)。如果一个半胱氨酸发生反应，则结果是如所示的单价免疫球蛋白-肽偶联物；但是如果两个半胱氨酸均发生反应，则结果是二价免疫球蛋白-肽偶联物。

[0159] 图82显示在SP柱上纯化前肽-接头构建体(SEQ ID NO:1062)与抗-DNP mAb(E273C)hIgG1(包含免疫球蛋白单体SEQ ID NO:3087、SEQ ID NO:3088、SEQ ID NO:3087、SEQ ID NO:3088)的位点特异性偶联反应混合物的还原性SDS-PAGE凝胶。约75％的mAb重链(HC)显示出5-kD偏移，从而表明单一GpTX-1肽类似物的偶联。越高的分子量条

带表示由于过度还原而得到的更高级偶联物。

[0160] 图 83 显示肽 - 接头构建体 (SEQ ID NO :1062) 与抗 -DNP mAb(E273C)hIgG1(包含免疫球蛋白单体 SEQ ID NO :3087、SEQ ID NO :3088、SEQ ID NO :3087、SEQ ID NO :3088) 的位点特异性偶联反应混合物的纯化的结果。左图显示使用 5-mL HiTrap SP-HP 柱时偶联反应的 280nm 紫外吸收的阳离子交换色谱图。右图显示得自阳离子交换色谱图的峰的非还原性 SDS-PAGE 凝胶 (左),表明抗体 - 肽偶联物的内部二硫键是完整的 ;以及得自阳离子交换色谱图的峰的还原性 SDS-PAGE 凝胶 (右)。峰 1 显示未反应的抗体的重链 (HC)。峰 2 显示大约 50％的偏移 HC,从而指示单价抗体 -GpTx-1 肽类似物偶联物。峰 3 显示几乎 100％的偏移 HC,从而指示二价抗体 -GpTx-1 肽类似物偶联物。

[0161] 图 84 显示肽 - 接头构建体 (SEQ ID NO :1062) 与抗 -DNP mAb(E273C)hIgG1 结构域 (SEQ ID NO :3089 的同二聚体) 的位点特异性偶联反应混合物的纯化的结果。左图显示使用 5mL HiTrap SP-HP 柱时偶联反应的 280nm 紫外吸收的阳离子交换色谱图。右图显示得自阳离子交换色谱图的峰的非还原性 SDS-PAGE 凝胶 (左),表明抗体 - 肽偶联物的内部二硫键是完整的 ;以及得自阳离子交换色谱图的峰的还原性 SDS-PAGE 凝胶 (右)。峰 1 显示大约 50％的偏移 HC,从而指示单价抗体 - 肽偶联物。峰 2 显示近 100％的偏移 HC,从而指示二价抗体 - 肽偶联物。

[0162] 图 85 显示在 Tosoh Bioscience Super SW3000,4μM,250A,4.6mm×30cm 柱上运行通过 100mM 磷酸钠、250mM NaCl、pH6.8 按 0.35mL/min 等度洗脱 20 分钟的 (上图) 未修饰抗 -DNP mAb(E273C)hIgG1(包含 SEQ ID NO :3087、SEQ ID NO :3088、SEQ ID NO :3087、SEQ ID NO :3088) 和 (下图) 二价抗体 -GpTx-1 肽类似物偶联物 (免疫球蛋白 - 肽偶联物 2) 的 280nm 紫外吸收的分析型尺寸排阻色谱图。色谱图表明肽偶联物样品中无聚集。

[0163] 图 86 显示肽 - 接头构建体 (SEQ ID NO :1062) 与抗 -DNP mAb(E273C)hIgG1(包含免疫球蛋白单体 SEQ ID NO :3087、SEQ ID NO :3088、SEQ ID NO :3087、SEQ ID NO :3088) 的二价肽偶联物 (即免疫球蛋白 - 肽偶联物 2) 的解卷积 LC-MS TOF 结果。多个峰的存在表明不同的糖基化同种型。

[0164] 图 87 显示肽 - 接头构建体 (SEQ ID NO :1062) 与抗 -DNP mAb(E52C)hIgG1Fc 结构域 (SEQ ID NO :3089 的同二聚体) 的二价肽偶联物 (即 Fc- 肽偶联物 2) 的解卷积 LC-MS TOF 结果。多个峰的存在表明不同的糖基化同种型。

[0165] 图 88 仅出于示意性目的显示 Fc- 肽偶联物 1 的示意图。通过免疫球蛋白晶体结构 (1HZH.pdb) 构建了免疫球蛋白抗 -DNP mAb(E52C)hIgG1Fc 结构域 (SEQ ID NO :3089 的同二聚体) 的同源模型,并以实心带示出。SEQ ID3089 的 Cys52(即偶联位点) 以 CPK 格式渲染。PEG11 接头在该实施方案中以任意构象作为实心管示出,该接头将免疫球蛋白 Fc 结构域中的 C52 残基连接到肽中的 Atz13 残基。通过 GpTx-1 的 NMR 结构构建了肽 (SEQ ID NO :1046) 的同源模型,并作为实心带显示,并且在该实施方案中示为相对于免疫球蛋白 Fc 结构域任意取向。

[0166] 图 89 仅出于示意性目的显示 Fc- 肽偶联物 2 的示意图。通过免疫球蛋白晶体结构 (1HZH.pdb) 构建了抗 -DNP mAb(E52C)hIgG1Fc 结构域 (SEQ ID NO :3089 的同二聚体) 的同源模型,并以实心带示出。两 Fc 结构域单体 (SEQ ID3089) 的 Cys52 残基均为偶联位点,并以 CPK 格式渲染。PEG11 接头在该实施方案中以任意构象作为实心管示出,该接头将

免疫球蛋白 Fc 结构域中的 C52 残基连接到肽中的 Atz13 残基。通过 GpTx-1 的 NMR 结构构建了肽 (SEQ ID NO :1046) 的同源模型，并作为实心带显示，并且相对于免疫球蛋白 Fc 结构域以任意取向示出。两个肽显示为反映 Fc- 肽偶联物 2 的二价性质。

[0167] 图 90 仅出于示意性目的显示免疫球蛋白 - 肽偶联物 1 的示意图。通过免疫球蛋白晶体结构 (1HZH.pdb) 构建了抗 -DNP mAb(E273C)hIgG1(包含免疫球蛋白单体 SEQ ID NO : 3087、SEQ ID NO :3088、SEQ ID NO :3087、SEQ ID NO :3088) 的同源模型，并以实心带示出。Cys273(即偶联位点) 以 CPK 格式渲染。在该实施方案中，PEG11 接头以任意构象作为实心管示出，该接头将免疫球蛋白中的 C273 残基连接到肽中的 Atz13 残基。通过 GpTx-1 的 NMR 结构构建了肽 (SEQ ID NO :1046) 的同源模型，并作为实心带显示，并且在该实施方案中示为相对于免疫球蛋白任意取向。

[0168] 图 91 显示免疫球蛋白 - 肽偶联物 2 的示意图仅出于示意性目的。通过免疫球蛋白晶体结构 (1HZH.pdb) 构建了抗 -DNP mAb(E273C)hIgG1(包含免疫球蛋白单体 SEQ ID NO : 3087、SEQ ID NO :3088、SEQ ID NO :3087、SEQ ID NO :3088) 的同源模型，并以实心带示出。两个 Cys273 残基 (即偶联位点) 均以 CPK 格式渲染。在该实施方案中，PEG11 接头以任意构象作为实心管示出，该接头将免疫球蛋白中的 C273 残基连接到肽中的 Atz13 残基。通过 GpTx-1 的 NMR 结构构建了肽 (SEQ ID NO :1046) 的同源模型，并作为实心带显示，并且在该实施方案中相对于免疫球蛋白以任意取向示出。两个肽显示为反映免疫球蛋白 - 肽偶联物 2 的二价性质。

[0169] 图 92 显示在对小鼠 (n ＝ 3) 给予 1 和 10mg/kg s.c. 剂量后 GpTx-1 肽类似物 -Fc 偶联物 (Fc- 肽偶联物 2) 和对照 Fc(SEQ ID NO :3089 的同二聚体) 的平均血浆浓度 - 时间曲线。

[0170] 图 93 显示在对小鼠 (n ＝ 3) 给予 1 和 10mg/kg s.c. 剂量后肽 -IgG 偶联物 (免疫球蛋白 - 肽偶联物 2) 和对照 IgG(包含 SEQ ID NO :3087、SEQ ID NO :3088、SEQ ID NO : 3087、SEQ ID NO :3088 的 hIgG1mAb) 的平均血浆浓度 - 时间曲线。

[0171] 图 94 显示 500nM 的肽 [Ala5]GpTx-1(SEQ ID NO :22) 对快速钠电流和电压门控钾电流的作用。曲线是得自从大鼠背根神经节酶法分离的神经元的电压钳记录。通过从 -90mV 的保持电压经 20ms 阶跃到 0mV，同时诱发了合并的内向钠电流和外向钾电流。右侧曲线大约在添加 500nM 肽后 160 秒采集。500nM 的 [Aa5]GpTx-1(SEQ ID NO :22) 阻断了快速钠电流，但未阻断电压门控钾电流。

[0172] 图 95 显示在雄性 CD-1 小鼠福尔马林疼痛模型中采用 5Mg/kg s.c. 的 1 小时预处理剂量时 [Glu29]GpTx-1(1-34)(SEQ ID NO :30) 的作用的时间进程。5mg/kg 的肽剂量和 3mg/kg 的阳性对照吗啡皮下剂量 (30 分钟预处理) 在第一期 (福尔马林注射后 0-5 分钟) 中无明显作用。5mg/kg 的 [Glu29]GpTx-1(1-34)(SEQ ID NO :30) 皮下剂量未展示出研究第二期 (福尔马林注射后 5-40 分钟) 中抬爪 / 舔爪所花的时间的明显缩短，但是吗啡阳性对照确实明显缩短了第二期中抬爪 / 舔爪所花的时间。末期暴露 (福尔马林注射后 45 分钟的肽血浆浓度) 对于 5mg/kg 肽剂量而言为 0.502±0.271μM。

[0173] 图 96 显示采用 5mg/kg s.c. 的 1 小时预处理剂量时 [Glu29]GpTx-1(1-34)(SEQ ID NO :30) 在雄性 CD-1 小鼠福尔马林疼痛模型第一期中的作用。5mg/kg 的肽剂量和 3mg/kg 的吗啡皮下剂量在第一期 (福尔马林注射后 0-5 分钟) 中无作用。

[0174] 图 97 显示采用 5mg/kg s.c. 的 1 小时预处理剂量时 [Glu29]GpTx-1(1-34)(SEQ ID NO:30) 在雄性 CD-1 小鼠福尔马林疼痛模型第二期（福尔马林注射后 5-40 分钟）中的作用。5mg/kg 的肽皮下剂量未展示出在研究第二期中相对于媒介物对照抬爪 / 舔爪所花的时间的显著缩短。吗啡阳性对照确实显著缩短了第二期中抬爪 / 舔爪所花的时间。

[0175] 图 98 显示采用 5mg/kg s.c. 的 1 小时预处理剂量时 [Glu29]GpTx-1(1-34)(SEQ ID NO:30) 对雄性 CD-1 小鼠福尔马林疼痛模型中爪子肿胀的作用。相对于媒介物 (PBS)，肽和吗啡对照均未显著减轻福尔马林注射所导致的爪子肿胀。

[0176] 图 99 显示以 5mg/kg 的皮下剂量通过 1 小时的预处理时间 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 对雄性 CD-1 小鼠自主活动的总基本运动分量的作用的重复。5mg/kg 的肽剂量使总基本运动显著减少。末期暴露（肽注射后 2 小时的肽血浆浓度）为 2.1±0.47μM。

[0177] 图 100 显示以 5mg/kg 的皮下剂量通过 1 小时的预处理时间 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 对雄性 CD-1 小鼠自主活动的细微运动分量的作用。在 5mg/kg 的剂量下，肽相对于媒介物显著减少了总细微运动。

[0178] 图 101 显示以 5mg/kg 的皮下剂量通过 1 小时的预处理时间 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 对雄性 CD-1 小鼠自主活动的总直立分量的作用。在 5mg/kg 的剂量下，肽相对于媒介物对照明显减少了总直立。

[0179] 图 102 显示以 5mg/kg 的皮下剂量通过 1 小时的预处理时间 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 对雄性 CD-1 小鼠自主活动的总直立时间分量的作用。在 5mg/kg 的剂量下，肽相对于媒介物对照显著减少了总直立时间。

[0180] 图 103 显示以 5mg/kg 的皮下剂量通过 1 小时的预处理时间 [Glu29]GpTx-1(1-34)(SEQ ID NO:30) 对雄性 CD-1 小鼠自主活动的总基本运动分量的作用。肽剂量相对于媒介物对照未显著减少探索行为或总基本运动。末期暴露（肽注射后 2 小时的肽血浆浓度）对于 5mg/kg 皮下肽剂量而言为 0.771±0.272μM。

[0181] 图 104 显示以 5mg/kg 的皮下剂量通过 1 小时的预处理时间 [Glu29]GpTx-1(1-34)(SEQ ID NO:30) 对雄性 CD-1 小鼠自主活动的细微运动分量的作用。在 5mg/kg 的剂量下，细微运动相对于媒介物对照未受显著影响。

[0182] 图 105 显示以 5mg/kg 的皮下剂量通过 1 小时的预处理时间 [Glu29]GpTx-1(1-34)(SEQ ID NO:30) 对雄性 CD-1 小鼠自主活动的总直立分量的作用。肽剂量相对于媒介物对照未显著减少探索行为或总直立。

[0183] 图 106 显示以 5mg/kg 的皮下剂量通过 1 小时的预处理时间 [Glu29]GpTx-1(1-34)(SEQ ID NO:30) 对雄性 CD-1 小鼠自主活动的总直立时间分量的作用。在 5mg/kg 的剂量下，总直立时间相对于媒介物对照未受显著影响。

[0184] 图 107 显示以 5mg/kg 的皮下剂量通过 1 小时的预处理时间 [Glu28]GpTx-1(1-34)(SEQ ID NO:153) 对雄性 CD-1 小鼠自主活动的总基本运动分量的作用。5mg/kg 的肽剂量使总基本运动显著减少。末期暴露（肽注射后 2 小时的肽血浆浓度）为 1.28±0.403μM。

[0185] 图 108 显示以 5mg/kg 的皮下剂量通过 1 小时的预处理时间 [Glu28]GpTx-1(1-34)(SEQ ID NO:153) 对雄性 CD-1 小鼠自主活动的细微运动分量的作用。在 5mg/kg 的剂量下，肽相对于媒介物显著减少了总细微运动。

[0186] 图 109 显示以 5mg/kg 的皮下剂量通过 1 小时的预处理时间 [Glu28]GpTx-1(1-34)

(SEQ ID NO:153) 对雄性 CD-1 小鼠自主活动的总直立分量的作用。在 5mg/kg 的剂量下，肽相对于媒介物对照明显减少了总直立。

[0187] 图 110 显示以 5mg/kg 的皮下剂量通过 1 小时的预处理时间 [Glu28]GpTx-1(1-34) (SEQ ID NO:153) 对雄性 CD-1 小鼠自主活动的总直立时间分量的作用。在 5mg/kg 的剂量下，肽相对于媒介物对照显著减少了总直立时间。

[0188] 图 111 显示通过 1 小时的预处理时间 10mg/kg 皮下剂量的 Fc- 肽偶联物 2 和免疫球蛋白 - 肽偶联物 2 对雄性 CD-1 小鼠自主活动的总基本运动分量的作用。肽偶联物剂量相对于媒介物对照未显著减少探索行为或总基本运动。末期暴露（肽偶联物注射后 24.5 小时的肽偶联物血浆浓度）对于 10mg/kg 皮下剂量的 Fc- 肽偶联物 2 和免疫球蛋白 - 肽偶联物 2 而言分别为 0.034±0.009μM 和 0.051±0.007μM。

[0189] 图 112 显示通过 1 小时的预处理时间 10mg/kg 皮下剂量的 Fc- 肽偶联物 2 和免疫球蛋白 - 肽偶联物 2 对雄性 CD-1 小鼠自主活动的细微运动分量的作用。在 10mg/kg 的剂量下，相对于媒介物对照，细微运动未受任一肽偶联物的显著影响。

[0190] 图 113 显示通过 1 小时的预处理时间 10mg/kg 皮下剂量的 Fc- 肽偶联物 2 和免疫球蛋白 - 肽偶联物 2 对雄性 CD-1 小鼠自主活动的总直立分量的作用。肽偶联物剂量相对于媒介物对照未显著减少探索行为或总直立。

[0191] 图 114 显示通过 1 小时的预处理时间 10mg/kg 皮下剂量的 Fc- 肽偶联物 2 和免疫球蛋白 - 肽偶联物 2 对雄性 CD-1 小鼠自主活动的总直立时间分量的作用。在 10mg/kg 的剂量下，相对于媒介物对照，总直立时间未受任一肽偶联物的显著影响。

[0192] 图 115 显示采用 10mg/kg s.c. 的 1 小时预处理剂量时在雄性 CD-1 小鼠福尔马林疼痛模型中 Fc- 肽偶联物 2 和免疫球蛋白 - 肽偶联物 2 的作用的时间进程。10mg/kg 的肽剂量和 3mg/kg 的阳性对照吗啡皮下剂量 (30 分钟预处理）在第一期（福尔马林注射后 0-5 分钟）中无明显作用。10mg/kg 的 Fc- 肽偶联物 2 和免疫球蛋白 - 肽偶联物 2 皮下剂量未展示出研究第二期（福尔马林注射后 5-40 分钟）中抬爪 / 舔爪所花的时间的明显缩短，但是吗啡阳性对照确实明显缩短了第二期中抬爪 / 舔爪所花的时间。末期暴露（福尔马林注射后 45 分钟的肽偶联物血浆浓度）对于 10mg/kg 剂量的 Fc- 肽偶联物 2 和免疫球蛋白 - 肽偶联物 2 而言分别为 0.035±0.011μM 和 0.040±0.011μM。

[0193] 图 116 显示采用 10mg/kg s.c. 的 1 小时预处理剂量时在雄性 CD-1 小鼠福尔马林疼痛模型第一期中 Fc- 肽偶联物 2 和免疫球蛋白 - 肽偶联物 2 的作用。10mg/kg 皮下剂量的 Fc- 肽偶联物 2 和免疫球蛋白 - 肽偶联物 2 以及 3mg/kg 皮下剂量的吗啡在第一期（福尔马林注射后 0-5 分钟）中无作用。

[0194] 图 117 显示采用 10mg/kg s.c. 的 1 小时预处理剂量时在雄性 CD-1 小鼠福尔马林疼痛模型第二期（福尔马林注射后 5-40 分钟）中 Fc- 肽偶联物 2 和免疫球蛋白 - 肽偶联物 2 的作用。10mg/kg 皮下剂量的 Fc- 肽偶联物 2 和免疫球蛋白 - 肽偶联物 2 未展示出相对于媒介物对照在研究第二期中抬爪 / 舔爪所化的时间的明显缩短。吗啡阳性对照确实显著缩短了第二期中抬爪 / 舔爪所花的时间。

具体实施方式

[0195] 本文所用的章节标题仅用于组织目的，不应视为限制所述的主题。

[0196] 定义

[0197] 除非在本文另有定义，否则结合本申请所用的科技术语应当具有本领域普通技术人员通常理解的含义。另外，除非上下文另有需要，否则单数形式的术语应包括多个，并且多数形式的术语也应包括单个。因此，如在本说明书和所附权利要求书中所用，单数形式“一”、“一个 / 种”和“该 / 所述”包括多个指代物，除非上下文另有明确指出。例如，提及“一种蛋白”包括多个蛋白；提及“一种细胞”包括多个细胞的群。

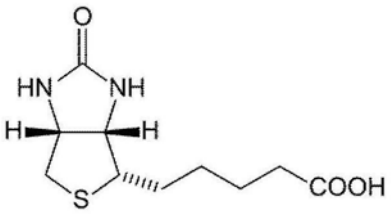
[0198] “多肽”和“蛋白”在本文可互换使用，并包括通过肽键共价连接的两个或更多个氨基酸的分子链。该术语不指代具体长度的产物。因此，“肽”和“寡肽”包含在多肽的定义内。该术语包括多肽的翻译后修饰，例如糖基化、乙酰化、生物素化、4- 戊炔酰化 (pentynoylation)、聚乙二醇化、磷酰化等。此外，蛋白片段、类似物、突变或变体蛋白、融合蛋白等也包含在多肽的含义内。该术语还包括其中包含了一种或多种氨基酸类似物或非规范或天然氨基酸的分子，如可以使用已知的蛋白工程技术进行重组表达而包含在内。此外，融合蛋白可通过熟知的有机化学技术如本文所述进行衍生化。

[0199] 包含通过接头部分直接或间接地共价连接、附接或键合到本发明另一种肽或多肽或半衰期延长部分的本发明的肽或多肽的本发明组合物为“偶联物”或“偶联的”分子，无论是通过化学手段（例如翻译后或合成后）还是通过重组融合而偶联。

[0200] “生物素”是水溶性 B 族复合维生素，即维生素 B7，它由与四氢噻吩环稠合的脲（四氢咪唑酮）环组成（参见式 I）。

[0201] 式 I：

[0202]



[0203] 戊酸取代基附接到四氢噻吩环的碳原子中的一个。在自然界中，生物素是脂肪酸和亮氨酸代谢中的辅酶，其在体内糖异生中发挥着作用。生物素以大约 10^{-14}M 至 10^{-16}M 的平衡解离常数 K_D 非常紧密地结合到四聚蛋白亲和素（例如鸡亲和素、细菌链霉亲和素以及中和亲和素），这是已知最强的蛋白 - 配体相互作用之一，接近共价键的强度。(Laitinen et al..Genetically engineered avidins and streptavidins,Cell Mol Life Sci.63(24)：2992-30177(2006))。生物素 - 亲和素非共价相互作用通常用在不同的生物技术应用中。（参见 Laitinen 等人，Genetically engineered avidins and streptavidins，Cell Mol Life Sci.63(24)：2992-30177(2006))。

[0204] “生物素化的”意指物质共价偶联到一个或多个生物素部分。可用于实践本发明的生物素化肽可商购获得（例如 Midwest Bio-Tech Inc.）或可容易地进行合成然后进行生物素化。诸如肽的化合物的生物素化可以通过任何已知的化学技术进行。这些包括伯胺生物素化、巯基生物素化和羧基生物素化。例如，作为赖氨酸侧链 ε - 胺和 N 端 α - 胺而存在的肽上的胺基团是伯胺生物素化的常用靶标。胺反应性生物素化试剂可基于水溶性分成两

组。

[0205] 1) 生物素的 N- 羟基琥珀酰亚胺 (NHS)- 酯在水溶液中的溶解性不佳。对于水溶液中的反应，它们必须首先溶解在有机溶剂中，然后再稀释成水性反应混合物。最常用于此目的的有机溶剂为二甲基亚砜 (DMSO) 和二甲基甲酰胺 (DMF)，它们与低浓度的大部分蛋白相容。

[0206] 2) 生物素的磺基 -NHS- 酯在水中的溶解性更高，由于容易水解，通常将它们在临用前溶于水中。磺基 -NHS- 酯的水溶性源于它们在 N- 羟基琥珀酰亚胺环上的磺酸根基团并消除了将试剂溶解在有机溶剂中的需要。

[0207] NHS- 和磺基 -NHS- 酯的化学反应基本上相同 :酰胺键形成，而 NHS 或磺基 -NHS 变成离去基团。由于酯的靶标为去质子化的伯胺，因此反应普遍高于 pH7。NHS- 酯的水解是主要的竞争反应，而水解速率随着 pH 的升高而增加。NHS- 和磺基 -NHS- 酯在 pH7 下具有数小时的半衰期，但在 pH9 下只有几分钟。将 NHS- 酯偶联到肽的伯胺的条件包括 4-37℃范围内的孵育温度、7-9 范围内的反应 pH 值和几分钟至约 12 小时的孵育时间。必须避免含胺（诸如 Tris 或甘氨酸）的缓冲液，因为它们会与反应竞争。HABA 染料 (2-(4- 羟基偶氮苯）苯甲酸）方法可用于确定生物素化的程度。简而言之，HABA 染料结合到亲和素并产生特征性吸收。当引入生物素化蛋白或其他分子形式的生物素时，其置换出染料，从而在 500nm 处产生吸光度变化。吸光度变化与样品中的生物素水平成正比。

[0208] 氨基酸残基的“4- 戊炔酰化”通常在 N 端或侧链通过标准酰胺键反应偶合 4- 戊炔酸而实现。当适合另外的聚乙二醇化时，4- 戊炔酰化可选地可在铜催化的 1,3- 偶极环加成反应（所谓的“点击”反应）中采用炔烃以与叠氮基 -PEG 分子中的叠氮化物反应以通过三唑连接肽和 PEG。

[0209] “分离的多肽”是从在多肽的天然来源中通常与其相关的至少一种污染性多肽分子中纯化或分离而得的多肽分子。分离的多肽分子的形式或环境不同于存在于自然界中的形式或环境。

[0210] “毒素肽”包括具有与可从毒液中分离而得的天然存在的药理学活性肽或多肽相同的氨基酸序列的肽或多肽，并且还包括此类天然存在的分子的修饰肽类似物。（参见例如 Kalman 等人，ShK-Dap22，apotent Kv1.3-specific immunosuppressive polypeptide，J.Biol.Chem.273(49) :32697-707(1998) ;Kem 等人，美国专利号 6,077,680 ;Mouhat 等人，OsK1derivatives，WO2006/002850A2 ;Chandy 等 人，Analogs of SHK toxin and their uses in selective inhibition of Kv1.3potassium channels，WO2006/042151 ；Sullivan 等人，Toxin Peptide therapeutic agents，WO2006/116156A2，它们均以引用方式整体并入本文）。蛇、蝎子、蜘蛛、蜜蜂、蜗牛和海葵是产生毒液的生物的一些实例，这些毒液可作为强效及选择性靶向离子通道和受体的小生物活性毒素肽或“毒素”的丰富来源。GpTx-1(SEQ ID NO :1)、GpTx-2(SEQ ID NO :467)、GpTx-3(SEQ ID NO :468)、GpTx-4(SEQ ID NO :469)、GpTx-5(SEQ ID NO :470)、GpTx-6(1-35)(SEQ ID NO :471) 和 GpTx-7(1-35)(SEQ ID NO :473) 是毒素肽的实例。抑制电压门控钠通道的毒素的一些其他实例包括从狼蛛虎纹捕鸟蛛 (Ornithoctonus huwena) 的毒液分离而得的虎纹捕鸟蛛毒素 -IV(ECLEI FKACN PSNDQ CCKSS KLVCS RKTRW CKYQI-NH_2//SEQ ID NO :528) 和虎纹捕鸟蛛毒素 -I(ACKGV FDACT PGKNE CCPNR VCSDK HKWCK WKL//SEQ ID NO :529) ；

从海洋芋螺木下芋螺的毒液分离而得的KIIIA(CCNCS SKWCR DHSRC C-NH_2//SEQ ID NO:530);以及从狼蛛智利绿丝绒的毒液分离而得的ProTxII(YCQKW MWTCD SERKC CEGMV CRLWC KKKLW//SEQ ID NO:531)。另一个实例为α毒素OD1(GVRDAYIADD KNCVYTCASN GYCNTECTKN GAESGYCQWI GRYGNACWCI KLPDEVPIRIPGKCR-NH_2//SEQ ID NO:589),这是一种从蝎子Odonthobuthus doriae的毒液分离而得的毒素。毒素肽的另一个实例为OSK1(也称为OsK1),这是一种从约旦柱尾蝎(Orthochirus Scrobiculosus)毒液中分离而得的毒素肽。(例如Mouhat等人,K+channel types targeted by synthetic OSK1,a toxin from Orthochirus scrobiculosus scorpion venom,Biochem.J.385:95-104(2005);Mouhat等人,Pharmacological profiling of Orthochirus scrobiculosus toxin1analogs with a trimmed N-terminal domain,Molec.Pharmacol.69:354-62(2006);Mouhat等人,OsK1derivatives,WO2006/002850A2)。另一个实例是从海葵Stichodactyla helianthus的毒液中分离而得的ShK及其肽类似物。(例如Tudor等人,Ionisation behaviour and solution properties of the potassium-channel blocker ShK toxin,Eur.J.Biochem.251(1-2):133-41(1998);Pennington等人,Role of disulfide bonds in the structure and potassium channel blocking activity of ShK toxin,Biochem.38(44):14549-58(1999);Kem等人,ShK toxin compositions and methods of use,美国专利号6,077,680;Lebrun等人,Neuropeptides originating in scorpion,美国专利号6,689,749;Beeton等人,Targeting effector memory T cells with a selective peptide inhibitor of Kv1.3channnels for therapy of autoimmune diseases,Molec.Pharmacol.67(4):1369-81(2005);以及Sullivan等人,Selective and potent peptide inhibitors of K_v1.3,WO2010/108154A2)。

[0211] 毒素肽通常为约20到约80个氨基酸长,包含2-5个二硫键并形成非常紧凑的结构。毒素肽(例如,得自蝎子、海葵和芋螺的毒液)已得到分离并针对它们对离子通道的影响进行了表征。此类肽似乎已从数量相对少的结构框架演变,这些结构框架尤其适合解决效力和稳定性的关键问题。蝎子和芋螺毒素肽中的大部分例如含有10-40个氨基酸和最多五个二硫键,从而形成通常耐蛋白水解的极其紧凑和受约束的结构(微蛋白)。芋螺毒素和蝎子毒素肽可基于它们的二硫键连接和肽折叠而划分成许多超家族。许多毒素肽的溶液结构已通过NMR光谱加以测定,从而示出了它们的紧凑结构并确认了家族折叠模式的保守性。(例如Tudor等人,Ionisation behaviour and solution properties of the potassium-channel blocker ShK toxin,Eur.J.Biochem.251(1-2):133-41(1998);Pennington等人,Role of disulfide bonds in the structure and potassium channel blocking activity of ShK toxin,Biochem.38(44):14549-58(1999);Jaravine等人,Three-dimensional structure of toxin OSK1from Orthochirus scrobiculosus scorpion venom,Biochem.36(6):1223-32(1997);del Rio-Portillo等人,NMR solution structure of Cn12,a novel peptide from the Mexican scorpion Centruroides noxius with a typical beta-toxin sequence but with alpha-like physiological activity,Eur.J.Biochem.271(12):2504-16(2004);Prochnicka-Chalufour等人,Solution structure of discrepin,a new K+-channel blocking peptide from the alpha-KTx15subfamily,Biochem.45(6):1795-1804(2006))。其他实例是本领域已知的,

或可见于 Sullivan 等人，Toxin Peptide Therapeutic Agents，WO06116156A2 或美国专利号 7,833,979 ;Sullivan 等人，Selective and potent peptide inhibitors of K_v1.3，WO2010/108154A2 ;Mouhat 等人，OsK1derivatives，WO2006/002850A2 ;Sullivan 等人，美国专利申请号 11/978,076（标题：，2007 年 10 月 25 日提交）;Lebrun 等人，美国专利号 6,689,749，其各自以引用方式整体并入。

[0212] 术语“肽类似物”是指序列与存在于自然界中的肽序列相差至少一个氨基酸残基取代、至少一个氨基酸内部添加或内部缺失和 / 或氨基或羧基末端截短或添加和 / 或羧基末端酰胺化的肽。“内部缺失”是指在非 N 或 C 端的位置不存在见于自然界中的序列中的氨基酸。同样，“内部添加”是指在非 N 或 C 端的位置存在见于自然界中的序列中的氨基酸。

[0213] 本发明物质组合物的实施方案包括毒素肽类似物，或其药学上可接受的盐。“毒素肽类似物”相对于所关注的天然毒素肽序列诸如 GpTx-1(DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-NH_2//SEQ ID NO :1) 包含所关注的天然毒素肽序列的修饰（例如，氨基酸残基取代、内部添加或插入、内部缺失和 / 或氨基或羧基末端截短，或如之前所述的添加）。本发明的毒素肽类似物为 20 至约 80 个氨基酸残基长，并且相对于 SEQ ID NO :1 而言具有 C^1-C^4、C^2-C^5 和 C^3-C^6 二硫（或二硒）键，其中 C^1、C^2、C^3、C^4、C^5 和 C^6 表示通常通过左侧的肽 N 端规定的出现在毒素肽一级序列中的半胱氨酸（或硒代半胱氨酸）残基的顺序，其中氨基酸序列中的第一和第六半胱氨酸（或硒代半胱氨酸）形成二硫键（或二硒键，如果为 SeCys），第二和第四半胱氨酸（或硒代半胱氨酸）形成二硫键（或二硒键，如果为 SeCys），并且第三和第五半胱氨酸（或硒代半胱氨酸）形成二硫键（或二硒键，如果为 SeCys）。如本文所述，本发明的毒素肽类似物还可以相对于 SEQ ID NO :1 在 N 端和 / 或 C 端末端具有另外的氨基酸残基。

[0214] 所谓物质组合物的“生理上可接受的盐”例如毒素肽类似物的盐是指已知或随后发现在药学上可接受的任何盐。药学上可接受的盐的一些非限制性实例为 :乙酸盐 ;三氟乙酸盐 ;氢卤化物，诸如盐酸盐和氢溴酸盐 ;硫酸盐 ;柠檬酸盐 ;马来酸盐 ;酒石酸盐 ;乙醇酸盐 ;葡糖酸盐 ;琥珀酸盐 ;甲磺酸盐 ;苯磺酸盐 ;没食子酸酯（没食子酸也称为 3,4,5- 三羟基苯甲酸）诸如五没食子酰葡萄糖 (PGG) 和表没食子儿茶素没食子酸酯 (EGCG) 的盐 ;胆固醇硫酸酯的盐 ;双羟萘酸盐 ;鞣酸盐和草酸盐。

[0215] 术语“融合蛋白”是指蛋白包含衍生自不止一种亲本蛋白或多肽的多肽组分。通常，融合蛋白由融合基因表达，在融合基因中编码一种蛋白的多肽序列的核苷酸序列在框内附到编码不同蛋白的多肽序列的核苷酸序列并任选地通过接头与之分开。融合基因然后可通过重组宿主细胞作为单一蛋白而表达。

[0216] 术语“模拟肽”、“肽模拟物”和“激动剂肽”是指具有与所关注的天然存在的蛋白（例如但不限于毒素肽分子）相当的生物活性的肽或蛋白。这些术语还包括间接模拟天然存在的肽分子的活性的肽，诸如通过使天然存在的分子增效。

[0217] 术语“拮抗剂肽”、“肽拮抗剂”和“抑制剂肽”是指阻断或在某种程度上干扰所关注受体的生物活性或具有与所关注受体（诸如但不限于离子通道（例如 Kv1.3) 或 G 蛋白偶联受体 (GPCR)) 的已知拮抗剂或抑制剂相当的生物活性的肽。

[0218] 蛋白的“结构域”是整个蛋白的任何部分，最多并包括完整的蛋白，但是通常包括少于完整的蛋白。结构域可以但不必独立于蛋白链的其余部分发生折叠和 / 或与特定的生物、生化或结构功能或位置相关（例如配体结合结构域或者胞质、跨膜或胞外结构域）。

[0219] 如本文所用,“可溶性”当涉及在宿主细胞中通过重组 DNA 技术产生的蛋白时是存在于水溶液中的蛋白 ;如果蛋白包含双精氨酸信号氨基酸序列,则可溶性蛋白在革兰氏阴性细菌宿主中导出到周质间隙,或通过能够分泌的真核宿主细胞或通过具有合适基因 (例如 kil 基因) 的细菌宿主分泌到培养基中。因此,可溶性蛋白是不存在于宿主细胞内的包涵体中的蛋白。可选地,取决于上下文,可溶性蛋白是不整合存在于细胞膜中的蛋白。相比之下,不溶性蛋白是以变性形式存在于宿主细胞中的细胞质颗粒 (称为包涵体) 内的蛋白,或者同样取决于上下文,不溶性蛋白是存在于细胞膜中的蛋白,包括但不限于胞质膜、线粒体膜、叶绿体膜、内质网膜等。

[0220] 在“可溶”(即溶解或能够溶解) 于没有显著量的离子型洗涤剂 (例如 SDS) 或变性剂 (例如脲、盐酸胍) 的水溶液中的蛋白与作为分散在溶液内的不溶性蛋白分子悬浮液存在的蛋白之间也存在区别。使用足以移除存在于液体培养基中的细胞的条件进行离心 (例如以 5,000×g 离心 4-5 分钟) 时,“可溶性”蛋白将不会从含有蛋白的溶液中移除。在本发明组合物的一些实施方案中,毒素肽类似物通过宿主细胞合成并在细胞包涵体内以不溶形式分离,然后可相对容易地从细胞提取物中的其他细胞组分中纯化,而毒素肽类似物可继而溶解、重折叠和 / 或进一步纯化。

[0221] 在“可溶性”蛋白 (即,在宿主细胞中表达时以可溶形式产生的蛋白) 与“溶解的”蛋白之间存在区别。可通过诸如盐酸胍、脲或十二烷基硫酸钠 (SDS) 的变性剂处理纯化的包涵体或细胞膜而使存在于包涵体内或整合存在于细胞膜内的不溶性重组蛋白溶解 (即,使得成为可溶形式)。然后必须将这些变性剂从溶解的蛋白制备物中除去,以允许将回收的蛋白复性 (重折叠)。虽然本发明的组合物可以活性形式重折叠,但是并非所有的蛋白在溶解到变性剂中然后除去变性剂后都将重折叠成活性构象。许多蛋白在除去变性剂时产生沉淀。低浓度的 SDS 可用于使包涵体和细胞膜溶解并将蛋白维持在溶液中。然而,渗析并不总是能够除去所有的 SDS(SDS 会形成不会渗析出来的胶束) ;因此,SDS 溶解的包涵体蛋白和 SDS 溶解的细胞膜蛋白可溶但不重折叠。

[0222] “分泌的”蛋白是指能够因分泌信号蛋白序列而被导向 ER、分泌小泡或胞外间隙的那些蛋白,以及释放到胞外间隙中而不必含有信号序列的那些蛋白。如果分泌的蛋白释放进胞外间隙,则分泌的蛋白可经历胞外加工以产生“成熟”蛋白。释放进胞外间隙可通过许多机理而发生,包括胞外分泌和蛋白水解裂解。在本发明组合物的一些其他实施方案中,毒素肽类似物可通过宿主细胞作为分泌蛋白而合成,随后可从胞外间隙和 / 或培养基中进一步纯化。

[0223] 术语“重组”表示材料 (例如核酸或多肽) 已通过人为干预而人工地或合成地 (即,非天然地) 改变。改变可在材料的天然环境或状态内对材料进行,或脱离其天然环境或状态而进行。例如,“重组核酸”是通过例如在克隆、DNA 改组或其他熟知的分子生物学程序期间对核酸进行重组而制备的核酸。此类分子生物学程序的实例见于 Maniatis 等人, Molecular Cloning.A Laboratory Manual.Cold Spring Harbor Laboratory,Cold Spring Harbor,N.Y.(1982)。“重组 DNA 分子”由通过此类分子生物学技术连接在一起的 DNA 片段组成。如本文所用的术语“重组蛋白”或“重组多肽”是指使用重组 DNA 分子表达的蛋白分子。“重组宿主细胞”是包含和 / 或表达重组核酸的细胞。

[0224] 术语“多核苷酸”或“核酸”包括含有两个或更多个核苷酸残基的单链和双链核苷

酸聚合物。包含多核苷酸的核苷酸残基可以是核糖核苷酸或脱氧核糖核苷酸或任一核苷酸类型的修饰形式。所述修饰包括碱基修饰，诸如溴尿苷和肌苷衍生物；核糖修饰，诸如 2'，3'－二脱氧核糖；以及核苷酸间键合修饰，诸如硫代磷酸、二硫代磷酸、硒代磷酸、二硒代磷酸、苯胺硫代磷酸、苯胺磷酸 (phosphoraniladate) 和酰胺磷酸 (phosphoroamidate)。

[0225] 术语“寡核苷酸”意指包含 200 个或更少的核苷酸残基的多核苷酸。在一些实施方案中，寡核苷酸的长度为 10 至 60 个碱基。在其他实施方案中，寡核苷酸的长度为 12、13、14、15、16、17、18、19 或 20 至 40 个核苷酸。寡核苷酸可以为单链或双链，例如用于构建突变基因。寡核苷酸可以为有义或反义寡核苷酸。寡核苷酸可以包含标记，包括便于定量或检测的同位素标记（例如 ^{125}I、^{14}C、^{13}C、^{35}S、^{3}H、^{2}H、^{13}N、^{15}N、^{18}O、^{17}O 等），用于检测测定的荧光标记、半抗原或抗原标记。寡核苷酸可例如用作 PCR 引物、克隆引物或杂交探针。

[0226] 在本文可互换使用的“多核苷酸序列”或“核苷酸序列”或“核酸序列”是多核苷酸中的核苷酸残基的一级序列，包括寡核苷酸、DNA 和 RNA、核酸或表示核苷酸残基一级序列的字符串，取决于上下文。通过任何指定的多核苷酸序列，可以确定给定的核酸或互补多核苷酸序列。包括在内的是可以为单链或双链的并表示有义或反义链的基因组或合成来源的 DNA 或 RNA。除非另外指明，否则本文所讨论的任何单链多核苷酸序列的左端为 5'末端；双链多核苷酸序列的左侧方向称为 5'方向。新生 RNA 转录物的 5′ 至 3′ 添加方向称为转录方向；处于 RNA 转录物 5′ 末端 5′ 的具有与 RNA 转录物相同序列的 DNA 链上的序列区域称为“上游序列”；处于 RNA 转录物 3′ 末端 3′ 的具有与 RNA 转录物相同序列的 DNA 链上的序列区域称为“下游序列”。

[0227] 如本文所用，“分离的核酸分子”或“分离的核酸序列”是下述任一种核酸分子：(1) 从在核酸的天然来源中与核酸通常相关的至少一种污染性核酸分子中鉴定并分离的，或 (2) 克隆的、扩增的、加标记的或以其他方式与背景核酸区分的，使得可以确定所关注核酸的序列。分离的核酸分子的形式或环境不同于存在于自然界中的形式或环境。然而，分离的核酸分子包括包含在通常表达多肽（例如寡肽或抗体）的细胞中的核酸分子，其中，例如该核酸分子处于不同于天然细胞中的染色体位置。

[0228] 如本文所用，术语“编码 ... 的核酸分子”、“编码 ... 的 DNA 序列”和“编码 ... 的 DNA”是指沿着脱氧核糖核酸链的脱氧核糖核苷酸的顺序或序列。这些脱氧核糖核苷酸的顺序决定沿着 mRNA 链的核糖核苷酸的顺序，也决定沿着多肽（蛋白）链的氨基酸的顺序。DNA 序列因此编码 RNA 序列和氨基酸。

[0229] 术语“基因”广泛地用于指代与生物功能相关的任何核酸。基因通常包括编码序列和 / 或表达此类编码序列所需的调控序列。术语“基因”适用于特定的基因组或重组序列，以及适用于由该序列编码的 cDNA 或 mRNA。“融合基因”包含下述编码区，所述编码区编码的多肽具有来自不同蛋白的部分，这些部分不天然存在于一起，或者不一起天然存在于与所编码的融合蛋白（即嵌合蛋白）中所存在的序列相同的序列中。基因还包括例如形成其他蛋白的识别序列的非表达核酸片段。包含调控蛋白（诸如转录因子）所结合的转录控制元件的非表达调控序列导致相邻或附近序列的转录。

[0230] “基因的表达”或“核酸的表达”意指 DNA 转录成 RNA（任选地包括 RNA 的修饰，例如剪接），RNA 翻译成多肽（可能包括多肽的后续翻译后修饰），或转录和翻译两者，如上下文所指明。

[0231] 如本文所用，术语“编码区”或“编码序列”当结合结构基因使用时是指编码存在于因 mRNA 分子翻译而产生的新生多肽中的氨基酸的核苷酸序列。编码区在真核生物中通过编码引发蛋氨酸的核苷酸三连体 "ATG" 连接在 5′ 侧上，并通过指定终止密码子的三个三连体（即 TAA、TAG、TGA）之一连接在 3′ 侧上。

[0232] 术语“控制序列”或“控制信号”是指在特定的宿主细胞中可影响其所连接的编码序列的表达和加工的多核苷酸序列。此类控制序列的性质可取决于宿主生物。在特定的实施方案中，原核生物的控制序列可包含启动子、核糖体结合位点和转录终止序列。真核生物的控制序列可包含含有一个或多个转录因子识别位点的启动子、转录增强子序列或元件、多聚腺苷酸化位点和转录终止序列。控制序列可包含前导序列和 / 或融合伴侣序列。启动子和增强子由与转录相关细胞蛋白发生特异性相互作用的 DNA 的短阵列组成 (Maniatis 等人，Science236 :1237(1987))。启动子和增强子元件已从多种真核来源分离，这些来源包括酵母、昆虫及哺乳动物细胞和病毒中的基因（类似的控制元件即启动子也存在于原核生物中）。特定启动子和增强子的选择取决于什么样的细胞类型将用于表达所关注的蛋白。一些真核启动子和增强子具有广泛的宿主范围，而其他则在有限的细胞类型亚组中具有功能（有关综述，参见 Voss 等人，Trends Biochem.Sci.，11 :287(1986)and Maniatis 等人，Science236 :1237(1987))。

[0233] 术语“载体”意指用于将蛋白编码信息传递到宿主细胞中的任何分子或实体（例如核酸、质粒、细菌噬菌体或病毒）。

[0234] 如本文所用的术语“表达载体”或“表达构建体”是指包含以下部分的重组 DNA 分子 :所需的编码序列，以及在特定宿主细胞中表达可操作地连接的编码序列所必需的合适的核酸控制序列。表达载体可包括但不限于下述序列 :其影响或控制转录、翻译并在存在内含子时影响可操作地连接到其上的编码序列的 RNA 剪接。在原核生物中表达所必需的核酸序列包括启动子、任选的操纵子序列、核糖体结合位点和可能的其他序列。真核细胞已知利用启动子、增强子以及终止和多聚腺苷酸化信号。分泌信号肽序列也可任选地由可操作地连接到所关注编码序列的表达载体编码，使得表达的多肽可由重组宿主细胞分泌，以在需要时更容易地从细胞中分离所关注的多肽。此类技术是本领域熟知的。（例如 Goodey、Andrew R. 等人，Peptide and DNA sequences，美国专利号 5,302,697 ;Weiner 等人，Compositions and methods for protein secretion，美国专利号 6,022,952 和美国专利号 6,335,178 ;Uemura 等人，Protein expression vector and utilization thereof，美国专利号 7,029,909 ;Ruben 等人，27human secreted proteins，US2003/0104400A1)。

[0235] 如本文所用的术语“可操作的结合”、“可操作的顺序”和“可操作地连接”是指核酸序列的连接方式使得产生能够指导给定基因的转录和 / 或所需蛋白分子的合成的核酸分子。该术语也指核酸序列的连接方式使得产生功能蛋白。例如，“可操作地连接”到蛋白编码序列的载体中的控制序列的连接方式使得蛋白编码序列的表达在与控制序列的转录活性相容的条件下实现。

[0236] 术语“宿主细胞”意指已通过核酸转化或能够通过核酸转化并因而表达所关注的基因的细胞。该术语包括亲代细胞的子代，而不论子代是否在形态上或在基因组成上与原始亲代细胞相同，只要存在所关注的基因即可。大量可用的和熟知的宿主细胞中的任何一种均可用于实践本发明。特定宿主的选择取决于本领域公认的许多因素。这些因素包括例

如与所选表达载体的相容性、由 DNA 分子编码的肽的毒性、转化率、肽的易回收性、表达特性、生物安全性和成本。考虑到并非所有的宿主对于表达特定的 DNA 序列都是等效的，这些因子必须达成平衡。在这些一般性指导原则内，在培养中可用的微生物宿主细胞包括细菌（诸如大肠杆菌属(Escherichia coli sp.))、酵母（诸如酵母属(Saccharomyces sp.)）和其他真菌细胞、昆虫细胞、植物细胞、哺乳动物（包括人类）细胞，例如 CHO 细胞和 HEK-293 细胞。修饰也可在 DNA 水平上进行。可将编码肽的 DNA 序列改变为与所选的宿主细胞更相容的密码子。对于大肠杆菌，优化的密码子是本领域已知的。可对密码子进行取代以消除限制性位点或包括沉默限制性位点，这可有助于在所选的宿主细胞中加工 DNA。接下来，可对转化的宿主进行培养和纯化。宿主细胞可在常规发酵条件下培养，使得所需的化合物得以表达。此类发酵条件是本领域熟知的。

[0237] 术语“转化”意指细胞摄入外来或外源 DNA，当已将外源 DNA 引入细胞膜内部时细胞即被“转染”。许多转染技术是本领域熟知的并在本文进行了公开。参见例如 Graham 等 人，1973，Virology52 :456 ;Sambrook 等 人，2001，Molecular Cloning :A Laboratory Manual，同上 ;Davis 等人，1986，Basic Methods in Molecular Biology，Elsevier ;Chu 等人，1981，Gene13 :197。此类技术可用于将一个或多个外源 DNA 部分引入合适的宿主细胞。

[0238] 术语“转化”是指细胞遗传特性的变化，当已对细胞进行了修饰以包含新的 DNA 或 RNA 时细胞即被转化。例如，如果通过转染、转导或其他技术引入新的遗传物质而使细胞相对于其天然状态发生遗传修饰，则细胞被转化。在转染或转导后，转化性 DNA 可通过物理整合到细胞染色体中而与细胞 DNA 重组，或者可作为游离基因元件瞬时维持而不进行复制，或者可作为质粒独立地进行复制。当转化性 DNA 随细胞的分裂而一起复制时，则将细胞视为已“稳定转化”。

[0239] 术语“转基因”是指起源于与宿主不同的物种的分离核苷酸序列，其可插入哺乳动物或哺乳动物胚胎的一个或多个细胞。转基因任选地可操作地连接到其他遗传元件（诸如启动子、多聚腺苷酸序列等），这些遗传元件可用于直接地或与细胞机器相结合而间接地调节转基因的转录和 / 或表达。可选地或除此之外，转基因可连接到有助于将转基因整合到哺乳动物细胞或胚核的染色体 DNA 中（例如，在同源重组中）的核苷酸序列。转基因可由哺乳动物内源性遗传物质中的特定核苷酸序列的同源或异源核苷酸序列组成，或为杂合序列（即，转基因的一个或多个部分为哺乳动物遗传物质同源的，而一个或多个部分为哺乳动物遗传物质异源的）。转基因核苷酸序列可编码内源性存在于哺乳动物中的多肽或多肽变体，可编码非天然存在于哺乳动物中的多肽（即外源多肽），或者可编码内源和外源多肽的杂合体。如果转基因可操作地连接到启动子，则启动子可以为哺乳动物和 / 或转基因同源或异源的。可选地，启动子可以为内源和外源启动子元件（增强子、沉默子、抑制子等）的杂合体。

[0240] 肽。重组 DNA 和 / 或 RNA 介导的蛋白表达和蛋白工程技术或任何其他制备肽的方法适用于制备本发明的多肽，例如毒素肽类似物及其融合蛋白偶联物（例如，包含毒素肽类似物和免疫球蛋白 Fc 结构域、转甲状腺素蛋白或人血清白蛋白的融合蛋白）。例如，可在转化的宿主细胞中产生肽。简而言之，制备编码该肽的重组 DNA 分子或构建体。制备此类 DNA 分子的方法是本领域熟知的。例如，可使用合适的限制酶从 DNA 切离编码肽的序列。大量可用的和熟知的宿主细胞中的任何一种均可用于实践本发明。特定宿主的选择取

决于本领域公认的许多因素。这些因素包括例如与所选表达载体的相容性、由 DNA 分子编码的肽的毒性、转化率、肽的易回收性、表达特性、生物安全性和成本。考虑到并非所有的宿主对于表达特定的 DNA 序列都是等效的，这些因子必须达成平衡。在这些一般性指导原则内，在培养中可用的微生物宿主细胞包括细菌（诸如大肠杆菌属）、酵母（诸如酵母属）和其他真菌细胞、昆虫细胞、植物细胞、哺乳动物（包括人类）细胞，例如 CHO 细胞和 HEK293 细胞。修饰也可在 DNA 水平上进行。可将编码肽的 DNA 序列改变为与所选的宿主细胞更相容的密码子。对于大肠杆菌，优化的密码子是本领域已知的。可对密码子进行取代以消除限制性位点或包括沉默限制性位点，这可有助于在所选的宿主细胞中加工 DNA。接下来，可对转化的宿主进行培养和纯化。宿主细胞可在常规发酵条件下培养，使得所需的化合物得以表达。此类发酵条件是本领域熟知的。此外，DNA 任选地还编码可操作地连接到所表达的毒素肽类似物的位于融合蛋白编码区 5’的信号肽序列（例如分泌信号肽）。有关可用于通过哺乳动物细胞进行本发明组合物的重组表达的合适重组方法和示例性 DNA 构建体的另外实例，包括偶联到本发明药理学活性毒素肽类似物的二聚 Fc 融合蛋白（“肽体”）或嵌合免疫球蛋白（轻链 + 重链）-Fc 异三聚体（“半体 (hemibody)”），参见 Sullivan 等人，Toxin Peptide Therapeutic Agents，US2007/0071764 和 Sullivan 等人，Toxin Peptide Therapeutic Agents，PCT/US2007/022831（作为 WO2008/088422 公开），所述专利均以引用方式整体并入本文。

[0241] 本发明的肽组合物也可通过合成方法制备。固相合成是制备各个肽的优选技术，因为它是制备小肽最具成本效益的方法。例如，熟知的固相合成技术包括使用保护基团、接头和固相载体，以及具体的保护和去保护反应条件、接头裂解条件、使用清除剂以及固相肽合成的其他方面。合适的技术是本领域熟知的。（例如 Merrifield(1973)，Chem.Polypeptides，pp.335-61(Katsoyannis and Panayotis 编辑）；Merrifield(1963)，J.Am.Chem.Soc.85：2149；Davis 等人 (1985)，Biochem.Intl.10：394-414；Stewart 和 Young(1969)，Solid Phase Peptide Synthesis；美国专利号 3,941,763；Finn 等人 (1976)，The Proteins（第三版）2：105-253；以及 Erickson 等人 (1976)，The Proteins（第三版）2：257-527；″ Protecting Groups in Organic Synthesis，″ 第三版，T.W.Greene and P.G.M.Wuts 编辑，John Wiley & Sons，Inc.，1999；NovaBiochem Catalog，2000；″ Synthetic Peptides，A User′ s Guide，″ G.A.Grant 编辑，W.H.Freeman & Company，New York，N.Y.，1992；″ Advanced Chemtech Handbook of Combinatorial & Solid Phase Organic Chemistry，″ W.D.Bennet，J.W.Christensen，L.K.Hamaker，M.L.Peterson，M.R.Rhodes，and H.H.Saneii 编辑，Advanced Chemtech，1998；″ Principles of Peptide Synthesis，2nd ed.，″ M.Bodanszky 编辑，Springer-Verlag，1993；″ The Practice of Peptide Synthesis，2nd ed.，″ M.Bodanszky and A.Bodanszky 编辑，Springer-Verlag，1994；″ Protecting Groups，″ P.J.Kocienski 编辑，Georg Thieme Verlag，Stuttgart，Germany，1994；″ Fmoc Solid Phase Peptide Synthesis，A Practical Approach，″ W.C.Chan and P.D.White 编辑，Oxford Press，2000，G.B.Fields 等人，Synthetic Peptides：A User′ s Guide，1990，77-183）。有关适用于制备本发明物质组合物的本领域已知的合成和纯化方法的另外实例，参见 Sullivan 等人，Toxin Peptide Therapeutic Agents，US2007/0071764 和 Sullivan 等

人，Toxin Peptide Therapeutic Agents，PCT/US2007/022831（作为 WO2008/088422A2 公开），所述专利均以引用方式整体并入本文。

[0242] 在本文对毒素肽类似物的进一步描述中，频繁地将单字母缩写系统应用于对通常结合到天然存在的肽和蛋白中的二十个“规范”氨基酸的种类命名（表 2）。此类单字母缩写在含义上完全可与三字母缩写或非缩写的氨基酸名称互换。在本文所用的单字母缩写系统内，大写字母表示 L- 氨基酸，小写字母表示 D- 氨基酸。例如，缩写“R”指定 L- 精氨酸而缩写“r”指定 D- 精氨酸。

[0243] 表 2. 规范氨基酸的单字母缩写。

[0244] 三字母缩写处于小括号中。

[0245]

丙氨酸(Ala)	A
谷氨酰胺(Gln)	Q
亮氨酸(Leu)	L
丝氨酸(Ser)	S
精氨酸(Arg)	R
谷氨酸(Glu)	E
赖氨酸(Lys)	K
苏氨酸(Thr)	T
天冬酰胺(Asn)	N
甘氨酸(Gly)	G
蛋氨酸(Met)	M
色氨酸(Trp)	W
天冬氨酸(Asp)	D
组氨酸(His)	H
苯丙氨酸(Phe)	F
酪氨酸(Tyr)	Y

	半胱氨酸(Cys)	C
	异亮氨酸(Ile)	I
[0246]	脯氨酸(Pro)	P
	缬氨酸(Val)	V

[0247] 氨基酸序列中的氨基酸取代在本文中通常通过以下方式指定:特定位置的氨基酸残基的单字母缩写,然后是相对于所关注的天然序列的以数字表示的氨基酸位置,再接着是代入的氨基酸残基的单字母符号。例如,“T30D”用符号表示相对于所关注的天然序列在氨基酸第30位通过天冬氨酸残基取代苏氨酸残基。

[0248] 在本发明的范围内可通过采用使用重组表达细胞的已知蛋白工程技术,将非规范氨基酸残基结合到肽中。(参见例如Link等人,Non-canonical amino acids in protein engineering,Current Opinion in Biotechnology,14(6):603-609(2003))。术语“非规范氨基酸残基”是指不在通常结合到天然存在的蛋白中的20个规范氨基酸之中的D或L形式的氨基酸残基,例如β-氨基酸、高氨基酸、环状氨基酸以及具有衍生化侧链的氨基酸。实例包括(L形式或D形式的)β-丙氨酸、β-氨基丙酸、哌啶酸、氨基己酸、氨基庚酸、氨基庚二酸、锁链素、二氨基庚二酸、N^{α}-乙基甘氨酸、N^{α}-乙基天冬酰胺、羟基赖氨酸、别羟基赖氨酸、异锁链素、别异亮氨酸、ω-甲基精氨酸、N^{α}-甲基甘氨酸、N^{α}-甲基异亮氨酸、N^{α}-甲基缬氨酸、γ-羧基谷氨酸、ε-N,N,N-三甲基赖氨酸、ε-N-乙酰基赖氨酸、O-磷酸丝氨酸、N^{α}-乙酰基丝氨酸、N^{α}-甲酰基蛋氨酸、3-甲基组氨酸、5-羟基赖氨酸和其他类似的氨基酸,和在下表3中列出的那些,以及如本文所述的那些的任一者的衍生化形式。表3包含可根据本发明使用的一些示例性非规范氨基酸残基以及通常在本文使用的相关缩写,但是技术人员将理解到不同的缩写和命名可适用于相同的物质并且在本文可以互换地出现。如本文所列举的一些氨基酸序列可在N端包含表示N端氨基的“{H}-”,和/或可在C端包含表示C端羧基的“-{游离酸}”。

[0249] 表3.可用于在根据本发明的肽序列中进行氨基酸添加、插入或取代的非规范氨基酸。在表3所列的缩写与本文其他地方所公开的相同物质的另一缩写不同的情况下,两个缩写都被视为适用的。除非另外指明,否则表3所列的氨基酸可以为L形式或D形式。

[0250]

氨基酸	缩写
乙酰胺甲基	Acm
乙酰基精氨酸	acetylarg
α-氨基己二酸	Aad
氨基丁酸	Abu
2-氨基丁酸	2-Abu
6-氨基己酸	Ahx、εAhx
3-氨基-6-羟基-2-哌啶酮	Ahp
2-氨基茚满-2-羧酸	Aic
α-氨基-异丁酸	Aib
3-氨基-2-萘甲酸	Anc
2-氨基四氢萘-2-羧酸	Atc
氨基苯丙氨酸	Aminophe、氨基-Phe
4-氨基-苯丙氨酸（也称为对氨基苯丙氨酸）	4AmP、4-AminoF、4-氨基-Phe
4-脒基-苯丙氨酸	4AmPhe
2-氨基-2-(1-甲脒基哌啶-4-基)乙酸	4AmPig
ω-N-甲基精氨酸	R(Me)
Argψ(CH_2NH) -还原的酰胺键	rArg
3-(1,2,3-三唑-4-基)丙氨酸	Atz
(S)-2-氨基-3-(1-(1-溴-2-氧代-6,9,12-三氧杂-3-氮杂十四烷-14-基)-1H-1,2,3-三唑-4-基)丙酸	Atz(PEG3-溴乙酰胺)

[0251]

3-(1-(O-(氨基乙基)-O'-(乙烯)-十甘醇)-1,2,3-三唑-4-基)丙氨酸	Atz(氨基-PEG10)
3-(1-(O-(氨基乙基)-O'-(乙烯)-乙二醇450avg)-1,2,3-三唑-4-基)丙氨酸	Atz(20kDa PEG)
(S)-2-氨基-3-(1-(2-氧代-6,9,12,15,18,21,24,27,30,33,36-十一氧杂-3-氮杂三十八烷-38-基)-1H-1,2,3-三唑-4-基)丙酸	Atz(PEG11-(乙酰胺甲基)
(S)-2-氨基-3-(1-(1-羟基-5-氧代-9,12,15,18,21,24,27,30,33,36,39-十一氧杂-3-硫杂-6-氮杂四十一烷-41-基)-1H-1,2,3-三唑-4-基)丙酸	Atz(PEG11-((2-羟乙基)硫代)乙酰胺)
(S)-2-氨基-3-(1-(1-溴-2-氧代-6,9,12,15,18,21,24,27,30,33,36-十一氧杂-3-氮杂三十八烷-38-基)-1H-1,2,3-三唑-4-基)丙酸	Atz(PEG11-溴乙酰胺)
(S)-2-氨基-6-(3-(1-(1-溴-2-氧代-6,9,12,15,18,21,24,27,30,33,36-十一氧杂-3-氮杂三十八烷-38-基)-1H-1,2,3-三唑-4-基)丙酰胺基)己酸	K(乙基-三唑-PEG11-溴乙酰胺)
β-丙氨酸	bA
β-高精氨酸	bhArg
β-高赖氨酸	bhomoK
β-高Tic	BhTic
β-高苯丙氨酸	BhPhe
β-高脯氨酸	BhPro
β-高色氨酸	BhTrp
4,4'-联苯丙氨酸、4-苯基-苯丙氨酸或联苯丙氨酸	Bip、4Bip
β,β-二苯基-丙氨酸	BiPhA
β-苯丙氨酸	BPhe

[0252]

对羧基苯丙氨酸	Cpa
瓜氨酸	Cit
环己基丙氨酸	Cha
环己基甘氨酸	Chg
环戊基甘氨酸	Cpg
4-叔丁基-L-苯丙氨酸	4tBu-F
4-苯甲酰基-L-苯丙氨酸	4-Bz-F
2-氯-L-苯丙氨酸	2-Cl-F
4-三氟甲基-L-苯丙氨酸	4CF3-F
4-氟-L-苯丙氨酸	4-F-F
4-甲基-L-苯丙氨酸	4-Me-F
2-氨基-3-胍基丙酸	3G-Dpr
α, γ-二氨基丁酸	Dab
2,4-二氨基丁酸	Dbu
二氨基丙酸	Dap
3,4-二氯-L-苯丙氨酸	DiCl-F
3,4-二甲氧基-L-苯丙氨酸	DiMeO-F
α, β-二氨基丙酸（或2,3-二氨基丙酸）	Dpr
3,3-二苯丙氨酸	Dip
4-胍基苯丙氨酸	Guf
4-胍基脯氨酸	4GuaPr
高精氨酸	hArg、hR
高瓜氨酸	hCit
高谷氨酰胺	hQ
高亮氨酸	hLeu、hL
高赖氨酸	hLys、hK、homoLys
高苯丙氨酸	hPhe、homoPhe
4-羟基脯氨酸（或羟基脯氨酸）	Hyp
2-茚满甘氨酸（或茚满甘氨酸）	IgI
二氢吲哚-2-羧酸	Idc
碘酪氨酸	I-Tyr

[0253]

Lys ψ(CH_2NH)-还原的酰胺键	rLys
(S)-6-((S)-2-乙酰胺戊-4-基酰胺基)-2-氨基己酸	K(Ac-Pra)
N-ε-生物素基-L-赖氨酸	K(生物素)
(S)-2,2',2''-(10-(2-((5-氨基-5-羧基戊基)氨基)-2-氧代乙基)-1,4,7,10-四氮杂环十二烷-1,4,7-三基)三乙酸	K(DOTA)
(S)-2-氨基-6-(戊-4-基酰胺基)己酸	K(4-Pen)
蛋氨酸氧化物	Met[O]
蛋氨酸砜	$Met[O]_2$
N^{α}-甲基精氨酸	NMeR
Nα-[$(CH_2)_3NHCH(NH)NH_2$]取代的甘氨酸	N-Arg
N^{α}-甲基瓜氨酸	NMeCit
N^{α}-甲基谷氨酰胺	NMeQ
N^{α}-甲基高瓜氨酸	N^{α}-MeHoCit
N^{α}-甲基高赖氨酸	NMeHoK
N^{α}-甲基亮氨酸	N^{α}-MeL、NMeL、NMeLeu、NMe-Leu
N^{α}-甲基赖氨酸	NMe-Lys
$N\varepsilon$-甲基-赖氨酸	N-eMe-K
$N\varepsilon$-乙基-赖氨酸	N-eEt-K
$N\varepsilon$-异丙基-赖氨酸	N-eIPr-K
N^{α}-甲基正亮氨酸	NMeNle、NMe-Nle
N^{α}-甲基鸟氨酸	N^{α}-MeOrn、NMeOrn
N^{α}-甲基苯丙氨酸	NMe-Phe
1'N-甲基色氨酸	1'NMeW
4-甲基-苯丙氨酸	MePhe
α-甲基苯丙氨酸	AMeF
N^{α}-甲基苏氨酸	NMe-Thr、NMeThr
N^{α}-甲基缬氨酸	NMeVal、NMe-Val

[0254]

Nε-(O-(氨基乙基)-O'-(2-丙酰基)-十一乙二醇)-赖氨酸	K(NPeg11)
Nε-(O-(氨基乙基)-O'-(2-丙酰基)-(乙二醇)27-赖氨酸	K(NPeg27)
3-(1-萘基)丙氨酸	1-Nal、1Nal
3-(2-萘基)丙氨酸	2-Nal、2Nal
六氢烟碱酸	Nip
硝基苯丙氨酸	nitrophe
正亮氨酸	Nle
正缬氨酸	Nva或Nvl
O-甲基酪氨酸	Omc-Tyr
(S)-辛基甘氨酸	OctylG
八氢吲哚-2-羧酸	Oic
鸟氨酸	Orn
Orn ψ(CH2NH)-还原的酰胺键	rOrn
焦谷氨酸	pGlu、PE、pE
L-磷酸丝氨酸	pS
4-哌啶基丙氨酸	4PipA
4-吡啶基丙氨酸	4Pal
3-吡啶基丙氨酸	3Pal
2-吡啶基丙氨酸	2Pal
对碘苯丙氨酸（或4-碘苯丙氨酸）	pI-Phe
苯基甘氨酸	Phg
炔丙基甘氨酸	Pra
哌可酸	Pip
4-氨基-1-哌啶-4-羧酸	4Pip
肌氨酸	Sar
1,2,3,4-四氢异喹啉	Tic
1,2,3,4-四氢异喹啉-1-羧酸	Tiq
1,2,3,4-四氢异喹啉-7-羟基-3-羧酸	羟基-Tic
1,2,3,4-四氢正哈尔满碱-3-羧酸	Tpi

[0255]

噻唑烷-4-羧酸	Thz
3-噻吩基丙氨酸	Thi
(S)-叔丁基甘氨酸	Tle
对称N'-ω-二甲基精氨酸	SDMA
N-ε-二甲基赖氨酸	K(Me2)
4-羧基苯丙氨酸	4CO2-F

[0256] UPAC-IUB 生物化学命名联合会(Joint Commission on Biochemical Nomenclature，JCBN)对氨基酸和肽给出的命名和符号已在以下文献中有所公开：Biochem.J.，1984，219，345-373；Eur.J.Biochem.，1984，138，9-37；1985，152，1；1993，213，2；Internat.J.Pept.Prot.Res.，1984，24，第 84 页之后；J.Biol.Chem.，1985，260，14-42；Pure Appl.Chem.，1984，56，595-624；Amino Acids and Peptides，1985，16，387-410；Biochemical Nomenclature and Related Documents，第 2 版，Portland Press，1992，第 39-69 页。

[0257] 本发明组合物的肽结构域的一个或多个可用修饰可以包括通过已知的化学技术实现的氨基酸添加或插入、氨基酸缺失、肽截短、氨基酸取代和/或氨基酸残基化学衍生化。例如，因而修饰的氨基酸序列相对于所关注的天然序列的氨基酸序列包含至少一个在其中插入或取代的氨基酸残基，其中插入或取代的氨基酸残基具有包含亲核或亲电反应性官能团的侧链，肽通过所述官能团共价偶联到接头和/或半衰期延长部分。根据本发明，这样的亲核或亲电反应性官能团的可用实例包括但不限于硫醇、伯胺、硒代、酰肼、醛、羧酸、酮、氨基氧基、被掩蔽(受保护)的醛或被掩蔽(受保护)的酮官能团。具有包含亲核反应性官能团的侧链的氨基酸残基的实例包括但不限于赖氨酸残基、高赖氨酸、α，β-二氨基丙酸残基、α，γ-二氨基丁酸残基、鸟氨酸残基、半胱氨酸、高半胱氨酸、谷氨酸残基、天冬氨酸残基或硒代半胱氨酸(“SeCys”)残基。

[0258] 氨基酸残基通常根据不同的化学和/或物理特性进行归类。术语“酸性氨基酸残基”是指具有包含酸性基团的侧链的 D 或 L 形式的氨基酸残基。示例性酸性残基包括天冬氨酸和谷氨酸残基。术语“烷基氨基酸残基”是指具有可为直链、支链或环状的 C_{1-6} 烷基侧链的 D 或 L 形式的氨基酸残基，包括如在脯氨酸中的氨基酸胺，其中 C_{1-6} 烷基被 0、1、2 或 3 个选自以下的取代基取代：C_{1-4} 卤代烷基、卤素、氰基、硝基、-C(=O)R^b、-C(=O)OR^a、-C(=O)NR^aR^a、-C(=NR^a)NR^aR^a、-NR^aC(=NR^a)NR^aR^a、-OR^a、-OC(=O)R^b、-OC(=O)NR^aR^a、-OC_{2-6} 烷基 NR^aR^a、-OC_{2-6} 烷基 OR^a、-SR^a、-S(=O)R^b、-S(=O)$_2R^b$、-S(=O)$_2NR^aR^a$、-NR^aR^a、-N(R^a)C(=O)R^b、-N(R^a)C(=O)OR^b、-N(R^a)C(=O)NR^aR^a、-N(R^a)C(=NR^a)NR^aR^a、-N(R^a)S(=O)$_2R^b$、-N(R^a)S(=O)$_2NR^aR^a$、-NR^aC_{2-6} 烷基 NR^aR^a 和 -NR^aC_{2-6} 烷基 OR^a；其中 R^a 在每种情况下独立地为 H 或 R^b；而 R^b 在每种情况下独立地为被 0、1、2 或 3 个选自以下的取代基取代的 C_{1-6} 烷基：卤素、C_{1-4} 烷基、C_{1-3} 卤代烷基、-OC_{1-4} 烷基、-NH_2、-NHC_{1-4} 烷基和 -N(C_{1-4} 烷基)C_{1-4} 烷基；或其任何质子化形式，包括丙氨酸、缬氨酸、亮氨酸、异亮氨酸、脯氨酸、丝氨酸、苏氨酸、赖氨酸、精氨酸、组氨酸、天冬氨酸、谷氨酸、天冬酰胺、谷氨酰胺、半胱氨酸、蛋氨酸、羟基脯氨酸、环己基

丙氨酸、正亮氨酸、正缬氨酸、2- 氨基丁酸，但是所述残基不含芳基或芳族基团。术语“芳族氨基酸残基”是指具有包含芳族基团的侧链的 D 或 L 形式的氨基酸残基。示例性芳族残基包括色氨酸、酪氨酸、3-(1- 萘基）丙氨酸、组氨酸或苯丙氨酸残基。术语“碱性氨基酸残基”是指具有包含碱性基团的侧链的 D 或 L 形式的氨基酸残基。示例性碱性氨基酸残基包括组氨酸、赖氨酸、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸和高精氨酸 (hR) 残基。术语“亲水性氨基酸残基”是指具有包含极性基团的侧链的 D 或 L 形式的氨基酸残基。示例性亲水性残基包括半胱氨酸、丝氨酸、苏氨酸、组氨酸、赖氨酸、天冬酰胺、天冬氨酸、谷氨酸、谷氨酰胺和瓜氨酸 (Cit) 残基。术语“亲脂性氨基酸残基”是指具有包含不带电、脂族或芳族基团的侧链的 D 或 L 形式的氨基酸残基。示例性亲脂性侧链包括苯丙氨酸、异亮氨酸、亮氨酸、蛋氨酸、缬氨酸、色氨酸和酪氨酸。丙氨酸 (A) 是两亲的，即它能够用作亲水性或亲脂性（即疏水性）残基。丙氨酸因此包括在“亲脂性”（即“疏水性”）残基和“亲水性”残基两者的定义内。术语“非官能性”或“中性”氨基酸残基是指具有不含酸性、碱性或芳族基团的侧链的 D 或 L 形式的氨基酸残基。示例性中性氨基酸残基包括蛋氨酸、甘氨酸、丙氨酸、缬氨酸、异亮氨酸、亮氨酸和正亮氨酸 (Nle) 残基。

[0259] 毒素肽类似物的另外可用实施方案可通过本文所公开的毒素多肽的氨基酸序列的保守修饰而产生。保守修饰将产生具有与进行此类修饰的偶联（如 PEG 偶联）肽相似的功能、物理和化学特性的半衰期延长部分偶联的肽。本文所公开的偶联毒素肽类似物的此类保守修饰形式也被设想为本发明的实施方案。

[0260] 相比之下，肽的功能和 / 或化学特性的实质性修饰可通过在氨基酸序列中选择下述取代而实现，所述取代在它们对于维持以下方面的作用上存在显著差异 :(a) 取代区域中分子主链的结构，例如，作为 α- 螺旋构象，(b) 靶点处分子的电荷或疏水性，或 (c) 分子的大小。

[0261] 例如，“保守氨基酸取代”可涉及通过非天然残基取代天然氨基酸残基，使得对该位置的氨基酸残基的极性或电荷具有很少的影响或无影响。此外，多肽中的任何天然残基也可被丙氨酸取代，如之前已针对“丙氨酸扫描诱变”进行了描述（参见例如 MacLennan 等人，Acta Physiol.Scand.Suppl.，643 :55-67(1998) ;Sasaki 等人，1998，Adv.Biophys.35 : 1-24(1998)，其讨论丙氨酸扫描诱变）。

[0262] 在本发明组合物的一些可用实施方案中，对毒素肽的氨基酸序列以一种或多种方式相对于所关注的天然毒素肽序列进行修饰，所关注的天然毒素肽序列诸如但不限于天然 GpTx-1 序列 (SEQ ID NO :1)、GpTx-1 的肽类似物或任何其他具有如表 5A、表 5B 和表 31 或本文其他地方所示的氨基酸序列的毒素肽。一个或多个可用的修饰可以包括通过已知的化学技术实现的氨基酸添加或插入、氨基酸缺失、肽截短、氨基酸取代和 / 或氨基酸残基化学衍生化。此类修饰可例如出于增强效力、选择性和 / 或蛋白水解稳定性等目的而进行。本领域的技术人员了解设计具有此类增强性质的肽类似物的技术，诸如丙氨酸扫描、以使用已知毒素肽序列的比对介导诱变为基础的合理设计和 / 或分子建模。

[0263] 术语“蛋白酶”与“肽酶”同义。蛋白酶包括两组酶 :裂解蛋白内某些点处的肽键的肽链内切酶，以及分别从 N 或 C 端移除一个或多个氨基酸的肽链端解酶。术语“蛋白酶”也作为肽链内切酶的同义词使用。蛋白酶的四种机理分类为 :丝氨酸蛋白酶、半胱氨酸蛋白

酶、天冬氨酸蛋白酶和金属蛋白酶。除了这四种机理分类外，还存在一部分被分配到未确定催化机理的蛋白酶的酶命名。这表示催化机理尚未确定。

[0264] 裂解亚位点命名法通常采取自Schechter和Berger建立的方案(Schechter I. & Berger A.，On the size of the active site in proteases.I.Papain，Biochemical and Biophysical Research Communication，27：157(1967)；Schechter I. & Berger A.，On the active site of proteases.3.Mapping the active site of papain；specific inhibitor peptides of papain，Biochemical and Biophysical Research Communication，32：898(1968))。根据此模型，经历裂解的底物中的氨基酸残基从裂解的键以N端方向被指定为P1、P2、P3、P4等。同样，C端方向的残基被指定为P1′、P2′、P3′、P4′等。

[0265] 技术人员知道鉴定所关注的蛋白酶结合或蛋白酶裂解位点的多种工具。例如，PeptideCutter软件可通过瑞士生物信息学研究所(SIB；www.expasy.org/tools/peptidecutter)的ExPASy(蛋白质分析专家系统)蛋白质组学服务器获得。PeptideCutter对SWISS-PROT和/或TrEMBL数据库中的蛋白序列或用户输入的蛋白序列搜索蛋白酶裂解位点。可以使用单一蛋白酶和化学品、蛋白酶和化学品的选定列表或完整列表。可以采用不同形式的结果输出：根据酶名称按字母顺序分组的或根据氨基酸数按顺序分组的裂解位点的表格。第三种输出选项是裂解位点的图谱。序列及绘制到其上的裂解位点按区块分组，区块的大小可由用户选择。确定蛋白酶裂解位点的其他工具是已知的。(例如Turk，B.等人，Determination of protease cleavage site motifs using mixture-based oriented peptide libraries，Nature Biotechnology，19：661-667(2001)；Barrett A.等人，Handbook of proteolytic enzymes，Academic Press(1998))。

[0266] 丝氨酸蛋白酶包括胰凝乳蛋白酶家族，该家族包括哺乳动物蛋白酶，诸如胰凝乳蛋白酶、胰蛋白酶或弹性蛋白酶或激肽释放酶。丝氨酸蛋白酶表现出不同的底物特异性，这些特异性与底物残基发生相互作用的各种酶亚位点中的氨基酸取代相关。一些酶具有扩展的与底物的相互作用位点，而其他的则具有限于P1底物残基的特异性。

[0267] 胰蛋白酶优先地在位置P1中的R或K处裂解。Keil(1992)进行的统计研究描述了围绕Arg-和Lys-键(即，分别为位置P2和P1′)的残基在胰蛋白酶裂解过程中的负面影响。(Keil，B.，Specificity of proteolysis，Springer-Verlag Berlin-Heidelberg-New York，335(1992))。位置P1′中的脯氨酸残基通常对胰蛋白酶裂解产生强烈的负面影响。相似地，P1′中的R和K的定位与位置P2和P1′中的带负电残基一样导致抑制。

[0268] 胰凝乳蛋白酶优先地在位置P1中的W、Y或F处裂解(高特异性)，并在较低程度上在位置P1中的L、M或H残基处裂解。(Keil，1992)。这些规则的例外是：当W存在于位置P1中时，裂解在M或P同时存在于位置P1′中时阻断。此外，位置P1′中的脯氨酸残基几乎完全独立于存在于位置P1中的氨基酸阻断裂解。当M残基存在于位置P1中时，裂解因位置P1′中存在Y残基而阻断。最后，当H位于位置P1中时，存在D、M或W残基也会阻断裂解。

[0269] 膜金属肽链内切酶(NEP；中性肽链内切酶、肾脏刷状缘中性蛋白酶、脑啡肽酶、EC3.4.24.11)在疏水性氨基酸残基的侧链处裂解肽。(Connelly，JC等人，Neutral Endopeptidase24.11in Human Neutrophils：Cleavage of Chemotactic Peptide，PNAS，

82(24) :8737-8741(1985))。

[0270] 凝血酶优先地在位置 P1 中的 R 残基处裂解。(Keil,1992)。凝血酶的天然底物为纤维蛋白原。最佳的裂解位点是当 R 残基处于位置 P1 而 Gly 处于位置 P2 和位置 P1′ 时。同样,当疏水性氨基酸残基存在于位置 P4 和位置 P3 中时,位置 P2 中的脯氨酸残基、位置 P1 中的 R 残基以及位置 P1′ 和位置 P2′ 中的非酸性氨基酸残基。对于其天然底物纤维蛋白原非常重要的残基是 P10 中的 D 残基。

[0271] 半胱天冬酶是一个半胱氨酸蛋白酶家族,这些蛋白酶包含具有保守氨基酸序列的活性位点并在 D 残基之后特异性裂解肽。(Earnshaw WC 等人,Mammalian caspases : Structure,activation,substrates,and functions during apoptosis,Annual Review of Biochemistry,68 :383-424(1999))。

[0272] Arg-C 蛋白酶优先地在位置 P1 中的 R 残基处进行裂解。裂解行为似乎只适度地受位置 P1′ 中的残基影响。(Keil,1992)。Asp-N 肽链内切酶特异性裂解位置 P1′ 中与 D 残基的键合。(Keil,1992)。

[0273] 前述内容仅仅是示例性的,决不是关于技术人员在实践本发明中可能感兴趣消除的蛋白酶结合位点和 / 或裂解位点的技术人员可用知识的详尽探讨。

[0274] 所需的氨基酸取代(无论是保守的还是非保守的)可在需要此类取代时由本领域的技术人员确定。例如,氨基酸取代可用于鉴定肽序列的重要残基,或者用于增加或降低本文所述的肽或媒介物 - 偶联肽分子的亲和力。

[0275] 天然存在的残基可基于共同的侧链性质分类 :

[0276] 1) 疏水性 :正亮氨酸 (Nor 或 Nle)、Met、Ala、Val、Leu、Ile ;

[0277] 2) 中性亲水性 :Cys、Ser、Thr、Asn、Gln ;

[0278] 3) 酸性 :Asp、Glu ;

[0279] 4) 碱性 :His、Lys、Arg ;

[0280] 5) 影响链取向的残基 :Gly、Pro ;以及

[0281] 6) 芳族 :Trp、Tyr、Phe。

[0282] 保守氨基酸取代可涉及这些分类之一中的成员与相同分类中的另一成员交换。保守氨基酸取代可涵盖非天然存在的氨基酸残基,它们通常通过化学肽合成而不是生物系统中的合成加以结合。这些包括模拟肽以及氨基酸部分的其他逆转或颠倒形式。

[0283] 非保守取代可涉及将这些分类之一中的成员交换成另一分类中的成员。可将此类取代的残基引入毒素肽类似物的区域中。

[0284] 在作出此类变化时,根据某些实施方案,可以考虑氨基酸的亲疏水性指数。为每个氨基酸基于其疏水性和电荷特性赋予亲疏水性指数。它们是 :异亮氨酸 (+4.5)、缬氨酸 (+4.2)、亮氨酸 (+3.8)、苯丙氨酸 (+2.8)、半胱氨酸 / 胱氨酸 (+2.5)、蛋氨酸 (+1.9)、丙氨酸 (+1.8)、甘氨酸 (-0.4)、苏氨酸 (-0.7)、丝氨酸 (-0.8)、色氨酸 (-0.9)、酪氨酸 (-1.3)、脯氨酸 (-1.6)、组氨酸 (-3.2)、谷氨酸 (-3.5)、谷氨酰胺 (-3.5)、天冬氨酸 (-3.5)、天冬酰胺 (-3.5)、赖氨酸 (-3.9) 和精氨酸 (-4.5)。

[0285] 氨基酸亲疏水性指数在为蛋白赋予相互作用性生物功能中的重要性在本领域中已得到理解 (参见例如 Kyte 等人,1982,J.Mol.Biol. 157 :105-131)。已知的是,某些氨基酸可用其他具有相似亲疏水性指数或评分的氨基酸取代并仍保持相似的生物活性。在基于

亲疏水性指数作出这些变化时，在某些实施方案中，将亲疏水性指数处于 ±2 内的氨基酸取代包括在内。在某些实施方案中，将处于 ±1 内的那些包括在内，而在某些实施方案中，将处于 ±0.5 内的那些包括在内。

[0286] 在本领域中还应当理解的是，相似的氨基酸的取代可基于亲水性有效地进行，尤其是当因而产生的生物功能性蛋白旨在用于免疫实施方案中时，如本文所公开。在某些实施方案中，蛋白的最大局部平均亲水性（如通过其相邻氨基酸的亲水性所控制）与其免疫原性和抗原性相关，即与蛋白的生物性质相关。

[0287] 以下亲水性值已赋给这些氨基酸残基：精氨酸 (+3.0)、赖氨酸 (+3.0)、天冬氨酸 (+3.0±1)、谷氨酸 (+3.0±1)、丝氨酸 (+0.3)、天冬酰胺 (+0.2)、谷氨酰胺 (+0.2)、甘氨酸 (0)、苏氨酸 (-0.4)、脯氨酸 (-0.5±1)、丙氨酸 (-0.5)、组氨酸 (-0.5)、半胱氨酸 (-1.0)、蛋氨酸 (-1.3)、缬氨酸 (-1.5)、亮氨酸 (-1.8)、异亮氨酸 (-1.8)、酪氨酸 (-2.3)、苯丙氨酸 (-2.5) 和色氨酸 (-3.4)。在基于相似的亲水性值作出这些变化时，在某些实施方案中，将亲水性值处于 ±2 内的氨基酸取代包括在内，在某些实施方案中，将处于 ±1 内的那些包括在内，以及在某些实施方案中，将处于 ±0.5 内的那些包括在内。基于亲水性，还可以鉴定一级氨基酸序列中的表位。这些区域也称为“表位核心区”。

[0288] 保守取代的实例包括将一个非极性（疏水性）氨基酸残基诸如异亮氨酸、缬氨酸、亮氨酸、正亮氨酸、丙氨酸或蛋氨酸替换为另一者；将一个极性（亲水性）氨基酸残基替换为另一者，诸如在精氨酸与赖氨酸之间、在谷氨酰胺与天冬酰胺之间、在甘氨酸与丝氨酸之间；将一个碱性氨基酸残基诸如赖氨酸、精氨酸或组氨酸替换为另一者；或者将一个酸性残基诸如天冬氨酸或谷氨酸替换为另一者。短语“保守氨基酸取代”还包括使用化学衍生化的残基替代非衍生化的残基，前提是此类肽显示出必需的生物活性。可根据本发明使用的其他示例性氨基酸取代在下表 4 中示出。

[0289] 表 4. 一些可用的氨基酸取代。

[0290]

原始残基	示例性取代
Ala	Val、Leu、Ile、Gly
Arg	Lys、Gln、Asn、His
Asn	Gln
Asp	Glu
Cys	Ser、Ala
Gln	Asn
Glu	Asp
Gly	Pro、Ala
His	Asn、Gln、Lys、Arg
Ile	Leu、Val、Met、Ala、Phe、正亮氨酸
Leu	正亮氨酸、Ile、Val、Met、Ala、Phe
Lys	Arg、1,4-二氨基-丁酸、Gln、Asn、His
Met	Leu、Phe、Ile
Phe	Leu、Val、Ile、Ala、Tyr
Pro	Ala
Ser	Thr、Ala、Cys
Thr	Ser
Trp	Tyr、Phe
Tyr	Trp、Phe、Thr、Ser
Val	Ile、Met、Leu、Phe、Ala、正亮氨酸

[0291] 以举例说明的方式，本发明的实施方案涉及物质组合物，该物质组合物包含具有下式的氨基酸序列的分离多肽：

[0292] $X_{aa}{}^{1}X_{aa}{}^{2}X_{aa}{}^{3}X_{aa}{}^{4}X_{aa}{}^{5}X_{aa}{}^{6}X_{aa}{}^{7}X_{aa}{}^{8}X_{aa}{}^{9}X_{aa}{}^{10}X_{aa}{}^{11}X_{aa}{}^{12}X_{aa}{}^{13}X_{aa}{}^{14}Asp^{15}X_{aa}{}^{16}X_{aa}{}^{17}X_{aa}{}^{18}X_{aa}{}^{19}X_{aa}{}^{20}X_{aa}{}^{21}X_{aa}{}^{22}X_{aa}{}^{23}X_{aa}{}^{24}X_{aa}{}^{25}X_{aa}{}^{26}X_{aa}{}^{27}X_{aa}{}^{28}X_{aa}{}^{29}X_{aa}{}^{30}X_{aa}{}^{31}Lys^{32}X_{aa}{}^{33}X_{aa}{}^{34}X_{aa}{}^{35}X_{aa}{}^{36}X_{aa}{}^{37}X_{aa}{}^{38}$//SEQ ID NO:475

[0293] 或其药学上可接受的盐，

[0294] 其中：

[0295] $X_{aa}^{1}X_{aa}^{2}$ 不存在；或者 X_{aa}^{1} 为任何氨基酸残基并且 X_{aa}^{2} 为任何氨基酸残基；或者 X_{aa}^{1} 不存在并且 X_{aa}^{2} 为任何氨基酸残基；

[0296] X_{aa}^{3} 在 X_{aa}^{18} 为 Cys 时为 Cys；或者 X_{aa}^{3} 在 X_{aa}^{18} 为 SeCys 时为 SeCys；或者 X_{aa}^{3} 在 X_{aa}^{18} 为烷基氨基酸残基时为烷基氨基酸残基（例如 X_{aa}^{3} 和 X_{aa}^{18} 可以独立地为 Ala 或 2-Abu 残基）；

[0297] X_{aa}^{4} 为酸性、疏水性、碱性或中性亲水性氨基酸残基（例如 X_{aa}^{4} 可选自 Ala、Glu、Asp、磷酸丝氨酸、磷酸酪氨酸、γ-羧基谷氨酸、Phe、Pro、Ile、Leu、Met、Val、Trp、Tyr、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N-甲基-精氨酸、ω-氨基精氨酸、ω-甲基-精氨酸、1-甲基-组氨酸、3-甲基-组氨酸、高精氨酸、N-甲基-赖氨酸、N-ε-甲基赖氨酸、Dab、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、4-苯基-苯丙氨酸 (Bip)、Gln、Asn、Ser、Thr 和 Cit 残基）；

[0298] X_{aa}^{5} 为 Gly、Ala、疏水性或碱性氨基酸残基（例如 X_{aa}^{5} 可选自 Ala、Phe、Ile、Leu、Met、Val、Trp、Tyr、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N-甲基-精氨酸、ω-氨基精氨酸、ω-甲基-精氨酸、1-甲基-组氨酸、3-甲基-组氨酸、高精氨酸、N-甲基-赖氨酸、N-ε-甲基赖氨酸、Dab、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1'NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4-苯基-苯丙氨酸 (Bip) 残基）；

[0299] X_{aa}^{6} 为 Gly、Ala、2-Abu、正亮氨酸 (Nle)、正缬氨酸 (Nva) 或疏水性氨基酸残基（例如 X_{aa}^{6} 可选自 Ala、Phe、Ile、Leu、Met、Val、Trp、Tyr、脯氨酸、硫杂脯氨酸、蛋氨酸、甘氨酸、1-Nal、2-Nal、1'NMe-Trp、环戊基甘氨酸 (Cpg)、苯基甘氨酸、N-甲基亮氨酸、N-甲基苯丙氨酸、N-甲基缬氨酸、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、2-氯苯丙氨酸、4-氯苯丙氨酸、3,4-二氯苯丙氨酸、4-三氟甲基-苯丙氨酸和 4-苯基-苯丙氨酸 (Bip) 残基）；

[0300] X_{aa}^{7} 为 Gly、Ala、芳族或疏水性氨基酸残基（例如 X_{aa}^{7} 可选自 Gly、Ala、Phe、Ile、Leu、Met、Val、Trp、Tyr、Pro、2-吡啶基丙氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1'NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、2-氯苯丙氨酸、4-氯苯丙氨酸、3,4-二氯苯丙氨酸、4-三氟甲基-苯丙氨酸和 4-苯基-苯丙氨酸 (Bip) 残基）；

[0301] X_{aa}^{8} 为碱性、酸性或中性亲水性氨基酸残基或 Ala 残基（例如 X_{aa}^{8} 可选自 Ala、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N-甲基-精氨酸、ω-氨基精氨酸、ω-甲基-精氨酸、1-甲基-组氨酸、3-甲基-组氨酸、高精氨酸、N-甲基-赖氨酸、N-ε-甲基赖氨酸、Dab、Ser、Thr、Asn、Gln、Cit、磷酸丝氨酸、磷酸酪氨酸、γ-羧基谷氨酸、Asp 和 Glu 残基）；

[0302] X_{aa}^{9} 为碱性或中性亲水性氨基酸残基（例如 X_{aa}^{9} 可选自 Ala、Pro、Met、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N-甲基-精氨酸、ω-氨基精氨酸、ω-甲基-精氨酸、1-甲基-组氨酸、3-甲基-组氨酸、高精氨酸、N-甲基-赖氨酸、N-ε-甲基赖氨酸、Dab、Gln、Asn、Ser、Thr 和 Cit 残基）；

[0303] X_{aa}^{10} 在 X_{aa}^{24} 为 Cys 时为 Cys；或者 X_{aa}^{10} 在 X_{aa}^{24} 为 SeCys 时为 SeCys；

[0304] X_{aa}^{11} 为任何氨基酸残基（例如 X_{aa}^{11} 可选自 Ala、Asp、Glu、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、Pra、Atz、高赖氨酸、鸟氨酸、N-甲基-精氨酸、ω-氨基精氨酸、ω-甲基-精氨酸、1-甲基-组氨酸、3-甲基-组氨酸、高精氨酸、N-甲基-赖氨酸、N-ε-甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4-苯基-苯丙氨酸 (Bip) 残基）；

[0305] X_{aa}^{12} 为 Pro、酸性、中性或疏水性氨基酸残基（例如 X_{aa}^{12} 可选自丙氨酸、缬氨酸、亮氨酸、异亮氨酸、脯氨酸、丝氨酸、苏氨酸、天冬氨酸、谷氨酸、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1'NMe-Trp、Cha 和 4- 苯基 - 苯丙氨酸 (Bip)、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、天冬酰胺、谷氨酰胺、蛋氨酸、羟基脯氨酸、苯丙氨酸、色氨酸和酪氨酸）；

[0306] X_{aa}^{13} 为任何氨基酸残基（例如 X_{aa}^{13} 可选自 Ala、Asp、Glu、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、Pra、Atz、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4- 苯基 - 苯丙氨酸 (Bip) 残基）；

[0307] X_{aa}^{14} 为任何氨基酸残基（例如 X_{aa}^{14} 可选自 Ala、Asp、Glu、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、Pra、Atz、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4- 苯基 - 苯丙氨酸 (Bip) 残基）；

[0308] X_{aa}^{16} 为碱性、中性亲水性或酸性氨基酸残基或 Ala 残基（例如 X_{aa}^{16} 可选自 Ala、Pro、Met、Arg、Lys、His、Pra、Atz、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、Gln、Asn、Ser、Thr、Cit、磷酸丝氨酸、磷酸酪氨酸、γ - 羧基谷氨酸、Asp 和 Glu 残基）；

[0309] X_{aa}^{17} 在 X_{aa}^{31} 为 Cys 时为 Cys ;或者 X_{aa}^{17} 在 X_{aa}^{31} 为 SeCys 时为 SeCys ；

[0310] X_{aa}^{18} 为 Cys、SeCys 或烷基氨基酸残基；

[0311] X_{aa}^{19} 为任何氨基酸残基（例如 X_{aa}^{19} 可选自 Ala、Asp、Glu、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4- 苯基 - 苯丙氨酸 (Bip) 残基）；

[0312] X_{aa}^{20} 为 Pro、Gly、碱性或中性亲水性残基（例如 X_{aa}^{20} 可选自 Ala、Pro、Met、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、Gln、Asn、Ser、Thr 和 Cit 残基）；

[0313] X_{aa}^{21} 为碱性、疏水性或中性亲水性氨基酸残基（例如 X_{aa}^{21} 可选自 Ala、Phe、Pro、Ile、Leu、Met、Val、Trp、Tyr、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、4- 苯基 - 苯丙氨酸 (Bip)、Gln、Asn、Ser、Thr 和 Cit 残基）；

[0314] X_{aa}^{22} 为疏水性或碱性氨基酸残基（例如 X_{aa}^{22} 可选自 Ala、Phe、Ile、Leu、Met、Val、Trp、Tyr、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖

氨酸、Dab、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1'NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4- 苯基 - 苯丙氨酸 (Bip) 残基）；

[0315] X_{aa}^{23} 为疏水性、碱性或中性亲水性氨基酸残基（例如 X_{aa}^{23} 可选自 Ala、Phe、Pro、Ile、Leu、Met、Val、Trp、Tyr、Arg、Lys、His、Pra、Atz、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、4- 苯基 - 苯丙氨酸 (Bip)、Gln、Asn、Ser、Thr 和 Cit 残基）；

[0316] X_{aa}^{24} 为 Cys 或 SeCys 残基；

[0317] X_{aa}^{25} 为 Ser、Ala 或中性亲水性氨基酸残基（例如 X_{aa}^{25} 选自 Ala、Gly、Pro、Met、甘氨酸、Gln、Asn、Ser、Thr 和 Cit 残基）；

[0318] X_{aa}^{26} 为 Ala、酸性、碱性或中性亲水性氨基酸残基（例如 X_{aa}^{26} 可选自 Ala、Pro、Met、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、甘氨酸、Asp、Glu、磷酸丝氨酸、磷酸酪氨酸、γ - 羧基谷氨酸、Gln、Asn、Ser、Thr 和 Cit 残基）；

[0319] X_{aa}^{27} 为酸性、碱性、中性亲水性或疏水性残基（例如 X_{aa}^{27} 可选自 Thr、Leu、Ile、Val、Ser、Met、Gln、Asn、Phe、Tyr、Trp、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、Asp、Glu、磷酸丝氨酸、磷酸酪氨酸、γ - 羧基谷氨酸、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、正亮氨酸、正缬氨酸、1-Nal、2-Nal、4- 苯基 - 苯丙氨酸 (Bip)、Glu、Asp 和 Gly 残基）；

[0320] X_{aa}^{28} 为芳族或碱性氨基酸残基（例如 X_{aa}^{28} 可选自 Phe、Trp、Tyr、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、1-Nal、2-Nal、2- 吡啶基 - 丙氨酸、3- 吡啶基 - 丙氨酸、4- 吡啶基 - 丙氨酸、4- 哌啶基 - 丙氨酸和 4- 苯基 - 苯丙氨酸 (Bip) 残基）；

[0321] X_{aa}^{29} 为酸性、碱性或中性亲水性氨基酸残基（例如 X_{aa}^{29} 可选自 Ala、Asp、Glu、磷酸丝氨酸、磷酸酪氨酸、γ - 羧基谷氨酸、Phe、Gly、His、Lys、Asn、Pro、Gln、Arg、Ser、Thr、Tyr、Pra、Atz、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸和 Dab 残基）。在一些可用的实施方案中，Xaa^{29} 为酸性或中性亲水性残基（例如 Ala、Asp、Glu、Gly、Asn、Gln、Ser、Thr、磷酸丝氨酸、磷酸酪氨酸或 γ - 羧基谷氨酸残基 [例如 SEQ ID NO：1071-2798]）；

[0322] X_{aa}^{30} 为 Trp、5- 溴代 Trp、6- 溴代 Trp、5- 氯代 Trp、6- 氯代 Trp、1-Nal、2-Nal 或硫代 Trp 残基；

[0323] X_{aa}^{31} 为 Cys 或 SeCys；

[0324] X_{aa}^{33} 为疏水性或芳族氨基酸残基（例如 X_{aa}^{33} 可选自 Phe、Ile、Leu、Met、Val、Trp、Tyr、正亮氨酸、正缬氨酸、1-Nal、2-Nal、2- 吡啶基 - 丙氨酸、3- 吡啶基 - 丙氨酸、4- 吡啶

基－丙氨酸、4- 哌啶基－丙氨酸、1’NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、2- 氯苯丙氨酸、4- 氯苯丙氨酸、3,4- 二氯苯丙氨酸、4- 三氟甲基－苯丙氨酸和 4- 苯基－苯丙氨酸 (Bip) 残基）；

[0325] X_{aa}^{34} 为任何氨基酸残基（例如 X_{aa}^{34} 可选自 Ala、Asp、Glu、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、Pra、Atz、高赖氨酸、鸟氨酸、N- 甲基－精氨酸、ω－氨基精氨酸、ω－甲基－精氨酸、1- 甲基－组氨酸、3- 甲基－组氨酸、高精氨酸、N- 甲基－赖氨酸、N- ε－甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1’NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、2- 氯苯丙氨酸、4- 氯苯丙氨酸、3,4- 二氯苯丙氨酸、4- 三氟甲基－苯丙氨酸、2- 吡啶基－丙氨酸、3- 吡啶基－丙氨酸、4- 羧基－苯丙氨酸和 4- 苯基－苯丙氨酸 (Bip) 残基）；

[0326] X_{aa}^{35} 为疏水性氨基酸残基（例如 X_{aa}^{35} 可选自 Phe、Ile、Leu、Met、Val、Trp、Tyr、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1’NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、2- 氯苯丙氨酸、4- 氯苯丙氨酸、3,4- 二氯苯丙氨酸、4- 三氟甲基－苯丙氨酸和 4- 苯基－苯丙氨酸 (Bip) 残基）；

[0327] X_{aa}^{36}、X_{aa}^{37} 和 X_{aa}^{38} 的每一者独立地不存在或独立地为中性、碱性或疏水性氨基酸残基（例如 X_{aa}^{36}、X_{aa}^{37} 和 X_{aa}^{38} 的每一者可独立地不存在或独立地选自 Ala、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、高赖氨酸、鸟氨酸、N- 甲基－精氨酸、ω－氨基精氨酸、ω－甲基－精氨酸、1- 甲基－组氨酸、3- 甲基－组氨酸、高精氨酸、N- 甲基－赖氨酸、N- ε－甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4- 苯基－苯丙氨酸 (Bip) 残基）；

[0328] 并且其中：

[0329] 如果 X_{aa}^{3} 和 X_{aa}^{18} 均为 Cys 残基，则在残基 X_{aa}^{3} 与残基 X_{aa}^{18} 之间存在二硫键；或者如果 X_{aa}^{3} 和 X_{aa}^{18} 均为 SeCys 残基，则在残基 X_{aa}^{3} 与残基 X_{aa}^{18} 之间存在二硒键；

[0330] 如果 X_{aa}^{10} 和 X_{aa}^{24} 均为 Cys 残基，则在残基 X_{aa}^{10} 与残基 X_{aa}^{24} 之间存在二硫键；或者如果 X_{aa}^{10} 和 X_{aa}^{24} 均为 SeCys 残基，则在残基 X_{aa}^{10} 与残基 X_{aa}^{24} 之间存在二硒键；

[0331] 如果 X_{aa}^{17} 和 X_{aa}^{31} 均为 Cys 残基，则在残基 X_{aa}^{17} 与残基 X_{aa}^{31} 之间存在二硫键；或者如果 X_{aa}^{17} 和 X_{aa}^{31} 均为 SeCys 残基，则在残基 X_{aa}^{17} 与残基 X_{aa}^{31} 之间存在二硒键；

[0332] 氨基末端残基任选地被乙酰化、生物素酰化或 4- 戊炔酰化或聚乙二醇化；并且

[0333] 羧基末端残基任选地被酰胺化。此类 C 端酰胺化的许多特定实例在表 5A 和表 5B 中示出。

[0334] 就在上面加以描述的本发明组合物 (SEQ ID NO:475) 的另一个实例是其中分离的多肽包含下式的氨基酸序列的物质组合物：

[0335] $X_{aa}^{1}X_{aa}^{2}Cys^{3}X_{aa}^{4}X_{aa}^{5}Ala^{6}X_{aa}^{7}X_{aa}^{8}X_{aa}^{9}Cys^{10}X_{aa}^{11}X_{aa}^{12}X_{aa}^{13}X_{aa}^{14}Asp^{15}X_{aa}^{16}Cys^{17}Cys^{18}X_{aa}^{19}X_{aa}^{20}{}_{aa}^{21}X_{aa}^{22}X_{aa}^{23}Cys^{24}X_{aa}^{25}X_{aa}^{26}X_{aa}^{27}X_{aa}^{28}X_{aa}^{29}X_{aa}^{30}Cys^{31}Lys^{32}X_{aa}^{33}X_{aa}^{34}X_{aa}^{35}X_{aa}^{36}X_{aa}^{37}X_{aa}^{38}$//SEQ ID NO:476，并且 SEQ ID NO:476 的可变位置如就在前面关于 SEQ ID NO:475 的可变位置的段落中示例性示出。物质组合物尤其可用的实施方案包含 SEQ ID NO:475 的位置 X_{aa}^{6} 处的 Ala、Gly、2-Abu、Nle 或 Nva 残基，而其中一些实施方案还具有 SEQ ID NO:475 的位置 X_{aa}^{27} 处的 Glu 残基，例如 [Ala5，Glu26]GpTx-1、[Gly5，Glu26]GpTx-1、[2-Abu5，Glu26]GpTx-1、[Nle5，Glu26]GpTx-1 或 [Nva5，Glu26]GpTx-1 肽类似物，其任选地还可以具有在其他氨基酸位置

处的另外的取代氨基酸残基和/或在N端和/或C端末端的另外残基。其他可用的实例包括在SEQ ID NO:475的位置X_{aa}^{29}或SEQ ID NO:476的X_{aa}^{29}处的Asp、Glu或Gln残基,具有或不具有在SEQ ID NO:475的位置X_{aa}^{27}处的Glu残基,例如[Ala5,Asp28]GpTx-1、[Ala5,Glu28]GpTx-1、[Ala5,Gln28]GpTx-1、[Ala5,Glu26,Asp28]GpTx-1、[Ala5,Glu26,Glu28]GpTx-1、[Ala5,Glu26,Gln28]GpTx-1、[Gly5,Asp28]GpTx-1、[Gly5,Glu28]GpTx-1、[Gly5,Gln28]GpTx-1、[Gly5,Glu26,Asp28]GpTx-1、[Gly5,Glu26,Glu28]GpTx-1、[Gly5,Glu26,Gln28]GpTx-1、[2-Abu5,Asp28]GpTx-1、[2-Abu5,Glu28]GpTx-1、[2-Abu5,Gln28]GpTx-1、[2-Abu5,Glu26,Asp28]GpTx-1、[2-Abu5,Glu26,Glu28]GpTx-1、[2-Abu5,Glu26,Gln28]GpTx-1、[Nle5,Asp28]GpTx-1、[Nle5,Glu28]GpTx-1、[Nle5,Gln28]GpTx-1、[Nle5,Glu26,Asp28]GpTx-1、[Nle5,Glu26,Glu28]GpTx-1和[Nle5,Glu26,Gln28]GpTx-1、[Nva5,Asp28]GpTx-1、[Nva5,Glu28]GpTx-1、[Nva5,Gln28]GpTx-1、[Nva5,Glu26,Asp28]GpTx-1、[Nva5,Glu26,Glu28]GpTx-1以及[Nva5,Glu26,Gln28]GpTx-1。

[0336] 所含的氨基酸序列包含SEQ ID NO:475的位置X_{aa}^{6}处的Ala残基的物质组合物的一些实例包括:SEQ ID NO:22、252-263、419-439、518-521、524、525、562-580、602、691、692、696-703、715、721-735、737-749、756、757、761、762、764-771、787-796、798、800、802、803、809-812、1028、1030-1040、1043-1047、1062-1065、1068-1070、1082、1096、1110、1124、1135、1146、1157、1165、1173、1181、1192、1203、1214、1222、1230、1238、1249、1260、1271、1279、1287、1295、1306、1317、1328、1336、1344、1352、1360、1368、1376、1384、1392、1400、1408、1416、1424、1432、1440、1448、1456、1464、1472、1480、1488、1496、1504、1512、1520、1528、1536、1544、1552、1560、1568、1576、1584、1592、1600、1608、1616、1624、1632、1640、1658、1672、1686、1700、1711、1722、1733、1741、1749、1757、1768、1779、1790、1798、1806、1814、1825、1836、1847、1855、1863、1871、1882、1893、1904、1912、1920、1928、1936、1944、1952、1960、1968、1976、1984、1992、2000、2008、2016、2024、2032、2040、2048、2056、2064、2072、2080、2088、2096、2104、2112、2120、2128、2136、2144、2152、2160、2168、2176、2184、2192、2200、2208、2216、2234、2248、2262、2276、2287、2298、2309、2317、2325、2333、2344、2355、2366、2374、2382、2390、2401、2412、2423、2431、2439、2447、2458、2469、2480、2488、2496、2504、2512、2520、2528、2536、2544、2552、2560、2568、2576、2584、2592、2600、2608、2616、2624、2632、2640、2648、2656、2664、2672、2680、2688、2696、2704、2712、2720、2728、2736、2744、2752、2760、2768、2776、2784、2792、2808、2822、2833、2844、2855、2863、2871、2879、2890、2901、2912、2920、2928、2936、2944、2952、2960、2968、2976、2984、2992、3000、3008、3016、3024、3032、3040、3048、3056、3064、3072和3080,如在表5A和表5B中所示。其他实例在前述任一者的C端包含游离酸(而不是酰胺化C端残基),诸如SEQ ID NO:597-601和813-1027,如在表5A和表5B中所示。

[0337] 所含的氨基酸序列包含SEQ ID NO:475的位置X_{aa}^{6}处的Gly残基的物质组合物的一些实例包括:SEQ ID NO:265、751、752、754、755、1081、1095、1109、1123、1134、1145、1156、1164、1172、1180、1191、1202、1213、1221、1229、1237、1248、1259、1270、1278、1286、1294、1305、1316、1327、1335、1343、1351、1359、1367、1375、1383、1391、1399、1407、1415、1423、1431、1439、1447、1455、1463、1471、1479、1487、1495、1503、1511、1519、1527、1535、1543、1551、1559、1567、1575、1583、1591、1599、1607、1615、1623、1631、1639、1657、1671、

1685、1699、1710、1721、1732、1740、1748、1756、1767、1778、1789、1797、1805、1813、1824、1835、1846、1854、1862、1870、1881、1892、1903、1911、1919、1927、1935、1943、1951、1959、1967、1975、1983、1991、1999、2007、2015、2023、2031、2039、2047、2055、2063、2071、2079、2087、2095、2103、2111、2119、2127、2135、2143、2151、2159、2167、2175、2183、2191、2199、2207、2215、2233、2247、2261、2275、2286、2297、2308、2316、2324、2332、2343、2354、2365、2373、2381、2389、2400、2411、2422、2430、2438、2446、2457、2468、2479、2487、2495、2503、2511、2519、2527、2535、2543、2551、2559、2567、2575、2583、2591、2599、2607、2615、2623、2631、2639、2647、2655、2663、2671、2679、2687、2695、2703、2711、2719、2727、2735、2743、2751、2759、2767、2775、2783、2791、2807、2821、2832、2843、2854、2862、2870、2878、2889、2900、2911、2919、2927、2935、2943、2951、2959、2967、2975、2983、2991、2999、3007、3015、3023、3031、3039、3047、3055、3063、3071 和 3079，如表 5A 和表 5B 中所示。

[0338] 所含的氨基酸序列包含 SEQ ID NO :475 的位置 X_{aa}^{6} 处的 2-Abu 残基的物质组合物的一些实例包括 :SEQ ID NO :605、636、649、706、707、718、753、758、797、799、801、804、807、808、1029、1041、1042、1048、1066、1067、1083、1097、1111、1125、1136、1147、1158、1166、1174、1182、1193、1204、1215、1223、1231、1239、1250、1261、1272、1280、1288、1296、1307、1318、1329、1337、1345、1353、1361、1369、1377、1385、1393、1401、1409、1417、1425、1433、1441、1449、1457、1465、1473、1481、1489、1497、1505、1513、1521、1529、1537、1545、1553、1561、1569、1577、1585、1593、1601、1609、1617、1625、1633、1641、1659、1673、1687、1701、1712、1723、1734、1742、1750、1758、1769、1780、1791、1799、1807、1815、1826、1837、1848、1856、1864、1872、1883、1894、1905、1913、1921、1929、1937、1945、1953、1961、1969、1977、1985、1993、2001、2009、2017、2025、2033、2041、2049、2057、2065、2073、2081、2089、2097、2105、2113、2121、2129、2137、2145、2153、2161、2169、2177、2185、2193、2201、2209、2217、2235、2249、2263、2277、2288、2299、2310、2318、2326、2334、2345、2356、2367、2375、2383、2391、2402、2413、2424、2432、2440、2448、2459、2470、2481、2489、2497、2505、2513、2521、2529、2537、2545、2553、2561、2569、2577、2585、2593、2601、2609、2617、2625、2633、2641、2649、2657、2665、2673、2681、2689、2697、2705、2713、2721、2729、2737、2745、2753、2761、2769、2777、2785、2793、2809、2823、2834、2845、2856、2864、2872、2880、2891、2902、2913、2921、2929、2937、2945、2953、2961、2969、2977、2985、2993、3001、3009、3017、3025、3033、3041、3049、3057、3065、3073 和 3081，如表 5A 和表 5B 中所示。

[0339] 所含的氨基酸序列包含 SEQ ID NO :475 的位置 X_{aa}^{6} 处的 Nle 残基的物质组合物的一些实例包括 :SEQ ID NO :607、638、651、1085、1099、1113、1127、1138、1149、1160、1168、1176、1184、1195、1206、1217、1225、1233、1241、1252、1263、1274、1282、1290、1298、1309、1320、1331、1339、1347、1355、1363、1371、1379、1387、1395、1403、1411、1419、1427、1435、1443、1451、1459、1467、1475、1483、1491、1499、1507、1515、1523、1531、1539、1547、1555、1563、1571、1579、1587、1595、1603、1611、1619、1627、1635、1643、1661、1675、1689、1703、1714、1725、1736、1744、1752、1760、1771、1782、1793、1801、1809、1817、1828、1839、1850、1858、1866、1874、1885、1896、1907、1915、1923、1931、1939、1947、1955、1963、1971、1979、1987、1995、2003、2011、2019、2027、2035、2043、2051、2059、2067、2075、2083、2091、2099、2107、2115、2123、2131、2139、2147、2155、2163、2171、2179、2187、2195、2203、2211、2219、

2237、2251、2265、2279、2290、2301、2312、2320、2328、2336、2347、2358、2369、2377、2385、2393、2404、2415、2426、2434、2442、2450、2461、2472、2483、2491、2499、2507、2515、2523、2531、2539、2547、2555、2563、2571、2579、2587、2595、2603、2611、2619、2627、2635、2643、2651、2659、2667、2675、2683、2691、2699、2707、2715、2723、2731、2739、2747、2755、2763、2771、2779、2787、2795、2811、2825、2836、2847、2858、2866、2874、2882、2893、2904、2915、2923、2931、2939、2947、2955、2963、2971、2979、2987、2995、3003、3011、3019、3027、3035、3043、3051、3059、3067、3075 和 3083，如表 5A 和表 5B 中所示。

[0340] 所含的氨基酸序列包含 SEQ ID NO :475 的位置 X_{aa}^{6} 处的 Nva 残基的物质组合物的一些实例包括 :SEQ ID NO :606、637、650、705、708、717、759、760、805、806、1084、1098、1112、1126、1137、1148、1159、1167、1175、1183、1194、1205、1216、1224、1232、1240、1251、1262、1273、1281、1289、1297、1308、1319、1330、1338、1346、1354、1362、1370、1378、1386、1394、1402、1410、1418、1426、1434、1442、1450、1458、1466、1474、1482、1490、1498、1506、1514、1522、1530、1538、1546、1554、1562、1570、1578、1586、1594、1602、1610、1618、1626、1634、1642、1660、1674、1688、1702、1713、1724、1735、1743、1751、1759、1770、1781、1792、1800、1808、1816、1827、1838、1849、1857、1865、1873、1884、1895、1906、1914、1922、1930、1938、1946、1954、1962、1970、1978、1986、1994、2002、2010、2018、2026、2034、2042、2050、2058、2066、2074、2082、2090、2098、2106、2114、2122、2130、2138、2146、2154、2162、2170、2178、2186、2194、2202、2210、2218、2236、2250、2264、2278、2289、2300、2311、2319、2327、2335、2346、2357、2368、2376、2384、2392、2403、2414、2425、2433、2441、2449、2460、2471、2482、2490、2498、2506、2514、2522、2530、2538、2546、2554、2562、2570、2578、2586、2594、2602、2610、2618、2626、2634、2642、2650、2658、2666、2674、2682、2690、2698、2706、2714、2722、2730、2738、2746、2754、2762、2770、2778、2786、2794、2810、2824、2835、2846、2857、2865、2873、2881、2892、2903、2914、2922、2930、2938、2946、2954、2962、2970、2978、2986、2994、3002、3010、3018、3026、3034、3042、3050、3058、3066、3074 和 3082，如表 5A 和表 5B 中所示。

[0341] 本发明组合物的其他示例性实施方案是未偶联的和偶联的 GpTx-1 的肽类似物，其具有如表 5A、表 5B 和表 31 中所示的氨基酸序列之一。本发明的分离多肽的特定实施方案包括具有选自以下的氨基酸序列的那些 :SEQ ID NO :3-134、136-305、307-386、388-474、515-527、532-588、590、591、593-1049 和 1062-3086，更具体地讲具有选自以下的氨基酸序列的那些 :SEQ ID NO :3-30、32-72、74-134、136-178、180-211、218-239、241-305、307-363、366-386、388-432、434-474、515-527、532-588、590、591、593-775、777、778、780-788、790-1049 和 1062-3086。进一步包含任选的接头部分和药学上可接受的共价连接的半衰期延长部分（如本文所述）的这些多肽中的任一者也涵盖在本发明的范围内。包含这些多肽（具有或不具有共价连接的半衰期延长部分）任一者和药学上可接受的载体的药物组合物也涵盖在本发明的范围内。

[0342] 表 5A. GpTx-1 和 GpTx-1 肽类似物的氨基酸序列。{H}- ＝ N 端的氨基 ;-{ 酰胺 } ＝酰胺化 C 端 ;Ac- ＝乙酰化 N 端 ;-{ 游离酸 } ＝羧化 C 端 ;{ 生物素 }- ＝生物素化 N 端 ;{4-Pen}- ＝ 4- 戊炔酰化 N- 端 ;{ 溴乙酰胺 -PEG11- 三唑 }- ＝共价偶联到 N 端的 3-(1-(1- 溴 -2- 氧代 -6,9,12,15,18,21,24,27,30,33,36- 十一氧杂 -3- 氮杂三十八

烷 -38- 基)-1H-1,2,3- 三唑 -4- 基) 丙酰基。

[0343]

命名	氨基酸序列	SEQ ID NO:
GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	1
[全 右 旋 异 构 体]GpTx-1(1-34)	{H}-dclgfmrkcipdndkccrpnlvcsrthkwckyvf-{酰胺}	2
[SeMet6]GpTx-1(1-34)	{H}-DCLGF[SeMet]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	3
[Ala12]GpTx-1(1-34)	{H}-DCLGFMRKCIPANDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	4
[Ala13]GpTx-1(1-34)	{H}-DCLGFMRKCIPDADKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	5
[Ala15]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDACCRPNLVCSRTHKWCKYVF-{ 酰胺}	6
[Ala20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPALVCSRTHKWCKYVF-{ 酰胺}	7
[Ala22]GpTx-1(1-34	{H}-DCLGFMRKCIPDNDKCCRPNLACSRTHKWCKYVF-{ 酰	8

[0344]

)	胺}	
[Ala25]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSATHKWCKYVF-{酰胺}	9
[Ala26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRAHKWCKYVF-{酰胺}	10
[Ala27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTAKWCKYVF-{酰胺}	11
[Ala28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHAWCKYVF-{酰胺}	12
[Ala31]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCAYVF-{酰胺}	13
[Ala32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKAVF-{酰胺}	14
[Ala33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYAF-{酰胺}	15
GpTx-1(1-34)-Ala	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFA-{酰胺}	16
Glu-GpTx-1(1-34)	{H}-EDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	17
[Glu1]GpTx-1(1-34)	{H}-ECLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	18
[Glu3]GpTx-1(1-34)	{H}-DCEGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	19
[Ala1]GpTx-1(1-34)	{H}-ACLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	20
[Ala3]GpTx-1(1-34)	{H}-DCAGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	21
[Ala5]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	22
[Ala6]GpTx-1(1-34)	{H}-DCLGFARKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	23
[Glu4]GpTx-1(1-34)	{H}-DCLEFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	24
[Glu8]GpTx-1(1-34)	{H}-DCLGFMRECIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	25
[Glu12]GpTx-1(1-34)	{H}-DCLGFMRKCIPENDKCCRPNLVCSRTHKWCKYVF-{酰胺}	26
[Glu13]GpTx-1(1-34)	{H}-DCLGFMRKCIPDEDKCCRPNLVCSRTHKWCKYVF-{酰胺}	27
[Glu15]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDECCRPNLVCSRTHKWCKYVF-{酰胺}	28
[Glu27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTEKWCKYVF-{酰胺}	29
[Glu29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKECKYVF-{酰胺}	30
[Glu31]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCEYVF-{酰胺}	31
[Glu32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKEVF-{酰胺}	32
[Glu33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYEF-{酰胺}	33
[Glu34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVE-{酰	34

[0345]

	胺}	
GpTx-1(1-34)-Glu	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFE-{酰胺}	35
Lys-GpTx-1(1-34)	{H}-KDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	36
[Lys1]GpTx-1(1-34)	{H}-KCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	37
[Lys3]GpTx-1(1-34)	{H}-DCKGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	38
[Lys4]GpTx-1(1-34)	{H}-DCLKFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	39
[Lys7]GpTx-1(1-34)	{H}-DCLGFMKKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	40
[Lys10]GpTx-1(1-34)	{H}-DCLGFMRKCKPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	41
[Lys12]GpTx-1(1-34)	{H}-DCLGFMRKCIPKNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	42
[Ala7]GpTx-1(1-34)	{H}-DCLGFMAKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	43
[Ala8]GpTx-1(1-34)	{H}-DCLGFMRACIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	44
[Ala10]GpTx-1(1-34)	{H}-DCLGFMRKCAPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	45
[Ala11]GpTx-1(1-34)	{H}-DCLGFMRKCIADNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	46
[Ala29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKACKYVF-{酰胺}	47
[Lys13]GpTx-1(1-34)	{H}-DCLGFMRKCIPDKDKCCRPNLVCSRTHKWCKYVF-{酰胺}	48
[Lys18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCKPNLVCSRTHKWCKYVF-{酰胺}	49
[Lys19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRKNLVCSRTHKWCKYVF-{酰胺}	50
[Lys20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPKLVCSRTHKWCKYVF-{酰胺}	51
[Lys22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLKCSRTHKWCKYVF-{酰胺}	52
[Lys25]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSKTHKWCKYVF-{酰胺}	53
[Lys26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRKHKWCKYVF-{酰胺}	54
[Lys27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTKKWCKYVF-{酰胺}	55
[Lys29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKKCKYVF-{酰胺}	56
[Lys32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKKVF-{酰胺}	57
[Lys33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYKF-{酰胺}	58
[Lys34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVK-{酰胺}	59
GpTx-1(1-34)-Lys	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFK-{酰胺}	60

[0346]

Arg-GpTx-1(1-34)	{H}-RDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	61
[Arg1]GpTx-1(1-34)	{H}-RCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	62
[Arg4]GpTx-1(1-34)	{H}-DCLRFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	63
[Arg6]GpTx-1(1-34)	{H}-DCLGFRRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	64
[Arg8]GpTx-1(1-34)	{H}-DCLGFMRRCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	65
[Arg10]GpTx-1(1-34)	{H}-DCLGFMRKCRPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	66
[Arg12]GpTx-1(1-34)	{H}-DCLGFMRKCIPRNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	67
[Arg15]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDRCCRPNLVCSRTHKWCKYVF-{酰胺}	68
[Arg20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPRLVCSRTHKWCKYVF-{酰胺}	69
[Arg26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRRHKWCKYVF-{酰胺}	70
[Arg27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTRKWCKYVF-{酰胺}	71
[Arg28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{酰胺}	72
[Arg31]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCRYVF-{酰胺}	73
[Arg33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYRF-{酰胺}	74
[Arg34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVR-{酰胺}	75
GpTx-1(1-34)-Arg	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFR-{酰胺}	76
[1-Nal1]GpTx-1(1-34)	{H}-[1-Nal]CLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	77
[1-Nal10]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	78
[1-Nal29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[1-Nal]CKYVF-{酰胺}	79
[1-Nal34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{酰胺}	80
[Trp1]GpTx-1(1-34)	{H}-WCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	81
[Trp5]GpTx-1(1-34)	{H}-DCLGWMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	82
[Trp10]GpTx-1(1-34)	{H}-DCLGFMRKCWPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	83
[Trp27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTWKWCKYVF-{酰胺}	84
[Trp32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKWVF-{酰胺}	85
[Trp34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVW-{酰胺}	86
GpTx-1(1-34)-Trp	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFW-{酰胺}	87

[0347]

[Ile5]GpTx-1(1-34)	{H}-DCLGIMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	88
[Phe6]GpTx-1(1-34)	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	89
[Asn10]GpTx-1(1-34)	{H}-DCLGFMRKCNPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	90
[Ser12]GpTx-1(1-34)	{H}-DCLGFMRKCIPSNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	91
[Gln15]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDQCCRPNLVCSRTHKWCKYVF-{ 酰胺}	92
[Ser-Ser19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRSSNLVCSRTHKWCKYVF-{ 酰胺}	93
[Lys26;Thr27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRKTKWCKYVF-{ 酰胺}	94
[Gln33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYQF-{ 酰胺}	95
[Ile34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVI-{ 酰胺}	96
[Tyr1]GpTx-1(1-34)	{H}-YCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	97
[Gln3]GpTx-1(1-34)	{H}-DCQGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	98
[Lys32;1-Nal34]GpTx-1(1-34)-Trp	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKKV[1-Nal]W-{酰胺}	99
Ala-GpTx-1(1-34)	{H}-ADCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	100
[Ala34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVA-{ 酰胺}	101
[Glu22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLECSRTHKWCKYVF-{ 酰胺}	102
[Arg13]GpTx-1(1-34)	{H}-DCLGFMRKCIPDRDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	103
[Arg29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKRCKYVF-{ 酰胺}	104
[1-Nal5]GpTx-1(1-34)	{H}-DCLG[1-Nal]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	105
Trp-GpTx-1(1-34)	{H}-WDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	106
GpTx-1(1-34)-游离酸	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 游离酸}	107
GpTx-1(2-34)	{H}-CLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	108
[Phe27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTFKWCKYVF-{ 酰胺}	109
[Tyr27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTYKWCKYVF-{ 酰胺}	110
[Leu27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTLKWCKYVF-{ 酰胺}	111
[Phe29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKFCKYVF-{ 酰胺}	112
[Tyr29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKYCKYVF-{ 酰胺}	113
[Leu29]GpTx-1(1-3	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKLCKYVF-{ 酰	114

[0348]

4)	胺}	
[Cit7]GpTx-1(1-34)	{H}-DCLGFM[Cit]KCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	115
[Cit18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCC[Cit]PNLVCSRTHKWCKYVF-{酰胺}	116
[Cit25]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCS[Cit]THKWCKYVF-{酰胺}	117
[Thr8]GpTx-1(1-34)	{H}-DCLGFMRTCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	118
[Asp10]GpTx-1(1-34)	{H}-DCLGFMRKCDPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	119
[Met21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNMVCSRTHKWCKYVF-{酰胺}	120
[Leu26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKWCKYVF-{ 酰胺}	121
[Leu34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVL-{ 酰胺}	122
[Nle6]GpTx-1(1-34)	{H}-DCLGF[Nle]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	123
[2-Abu6]GpTx-1(1-34)	{H}-DCLGF[2-Abu]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	124
[2-Abu2,17]GpTx-1(1-34)	{H}-D[2-Abu]LGFMRKCIPDNDKC[2-Abu]RPNLVCSRTHKWCKYVF-{酰胺}	125
[Gly19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRGNLVCSRTHKWCKYVF-{酰胺}	126
[Lys32]GpTx-1(1-34)-Trp	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKKVFW-{酰胺}	127
[2-Nal5]GpTx-1(1-34)	{H}-DCLG[2-Nal]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	128
[2-Nal29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[2-Nal]CKYVF-{酰胺}	129
[2-Nal34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[2-Nal]-{酰胺}	130
GpTx-1(1-34)-2-Nal	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[2-Nal]-{酰胺}	131
Ac-GpTx-1(1-34)	{Acetyl}DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	132
GpTx-1(1-34)-Trp-游离酸	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFW{游离酸}	133
[Glu18;desAsn20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCEGLVCSRTHKWCKYVF-{ 酰胺}	134
[2-Abu9,23]GpTx-1(1-34)	{H}-DCLGFMRK[2-Abu]IPDNDKCCRPNLV[2-Abu]SRTHKWCKYVF-{酰胺}	135
[2-Nal5,34]GpTx-1(1-34)	{H}-DCLG[2-Nal]MRKCIPDNDKCCRPNLVCSRTHKWCKYV[2-Nal]-{酰胺}	136
[2-Nal5;1-Nal34]GpTx-1(1-34)	{H}-DCLG[2-Nal]MRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{酰胺}	137
[1-Nal34]GpTx-1(1-34)-Trp	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]W-{酰胺}	138
[2-Nal34]GpTx-1(1-34)-Trp	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[2-Nal]W-{酰胺}	139
[Ala2,17]GpTx-1(1-34)	{H}-DALGFMRKCIPDNDKCARPNLVCSRTHKWCKYVF-{ 酰胺}	140
[Ala4]GpTx-1(1-34)	{H}-DCLAFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰	141

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	胺}	
[Ala24]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCARTHKWCKYVF-{酰胺}	142
[Glu5]GpTx-1(1-34)	{H}-DCLGEMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	143
[Glu6]GpTx-1(1-34)	{H}-DCLGFERKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	144
[Glu7]GpTx-1(1-34)	{H}-DCLGFMEKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	145
[Glu10]GpTx-1(1-34)	{H}-DCLGFMRKCEPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	146
[Glu11]GpTx-1(1-34)	{H}-DCLGFMRKCIEDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	147
[Glu18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCEPNLVCSRTHKWCKYVF-{酰胺}	148
[Glu20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPELVCSRTHKWCKYVF-{酰胺}	149
[Glu24]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCERTHKWCKYVF-{酰胺}	150
[Glu25]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSETHKWCKYVF-{酰胺}	151
[Glu26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSREHKWCKYVF-{酰胺}	152
[Glu28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	153
[Lys6]GpTx-1(1-34)	{H}-DCLGFKRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	154
[Arg3]GpTx-1(1-34)	{H}-DCRGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	155
[Arg5]GpTx-1(1-34)	{H}-DCLGRMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	156
[Arg19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRRNLVCSRTHKWCKYVF-{酰胺}	157
[Arg22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLRCSRTHKWCKYVF-{酰胺}	158
[Arg32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKRVF-{酰胺}	159
[1-Nal4]GpTx-1(1-34)	{H}-DCL[1-Nal]FMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	160
[1-Nal6]GpTx-1(1-34)	{H}-DCLGF[1-Nal]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	161
[1-Nal12]GpTx-1(1-34)	{H}-DCLGFMRKCIP[1-Nal]NDKCCRPNLVCSRTHKWCKYVF-{酰胺}	162
[1-Nal13]GpTx-1(1-34)	{H}-DCLGFMRKCIPD[1-Nal]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	163
[1-Nal20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRP[1-Nal]LVCSRTHKWCKYVF-{酰胺}	164
[1-Nal21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPN[1-Nal]VCSRTHKWCKYVF-{酰胺}	165
[1-Nal27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[1-Nal]KWCKYVF-{酰胺}	166
[1-Nal32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[1-Nal]VF-{酰胺}	167

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[1-Nal33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[1-Nal]F-{酰胺}	168
[Trp4]GpTx-1(1-34)	{H}-DCLWFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	169
[Trp6]GpTx-1(1-34)	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	170
[Trp11]GpTx-1(1-34)	{H}-DCLGFMRKCIWDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	171
[Trp12]GpTx-1(1-34)	{H}-DCLGFMRKCIPWNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	172
[Trp13]GpTx-1(1-34)	{H}-DCLGFMRKCIPDWDKCCRPNLVCSRTHKWCKYVF-{酰胺}	173
[Trp18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCWPNLVCSRTHKWCKYVF-{酰胺}	174
[Trp20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPWLVCSRTHKWCKYVF-{酰胺}	175
[Trp21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNWVCSRTHKWCKYVF-{酰胺}	176
[Trp22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLWCSRTHKWCKYVF-{酰胺}	177
[Trp26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRWHKWCKYVF-{酰胺}	178
[Trp31]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCWYVF-{酰胺}	179
[Trp33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYWF-{酰胺}	180
[Ser19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRSNLVCSRTHKWCKYVF-{酰胺}	181
[Gln33;1-Nal34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYQ[1-Nal]-{酰胺}	182
[Arg28;Gln33;1-Nal34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCKYQ[1-Nal]-{酰胺}	183
[Arg20;Gln33;1-Nal34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPRLVCSRTHKWCKYQ[1-Nal]-{酰胺}	184
[Arg20,28;Gln33;1-Nal34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPRLVCSRTHRWCKYQ[1-Nal]-{酰胺}	185
[Arg15;Gln33;1-Nal34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDRCCRPNLVCSRTHKWCKYQ[1-Nal]-{酰胺}	186
Arg-GpTx-1(1-34)-Trp	{H}-RDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFW-{酰胺}	187
[PE1]GpTx-1(1-34)	{H}-[PE]CLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	188
[Ile1]GpTx-1(1-34)	{H}-ICLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	189
[Pro1]GpTx-1(1-34)	{H}-PCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	190
[Ser1]GpTx-1(1-34)	{H}-SCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	191
[Thr1]GpTx-1(1-34)	{H}-TCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	192
[Leu12]GpTx-1(1-34)	{H}-DCLGFMRKCIPLNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	193
[Gly12]GpTx-1(1-34)	{H}-DCLGFMRKCIPGNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	194

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[Ile12]GpTx-1(1-34)	{H}-DCLGFMRKCIPINDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	195
[Thr12]GpTx-1(1-34)	{H}-DCLGFMRKCIPTNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	196
[Tyr12]GpTx-1(1-34)	{H}-DCLGFMRKCIPYNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	197
[Gly20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPGLVCSRTHKWCKYVF-{ 酰胺}	198
[Phe20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPFLVCSRTHKWCKYVF-{ 酰胺}	199
[Tyr20]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPYLVCSRTHKWCKYVF-{ 酰胺}	200
1-Nal-GpTx-1(1-34)	{H}-[1-Nal]DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	201
[Trp3]GpTx-1(1-34)	{H}-DCWGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	202
[1-Nal3]GpTx-1(1-34)	{H}-DC[1-Nal]GFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	203
[Lys5]GpTx-1(1-34)	{H}-DCLGKMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	204
[Trp7]GpTx-1(1-34)	{H}-DCLGFMWKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	205
[1-Nal7]GpTx-1(1-34)	{H}-DCLGFM[1-Nal]KCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	206
[Trp8]GpTx-1(1-34)	{H}-DCLGFMRWCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	207
[1-Nal8]GpTx-1(1-34)	{H}-DCLGFMR[1-Nal]CIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	208
[Lys11]GpTx-1(1-34)	{H}-DCLGFMRKCIKDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	209
[Arg11]GpTx-1(1-34)	{H}-DCLGFMRKCIRDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	210
[1-Nal11]GpTx-1(1-34)	{H}-DCLGFMRKCI[1-Nal]DNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	211
[Ala14]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNAKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	212
[Glu14]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNEKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	213
[Lys14]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNKKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	214
[Arg14]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNRKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	215
[Trp14]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNWKCCRPNLVCSRTHKWCKYVF-{酰胺}	216
[1-Nal14]GpTx-1(1-34)	{H}-DCLGFMRKCIPDN[1-Nal]KCCRPNLVCSRTHKWCKYVF-{酰胺}	217
[Trp15]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDWCCRPNLVCSRTHKWCKYVF-{酰胺}	218
[1-Nal15]GpTx-1(1-34)	{H}-DCLGFMRKCIPDND[1-Nal]CCRPNLVCSRTHKWCKYVF-{酰胺}	219
[Ala18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCAPNLVCSRTHKWCKYVF-{ 酰胺}	220
[1-Nal18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCC[1-Nal]PNLVCSRTHKWCKYV	221

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	F-{酰胺}	
[Ala19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRANLVCSRTHKWCKYVF-{酰胺}	222
[Glu19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRENLVCSRTHKWCKYVF-{酰胺}	223
[Trp19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRWNLVCSRTHKWCKYVF-{酰胺}	224
[1-Nal19]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCR[1-Nal]NLVCSRTHKWCKYVF-{酰胺}	225
[Ala21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNAVCSRTHKWCKYVF-{酰胺}	226
[Glu21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNEVCSRTHKWCKYVF-{酰胺}	227
[Lys21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNKVCSRTHKWCKYVF-{酰胺}	228
[Arg21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNRVCSRTHKWCKYVF-{酰胺}	229
[1-Nal22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNL[1-Nal]CSRTHKWCKYVF-{酰胺}	230
[Lys24]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCKRTHKWCKYVF-{酰胺}	231
[Arg24]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCRRTHKWCKYVF-{酰胺}	232
[Trp24]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCWRTHKWCKYVF-{酰胺}	233
[1-Nal24]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVC[1-Nal]RTHKWCKYVF-{酰胺}	234
[Trp25]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSWTHKWCKYVF-{酰胺}	235
[1-Nal25]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCS[1-Nal]THKWCKYVF-{酰胺}	236
[1-Nal26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSR[1-Nal]HKWCKYVF-{酰胺}	237
[Trp28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHWWCKYVF-{酰胺}	238
[1-Nal28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTH[1-Nal]WCKYVF-{酰胺}	239
[1-Nal31]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWC[1-Nal]YVF-{酰胺}	240
GpTx-1(1-34)-1-Nal	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[1Nal]-{酰胺}	241
[Bip5]GpTx-1(1-34)	{H}-DCLG[Bip]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	242
[Cha5]GpTx-1(1-34)	{H}-DCLG[Cha]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	243
[Leu6]GpTx-1(1-34)	{H}-DCLGFLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	244
[Cha6]GpTx-1(1-34)	{H}-DCLGF[Cha]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	245
[1'NMeW32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[1'NMeW]VF-{酰胺}	246
[pI-Phe5]GpTx-1(1-34)	{H}-DCLG[pI-Phe]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	247
[Ile33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYIF-{ 酰	248

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	胺}	
[pI-Phe33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[pI-Phe]F-{酰胺}	249
[1'NMeW33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[1'NMeW]F-{酰胺}	250
[Arg28;1-Nal32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCK[1-Nal]VF-{酰胺}	251
[Ala5;Trp33]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYWF-{酰胺}	252
[Ala5;Trp32]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKWVF-{酰胺}	253
[Ala5;1-Nal32]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCK[1-Nal]VF-{酰胺}	254
[Ala5;Leu26]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRLHKWCKYVF-{酰胺}	255
[Ala5;1-Nal6]GpTx-1(1-34)	{H}-DCLGA[1-Nal]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	256
[Ala5;Phe6]GpTx-1(1-34)	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	257
[Ala5;1-Nal33]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKY[1-Nal]F-{酰胺}	258
[Ala5;1-Nal10]GpTx-1(1-34)	{H}-DCLGAMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	259
[Ala5;Arg28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{ 酰胺}	260
[Ala5;Trp6]GpTx-1(1-34)	{H}-DCLGAWRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	261
[Ala5;Phe6;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRLHRWCKYVF-{ 酰胺}	262
[Ala5;Phe6;Leu26]GpTx-1(1-34)	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRLHKWCKYVF-{ 酰胺}	263
[1'NMeW5]GpTx-1(1-34)	{H}-DCLG[1'NMeW]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	264
[Gly5]GpTx-1(1-34)	{H}-DCLGGMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	265
[His5]GpTx-1(1-34)	{H}-DCLGHMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	266
[Leu5]GpTx-1(1-34)	{H}-DCLGLMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	267
[Met5]GpTx-1(1-34)	{H}-DCLGMMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	268
[Pro5]GpTx-1(1-34)	{H}-DCLGPMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	269
[Thr5]GpTx-1(1-34)	{H}-DCLGTMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰	270

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	胺}	
[Tyr5]GpTx-1(1-34)	{H}-DCLGYMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	271
[Val5]GpTx-1(1-34)	{H}-DCLGVMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	272
[D-Phe5]GpTx-1(1-34)	{H}-DCLGfMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	273
[NMeTrp5]GpTx-1(1-34)	{H}-DCLG[NMeTrp]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	274
[Phg5]GpTx-1(1-34)	{H}-DCLG[Phg]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	275
[4CO2-F5]GpTx-1(1-34)	{H}-DCLG[4CO2-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	276
[2PAL5]GpTx-1(1-34)	{H}-DCLG[2PAL]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	277
[Asn6]GpTx-1(1-34)	{H}-DCLGFNRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	278
[Gln6]GpTx-1(1-34)	{H}-DCLGFQRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	279
[Gly6]GpTx-1(1-34)	{H}-DCLGFGRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	280
[His6]GpTx-1(1-34)	{H}-DCLGFHRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	281
[Ile6]GpTx-1(1-34)	{H}-DCLGFIRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	282
[Pro6]GpTx-1(1-34)	{H}-DCLGFPRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	283
[Ser6]GpTx-1(1-34)	{H}-DCLGFSRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	284
[Thr6]GpTx-1(1-34)	{H}-DCLGFTRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	285
[Tyr6]GpTx-1(1-34)	{H}-DCLGFYRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	286
[Val6]GpTx-1(1-34)	{H}-DCLGFVRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	287
[Phg6]GpTx-1(1-34)	{H}-DCLGF[Phg]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	288
[NMeTrp6]GpTx-1(1-34)	{H}-DCLGF[NMeTrp]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	289
[NMePhe6]GpTx-1(1-34)	{H}-DCLGF[NMePhe]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	290
[pI-Phe6]GpTx-1(1-34)	{H}-DCLGF[pI-Phe]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	291
[1'NMeW6]GpTx-1(1-34)	{H}-DCLGF[1'NMeW]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	292
[4CO2-F6]GpTx-1(1-34)	{H}-DCLGF[4CO2-F]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	293
[2PAL6]GpTx-1(1-34)	{H}-DCLGF[2PAL]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	294
[K(Me2)7]GpTx-1(1-34)	{H}-DCLGFM[K(Me2)]KCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	295
[SDMA7]GpTx-1(1-34)	{H}-DCLGFM[SDMA]KCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	296
[SDMA8]GpTx-1(1-	{H}-DCLGFMR[SDMA]CIPDNDKCCRPNLVCSRTHKWCKY	297

[0355]

34)	VF-{酰胺}	
[K(Me2)8]GpTx-1(1-34)	{H}-DCLGFMR[K(Me2)]CIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	298
[Tyr10]GpTx-1(1-34)	{H}-DCLGFMRKCYPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	299
[NMeTrp10]GpTx-1(1-34)	{H}-DCLGFMRKC[NMeTrp]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	300
[Val10]GpTx-1(1-34)	{H}-DCLGFMRKCVPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	301
[Phe10]GpTx-1(1-34)	{H}-DCLGFMRKCFPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	302
[Leu10]GpTx-1(1-34)	{H}-DCLGFMRKCLPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	303
[His10]GpTx-1(1-34)	{H}-DCLGFMRKCHPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	304
[Ser10]GpTx-1(1-34)	{H}-DCLGFMRKCSPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	305
[Met10]GpTx-1(1-34)	{H}-DCLGFMRKCMPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	307
[Pro10]GpTx-1(1-34)	{H}-DCLGFMRKCPPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	308
[Thr10]GpTx-1(1-34)	{H}-DCLGFMRKCTPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	309
[4CO2-F10]GpTx-1(1-34)	{H}-DCLGFMRKC[4CO2-F]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	310
[2PAL10]GpTx-1(1-34)	{H}-DCLGFMRKC[2PAL]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	311
[SDMA15]GpTx-1(1-34)	{H}-DCLGFMRKCIPDND[SDMA]CCRPNLVCSRTHKWCKYVF-{酰胺}	312
[K(Me2)15]GpTx-1(1-34)	{H}-DCLGFMRKCIPDND[K(Me2)]CCRPNLVCSRTHKWCKYVF-{酰胺}	313
[K(Me2)18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCC[K(Me2)]PNLVCSRTHKWCKYVF-{酰胺}	314
[SDMA18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCC[SDMA]PNLVCSRTHKWCKYVF-{酰胺}	315
[2PAL18]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCC[2PAL]PNLVCSRTHKWCKYVF-{酰胺}	316
[4CO2-F21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPN[4CO2-F]VCSRTHKWCKYVF-{酰胺}	317
[2PAL21]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPN[2PAL]VCSRTHKWCKYVF-{酰胺}	318
[Phe22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLFCSRTHKWCKYVF-{ 酰胺}	319
[Pro22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLPCSRTHKWCKYVF-{ 酰胺}	320
[Ile22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLICSRTHKWCKYVF-{ 酰胺}	321
[Leu22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLLCSRTHKWCKYVF-{ 酰胺}	322
[Ser22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLSCSRTHKWCKYVF-{ 酰胺}	323
[Gly22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLGCSRTHKWCKYVF-{ 酰胺}	324
[Asn22]GpTx-1(1-3	{H}-DCLGFMRKCIPDNDKCCRPNLNCSRTHKWCKYVF-{ 酰	325

[0356]

4)	胺}	
[His22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLHCSRTHKWCKYVF-{酰胺}	326
[Asp22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLDCSRTHKWCKYVF-{酰胺}	327
[NMePhe22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNL[NMePhe]CSRTHKWCKYVF-{酰胺}	328
[Thr22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLTCSRTHKWCKYVF-{酰胺}	329
[Phg22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNL[Phg]CSRTHKWCKYVF-{酰胺}	330
[Tyr22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLYCSRTHKWCKYVF-{酰胺}	331
[Met22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLMCSRTHKWCKYVF-{酰胺}	332
[4CO2-F22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNL[4CO2-F]CSRTHKWCKYVF-{酰胺}	333
[2PAL22]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNL[2PAL]CSRTHKWCKYVF-{酰胺}	334
[K(Me2)25]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCS[K(Me2)]THKWCKYVF-{酰胺}	335
[SDMA25]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCS[SDMA]THKWCKYVF-{酰胺}	336
[His26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRHHKWCKYVF-{酰胺}	337
[Ser26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRSHKWCKYVF-{酰胺}	338
[Gln26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRQHKWCKYVF-{酰胺}	339
[Tyr26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRYHKWCKYVF-{酰胺}	340
[Phe26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRFHKWCKYVF-{酰胺}	341
[Asn26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRNHKWCKYVF-{酰胺}	342
[Gly26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRGHKWCKYVF-{酰胺}	343
[Val26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRVHKWCKYVF-{酰胺}	344
[Pro26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRPHKWCKYVF-{酰胺}	345
[Met26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRMHKWCKYVF-{酰胺}	346
[Asp26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRDHKWCKYVF-{酰胺}	347
[Ile26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRIHKWCKYVF-{酰胺}	348
[2PAL26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSR[2PAL]HKWCKYVF-{酰胺}	349
[4CO2-F26]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSR[4CO2-F]HKWCKYVF-{酰胺}	350
[4CO2-F27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[4CO2-F]KWCKYVF-{酰胺}	351

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[2PAL27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[2PAL]KWCKYVF-{酰胺}	352
[SDMA27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[SDMA]KWCKYVF-{酰胺}	353
[K(Me2)27]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[K(Me2)]KWCKYVF-{酰胺}	354
[K(Me2)28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTH[K(Me2)]WCKYVF-{酰胺}	355
[SDMA28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTH[SDMA]WCKYVF-{酰胺}	356
[NMeTrp29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[NMeTrp]CKYVF-{酰胺}	357
[pI-Phe29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[pI-Phe]CKYVF-{酰胺}	358
[NMePhe29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[NMePhe]CKYVF-{酰胺}	359
[Bip29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[Bip]CKYVF-{酰胺}	360
[1'NMeW29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[1'NMeW]CKYVF-{酰胺}	361
[Phg29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[Phg]CKYVF-{酰胺}	362
[4CO2-F29]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[4CO2-F]CKYVF-{酰胺}	363
[2PAL31]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWC[2PAL]YVF-{酰胺}	364
[SDMA31]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWC[SDMA]YVF-{酰胺}	365
[Gln32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKQVF-{酰胺}	366
[Ile32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKIVF-{酰胺}	367
[Met32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKMVF-{酰胺}	368
[Thr32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKTVF-{酰胺}	369
[NMePhe32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[NMePhe]VF-{酰胺}	370
[NMeTrp32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[NMeTrp]VF-{酰胺}	371
[Val32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKVVF-{酰胺}	372
[Leu32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKLVF-{酰胺}	373
[Phg32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[Phg]VF-{酰胺}	374
[Cha32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[Cha]VF-{酰胺}	375
[Bip32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[Bip]VF-{酰胺}	376
[Phe32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKFVF-{酰胺}	377
[Gly32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKGVF-{酰胺}	378

[0358]

[Asn32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKNVF-{酰胺}	379
[His32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKHVF-{酰胺}	380
[pI-Phe32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[pI-Phe]VF-{酰胺}	381
[Ser32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKSVF-{酰胺}	382
[Pro32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKPVF-{酰胺}	383
[2PAL32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[2PAL]VF-{酰胺}	384
[4CO2-F32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[4CO2-F]VF-{酰胺}	385
[Cha33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[Cha]F-{酰胺}	386
[NMePhe33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[NMePhe]F-{酰胺}	388
[NMeTrp33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[NMeTrp]F-{酰胺}	389
[Phe33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYFF-{酰胺}	390
[Met33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYMF-{酰胺}	391
[His33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYHF-{酰胺}	392
[Phg33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[Phg]F-{酰胺}	393
[Asn33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYNF-{酰胺}	394
[Asp33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYDF-{酰胺}	395
[Thr33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYTF-{酰胺}	396
[Ser33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYSF-{酰胺}	397
[Pro33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYPF-{酰胺}	398
[Tyr33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYYF-{酰胺}	399
[Leu33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYLF-{酰胺}	400
[Gly33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYGF-{酰胺}	401
[2PAL33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[2PAL]F-{酰胺}	402
[4CO2-F33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[4CO2-F]F-{酰胺}	403
[D-Phe34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVf-{酰胺}	404
[Cha34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[Cha]-{酰胺}	405
[Phg34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[Phg]-	406

[0359]

	{酰胺}	
[NMeTrp34]GpTx-1 (1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[NMeTrp]-{酰胺}	407
[NMePhe34]GpTx-1 (1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[NMePhe]-{酰胺}	408
[1'NMeW34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[1'NMeW]-{酰胺}	409
[4CO2-F34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[4CO2-F]-{酰胺}	410
[2PAL34]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[2PAL]-{酰胺}	411
GpTx-1(1-34)-2-Nal	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[2-Nal]-{酰胺}	412
GpTx-1(1-34)-4CO2-F	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[4CO2-F]-{酰胺}	413
GpTx-1(1-34)-2PAL	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[2PAL]-{酰胺}	414
GpTx-1(1-33)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV-{ 酰胺}	415
GpTx-1(1-32)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY-{酰胺}	416
GpTx-1(1-31)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK-{酰胺}	417
GpTx-1(1-30)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWC-{酰胺}	418
[Ala5;Glu33]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYEF-{ 酰胺}	419
[Ala5;Arg28;1-Nal33]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHRWCKY[1-Nal]F-{酰胺}	420
[Ala5;1-Nal20]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRP[1-Nal]LVCSRTHKWCKYVF-{酰胺}	421
[Ala5;Trp20]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPWLVCSRTHKWCKYVF-{ 酰胺}	422
[Ala5;Trp12]GpTx-1(1-34)	{H}-DCLGAMRKCIPWNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	423
[Trp4;Ala5]GpTx-1(1-34)	{H}-DCLWAMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	424
[1-Nal1;Ala5]GpTx-1(1-34)	{H}-[1-Nal]CLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	425
[Ala5,33]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYAF-{ 酰胺}	426
[Ala5;1-Nal13]GpTx-1(1-34)	{H}-DCLGAMRKCIPD[1-Nal]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	427
[Ala5;Trp13]GpTx-1(1-34)	{H}-DCLGAMRKCIPDWDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	428
[Glu4;Ala5]GpTx-1(1-34)	{H}-DCLEAMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	429
[Ala5;Glu34]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYVE-{酰胺}	430
[Ala5,34]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYVA-{酰胺}	431
[Ala5,32]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKAVF-{ 酰胺}	432
[Ala5,31]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCAYVF-{ 酰胺}	433
[Ala5,29]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKACKYVF-{ 酰胺}	434

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[Ala5;Glu28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	435
[Ala5;Glu7]GpTx-1(1-34)	{H}-DCLGAMEKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	436
[Ala5;Glu29]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKECKYVF-{酰胺}	437
[Ala5;Glu25]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSETHKWCKYVF-{酰胺}	438
[Ala5;Glu15]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDECCRPNLVCSRTHKWCKYVF-{酰胺}	439
[1-Nal10;Trp32]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKWVF-{酰胺}	440
[1-Nal10;Arg28]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHRWCKYVF-{酰胺}	441
[Arg28;1-Nal33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCKY[1-Nal]F-{酰胺}	442
[Arg28;Trp32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCKWVF-{酰胺}	443
[Arg28;Trp33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCKYWF-{酰胺}	444
[Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHRWCKYVF-{酰胺}	445
[Leu26;Trp32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKWCKWVF-{酰胺}	446
[Leu26;Trp33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKWCKYWF-{酰胺}	447
[Trp6;Arg28]GpTx-1(1-34)	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{酰胺}	448
[Trp6,32]GpTx-1(1-34)	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRTHKWCKWVF-{酰胺}	449
[Trp32,33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKWWF-{酰胺}	450
[1-Nal6;Trp32]GpTx-1(1-34)	{H}-DCLGF[1-Nal]RKCIPDNDKCCRPNLVCSRTHKWCKWVF-{酰胺}	451
[1-Nal10,32]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCK[1-Nal]VF-{酰胺}	452
[Leu26;1-Nal32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKWCK[1-Nal]VF-{酰胺}	453
[1-Nal6;Arg28]GpTx-1(1-34)	{H}-DCLGF[1-Nal]RKCIPDNDKCCRPNLVCSRTHRWCKYVF-{酰胺}	454
[Trp32;1-Nal33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKW[1-Nal]F-{酰胺}	455
[Trp6;Leu26]GpTx-1(1-34)	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRLHKWCKYVF-{酰胺}	456
[1-Nal10;Leu26]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRLHKWCKYVF-{酰胺}	457
[Trp6;1-Nal10]GpTx-1(1-34)	{H}-DCLGFWRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	458
[1-Nal10;Trp12]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PWNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	459
[1-Nal32;Trp33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[1-Nal]WF-{酰胺}	460
[Trp6;1-Nal33]GpTx-1(1-34)	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRTHKWCKY[1-Nal]F-{酰胺}	461

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[1-Nal10,33]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKY[1-Nal]F-{酰胺}	462
[Leu26;1-Nal33]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKWCKY[1-Nal]F-{酰胺}	463
Trp-[1-Nal10]GpTx-1(1-34)	{H}-WDCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	464
[Trp1;1-Nal10]GpTx-1(1-34)	{H}-WCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	465
[1-Nal1,10]GpTx-1(1-34)	{H}-[1-Nal]CLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	466
GpTx-2	{H}-DCLGFMRKCSPDNDKCCRPNLVCSRKHKWCKYEI-{酰胺}	467
GpTx-3	{H}-DCLGWFKGCDPDNDKCCEGYKCNRRDKWCKYKL-{酰胺}	468
GpTx-4	{H}-DCLGWFKGCDPDNDKCCENYKCNRREQWCKYKL-{酰胺}	469
GpTx-5(1-35)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFK-{游离酸}	470
GpTx-6(1-35)	{H}-DCLGWFKGCDPDNDKCCEGYKCNRRDKWCKYKLWK-{游离酸}	471
GpTx-6(1-34)	{H}-DCLGWFKGCDPDNDKCCEGYKCNRRDKWCKYKLW-{游离酸}	472
GpTx-7(1-35)	{H}-DCLGWFKGCDPDNDKCCENYKCNRRDKWCKYKLWK-{游离酸}	473
GpTx-7(1-34)	{H}-DCLGWFKGCDPDNDKCCENYKCNRRDKWCKYKLW-{游离酸}	474
[Phe6;Atz(20kDa PEG)13]GpTx-1(1-34)	{H}-DCLGFFRKCIPD[Atz(20kDa PEG)]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	590
[Phe6;Atz13]GpTx-1(1-34)	DCLGFFRKCIPD[Atz]DKCCRPNLVCSRTHKWCKYVF{酰胺}	591
[Phe6,Atz(20kDa Peg)28]GpTx-1(1-34)	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTH[Atz(20kDa PEG)]WCKYVF-{酰胺}	593
[Phe6,Atz(20kDa Peg)22]GpTx-1(1-34)	{H}-DCLGFFRKCIPDNDKCCRPNL[Atz(20kDa PEG)]CSRTHKWCKYVF-{酰胺}	594
[1-Nal10;Glu29]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKECKYVF-{酰胺}	595
[3Pal5]GpTx-1(1-34)	{H}-DCLG[3Pal]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	596
[Ala5;Phe6;Tyr13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDYDKCCRPNLVCSRTHRWCKYVF-{游离酸}	597
[Ala5;Leu6;Gly28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHGWCKYVF-{游离酸}	598
[Ala5;Leu6;His28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHHWCKYVF-{游离酸}	599
[Ala5;Leu6]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{游离酸}	600
[Ala5;Leu6;Asn28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHNWCKYVF-{游离酸}	601
[D-Ala5;Phe6]GpTx-1(1-34)	{H}-DCLGaFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	602

[0362]

[bAla5;Phe6]GpTx-1(1-34)	{H}-DCLG[bAla]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	603
[Aib5;Phe6]GpTx-1(1-34)	{H}-DCLG[Aib]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	604
[2-Abu5;Phe6]GpTx-1(1-34)	{H}-DCLG[2-Abu]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	605
[Nva5;Phe6]GpTx-1(1-34)	{H}-DCLG[Nva]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	606
[Nle5;Phe6]GpTx-1(1-34)	{H}-DCLG[Nle]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	607
[OctylG5;Phe6]GpTx-1(1-34)	{H}-DCLG[OctylG]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	608
[Tle5;Phe6]GpTx-1(1-34)	{H}-DCLG[Tle]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	609
[hLeu5;Phe6]GpTx-1(1-34)	{H}-DCLG[hLeu]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	610
[Met5;Phe6]GpTx-1(1-34)	{H}-DCLGMFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	611
[Leu5;Phe6]GpTx-1(1-34)	{H}-DCLGLFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	612
[3Pal5;Phe6]GpTx-1(1-34)	{H}-DCLG[3Pal]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	613
[Thi5;Phe6]GpTx-1(1-34)	{H}-DCLG[Thi]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	614
[Cpg5;Phe6]GpTx-1(1-34)	{H}-DCLG[Cpg]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	615
[Chg5;Phe6]GpTx-1(1-34)	{H}-DCLG[Chg]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	616
[Ser5;Phe6]GpTx-1(1-34)	{H}-DCLGSFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	617
[Val5;Phe6]GpTx-1(1-34)	{H}-DCLGVFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	618
[4-Bz-F5;Phe6]GpTx-1(1-34)	{H}-DCLG[4-Bz-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	619
[DiMeO-F5;Phe6]GpTx-1(1-34)	{H}-DCLG[DiMeO-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	620
[DiCl-F5;Phe6]GpTx-1(1-34)	{H}-DCLG[DiCl-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	621
[pI-Phe5;Phe6]GpTx-1(1-34)	{H}-DCLG[pI-Phe]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	622
[4CF3-F5;Phe6]GpTx-1(1-34)	{H}-DCLG[4CF3-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	623
[4-F-F5;Phe6]GpTx-1(1-34)	{H}-DCLG[4-F-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	624
[4-Me-F5;Phe6]GpTx-1(1-34)	{H}-DCLG[4-Me-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	625
[4tBu-F5;Phe6]GpTx-1(1-34)	{H}-DCLG[4tBu-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	626
[NMeVal5;Phe6]GpTx-1(1-34)	{H}-DCLG[NMeVal]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	627
[NMeLeu5;Phe6]GpTx-1(1-34)	{H}-DCLG[NMeLeu]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	628
[NMePhe5;Phe6]GpTx-1(1-34)	{H}-DCLG[NMePhe]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	629
[2-Cl-F5;Phe6]GpTx	{H}-DCLG[2-Cl-F]FRKCIPDNDKCCRPNLVCSRTHKWCKYV	630

[0363]

-1(1-34)	F-{酰胺}	
[hPhe5;Phe6]GpTx-1(1-34)	{H}-DCLG[hPhe]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	631
[Sar5;Phe6]GpTx-1(1-34)	{H}-DCLG[Sar]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	632
[D-Ala5;Leu6]GpTx-1(1-34)	{H}-DCLGaLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	633
[bAla5;Leu6]GpTx-1(1-34)	{H}-DCLG[bAla]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	634
[Aib5;Leu6]GpTx-1(1-34)	{H}-DCLG[Aib]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	635
[2-Abu5;Leu6]GpTx-1(1-34)	{H}-DCLG[2-Abu]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	636
[Nva5;Leu6]GpTx-1(1-34)	{H}-DCLG[Nva]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	637
[Nle5;Leu6]GpTx-1(1-34)	{H}-DCLG[Nle]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	638
[OctylG5;Leu6]GpTx-1(1-34)	{H}-DCLG[OctylG]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	639
[Ala5,Phe6,Pra13,Leu26,Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPD[Pra]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	640
[Met5;Leu6]GpTx-1(1-34)	{H}-DCLGMLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	641
[3Pal5;Leu6]GpTx-1(1-34)	{H}-DCLG[3Pal]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	642
[Ser5;Leu6]GpTx-1(1-34)	{H}-DCLGSLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	643
[Val5;Leu6]GpTx-1(1-34)	{H}-DCLGVLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	644
[DiMeO-F5;Leu6]GpTx-1(1-34)	{H}-DCLG[DiMeO-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	645
[Sar5;Leu6]GpTx-1(1-34)	{H}-DCLG[Sar]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	646
[D-Ala5]GpTx-1(1-34)	{H}-DCLGaMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	647
[bAla5]GpTx-1(1-34)	{H}-DCLG[bAla]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	648
[2-Abu5]GpTx-1(1-34)	{H}-DCLG[2-Abu]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	649
[Nva5]GpTx-1(1-34)	{H}-DCLG[Nva]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	650
[Nle5]GpTx-1(1-34)	{H}-DCLG[Nle]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	651
[DiMeO-F5]GpTx-1(1-34)	{H}-DCLG[DiMeO-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	652
[DiCl-F5]GpTx-1(1-34)	{H}-DCLG[DiCl-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	653
[4CF3-F5]GpTx-1(1-34)	{H}-DCLG[4CF3-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	654
[4-F-F5]GpTx-1(1-34)	{H}-DCLG[4-F-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	655
[NMeVal5]GpTx-1(1-34)	{H}-DCLG[NMeVal]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	656
[NMePhe5]GpTx-1(	{H}-DCLG[NMePhe]MRKCIPDNDKCCRPNLVCSRTHKWCK	657

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1-34)	YVF-{酰胺}	
[Sar5]GpTx-1(1-34)	{H}-DCLG[Sar]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	658
[Tle5;Leu6]GpTx-1(1-34)	{H}-DCLG[Tle]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	659
[hLeu5;Leu6]GpTx-1(1-34)	{H}-DCLG[hLeu]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	660
[Leu5,6]GpTx-1(1-34)	{H}-DCLGLLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	661
[Thi5;Leu6]GpTx-1(1-34)	{H}-DCLG[Thi]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	662
[Cpg5;Leu6]GpTx-1(1-34)	{H}-DCLG[Cpg]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	663
[Chg5;Leu6]GpTx-1(1-34)	{H}-DCLG[Chg]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	664
[4-Bz-F5;Leu6]GpTx-1(1-34)	{H}-DCLG[4-Bz-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	665
[DiCl-F5;Leu6]GpTx-1(1-34)	{H}-DCLG[DiCl-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	666
[pI-Phe5;Leu6]GpTx-1(1-34)	{H}-DCLG[pI-Phe]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	667
[4CF3-F5;Leu6]GpTx-1(1-34)	{H}-DCLG[4CF3-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	668
[4-F-F5;Leu6]GpTx-1(1-34)	{H}-DCLG[4-F-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	669
[4-Me-F5;Leu6]GpTx-1(1-34)	{H}-DCLG[4-Me-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	670
[4tBu-F5;Leu6]GpTx-1(1-34)	{H}-DCLG[4tBu-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	671
[NMeVal5;Leu6]GpTx-1(1-34)	{H}-DCLG[NMeVal]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	672
[NMeLeu5;Leu6]GpTx-1(1-34)	{H}-DCLG[NMeLeu]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	673
[NMePhe5;Leu6]GpTx-1(1-34)	{H}-DCLG[NMePhe]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	674
[2-Cl-F5;Leu6]GpTx-1(1-34)	{H}-DCLG[2-Cl-F]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	675
[hPhe5;Leu6]GpTx-1(1-34)	{H}-DCLG[hPhe]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	676
[OctylG5]GpTx-1(1-34)	{H}-DCLG[OctylG]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	677
[Tle5]GpTx-1(1-34)	{H}-DCLG[Tle]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	678
[hLeu5]GpTx-1(1-34)	{H}-DCLG[hLeu]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	679
[Cha5;Phe6]GpTx-1(1-34)	{H}-DCLG[Cha]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	680
[Cha5;Leu6]GpTx-1(1-34)	{H}-DCLG[Cha]LRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	681
[Thi5]GpTx-1(1-34)	{H}-DCLG[Thi]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	682
[Cpg5]GpTx-1(1-34)	{H}-DCLG[Cpg]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	683
[Chg5]GpTx-1(1-34)	{H}-DCLG[Chg]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	684

[0365]

[4-Bz-F5]GpTx-1(1-34)	{H}-DCLG[4-Bz-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	685
[4-Me-F5]GpTx-1(1-34)	{H}-DCLG[4-Me-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	686
[4tBu-F5]GpTx-1(1-34)	{H}-DCLG[4tBu-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	687
[NMeLeu5]GpTx-1(1-34)	{H}-DCLG[NMeLeu]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	688
[2-Cl-F5]GpTx-1(1-34)	{H}-DCLG[2-Cl-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	689
[hPhe5]GpTx-1(1-34)	{H}-DCLG[hPhe]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	690
[Ala5;Glu28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	691
[Ala5;1'NMeW32]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCK[1'NMeW]VF-{酰胺}	692
[Met5;1'NMeW32]GpTx-1(1-34)	{H}-DCLGMMRKCIPDNDKCCRPNLVCSRTHKWCK[1'NMeW]VF-{酰胺}	693
[Arg4;Met5]GpTx-1(1-34)	{H}-DCLRMMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	694
[Ser19;1'NMeW32]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRSNLVCSRTHKWCK[1'NMeW]VF-{酰胺}	695
[Ala5;Leu6]GpTx-1(1-34)	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	696
[Ala5;Gly6]GpTx-1(1-34)	{H}-DCLGAGRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	697
[Ala5;Tyr6]GpTx-1(1-34)	{H}-DCLGAYRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	698
[Ala5;1'NMeW6]GpTx-1(1-34)	{H}-DCLGA[1'NMeW]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	699
[Ala5;Asp10]GpTx-1(1-34)	{H}-DCLGAMRKCDPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	700
[Ala5;Asp10;Glu12]GpTx-1(1-34)	{H}-DCLGAMRKCDPENDKCCRPNLVCSRTHKWCKYVF-{酰胺}	701
[Ala5;Phe6;Asp10]GpTx-1(1-34)	{H}-DCLGAFRKCDPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	702
[Ala5;Phe6;Glu12]GpTx-1(1-34)	{H}-DCLGAFRKCIPENDKCCRPNLVCSRTHKWCKYVF-{酰胺}	703
[Val5;Glu28]GpTx-1(1-34)	{H}-DCLGVMRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	704
[Nva5;Glu28]GpTx-1(1-34)	{H}-DCLG[Nva]MRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	705
[2-Abu5;Glu28]GpTx-1(1-34)	{H}-DCLG[2-Abu]MRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	706
[2-Abu5;Leu6;Glu28]GpTx-1(1-34)	{H}-DCLG[2-Abu]LRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	707
[Nva5;Leu6;Glu28]GpTx-1(1-34)	{H}-DCLG[Nva]LRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	708
[Val5;Leu6;Glu28]GpTx-1(1-34)	{H}-DCLGVLRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	709
[Val5;Asp10]GpTx-1(1-34)	{H}-DCLGVMRKCDPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	710
[Val5;Glu12]GpTx-1(1-34)	{H}-DCLGVMRKCIPENDKCCRPNLVCSRTHKWCKYVF-{酰胺}	711

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[Val5;Asp10;Glu12]GpTx-1(1-34)	{H}-DCLGVMRKCDPENDKCCRPNLVCSRTHKWCKYVF-{酰胺}	712
[Val5;Cit25]GpTx-1(1-34)	{H}-DCLGVMRKCIPDNDKCCRPNLVCS[Cit]THKWCKYVF-{酰胺}	713
[Thr5;Asp10]GpTx-1(1-34)	{H}-DCLGTMRKCDPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	714
[Ala5;Gly28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHGWCKYVF-{酰胺}	715
[2-Abu2,17;Ala5;Asp10]GpTx-1(1-34)	{H}-D[2-Abu]LGAMRKCDPDNDKC[2-Abu]RPNLVCSRTHKWCKYVF-{酰胺}	716
[2-Abu2,17;Nva5;Leu6;Glu28]GpTx-1(1-34)	{H}-D[2-Abu]LG[Nva]LRKCIPDNDKC[2-Abu]RPNLVCSRTHEWCKYVF-{酰胺}	717
[2-Abu2,5,17;Leu6;Glu28]GpTx-1(1-34)	{H}-D[2-Abu]LG[2-Abu]LRKCIPDNDKC[2-Abu]RPNLVCSRTHEWCKYVF-{酰胺}	718
[2-Abu2,17;Ala5;Leu6;Glu28]GpTx-1(1-34)	{H}-D[2-Abu]LGALRKCIPDNDKC[2-Abu]RPNLVCSRTHEWCKYVF-{酰胺}	719
[2-Abu2,17;Val5;Leu6;Glu28]GpTx-1(1-34)	{H}-D[2-Abu]LGVLRKCIPDNDKC[2-Abu]RPNLVCSRTHEWCKYVF-{酰胺}	720
[Ala5;Nle6]GpTx-1(1-34)	{H}-DCLGA[Nle]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	721
[Ala5;Nle6;Glu10]GpTx-1(1-34)	{H}-DCLGA[Nle]RKCEPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	722
[Ala5;Leu6;Glu10]GpTx-1(1-34)	{H}-DCLGALRKCEPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	723
[Ala5;Phe6;Glu10]GpTx-1(1-34)	{H}-DCLGAFRKCEPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	724
[Ala5;Nle6;Glu12]GpTx-1(1-34)	{H}-DCLGA[Nle]RKCIPENDKCCRPNLVCSRTHKWCKYVF-{酰胺}	725
[Ala5;Leu6;Glu12]GpTx-1(1-34)	{H}-DCLGALRKCIPENDKCCRPNLVCSRTHKWCKYVF-{酰胺}	726
[Ala5;Nle6;Glu28]GpTx-1(1-34)	{H}-DCLGA[Nle]RKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	727
[Ala5;Leu6;Glu28]GpTx-1(1-34)	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	728
[Ala5;Phe6;Glu28]GpTx-1(1-34)	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	729
[Ala5,25;Nle6]GpTx-1(1-34)	{H}-DCLGA[Nle]RKCIPDNDKCCRPNLVCSATHKWCKYVF-{酰胺}	730
[Ala5,25;Leu6]GpTx-1(1-34)	{H}-DCLGALRKCIPDNDKCCRPNLVCSATHKWCKYVF-{酰胺}	731
[Ala5,25;Phe6]GpTx-1(1-34)	{H}-DCLGAFRKCIPDNDKCCRPNLVCSATHKWCKYVF-{酰胺}	732
[Ala5;Nle6;Glu25]GpTx-1(1-34)	{H}-DCLGA[Nle]RKCIPDNDKCCRPNLVCSETHKWCKYVF-{酰胺}	733
[Ala5;Leu6;Glu25]GpTx-1(1-34)	{H}-DCLGALRKCIPDNDKCCRPNLVCSETHKWCKYVF-{酰胺}	734
[Ala5;Phe6;Glu25]GpTx-1(1-34)	{H}-DCLGAFRKCIPDNDKCCRPNLVCSETHKWCKYVF-{酰胺}	735
[Phe6,Pra15]GpTx-1(1-34)	{H}-DCLGFFRKCIPDND[Pra]CCRPNLVCSRTHKWCKYVF-{酰胺}	736
[Ala5;His28]GpTx-1	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHHWCKYVF-{酰	737

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(1-34)	胺}	
[Ala5;Ser28]GpTx-1 (1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHSWCKYVF-{酰胺}	738
[Ala5;Gln28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHQWCKYVF-{酰胺}	739
[Ala5;3Pal28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[3Pal]WCKYVF-{酰胺}	740
[Ala5;4-氨基F28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[4-氨基F]WCKYVF-{酰胺}	741
[Ala5;K(Ac)28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[K(Ac)]WCKYVF-{酰胺}	742
[Ala5;SDMA28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[SDMA]WCKYVF-{酰胺}	743
[Ala5;hArg28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[hArg]WCKYVF-{酰胺}	744
[Ala5;R(Me)28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[R(Me)]WCKYVF-{酰胺}	745
[Ala5;Orn28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Orn]WCKYVF-{酰胺}	746
[Ala5;Dap28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Dap]WCKYVF-{酰胺}	747
[Ala5;Cit28]GpTx-1 (1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Cit]WCKYVF-{酰胺}	748
[Ala5;HCit28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[HCit]WCKYVF-{酰胺}	749
[Asp28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHDWCKYVF-{酰胺}	750
[Gly5;Val6]GpTx-1(1-34)	{H}-DCLGGVRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	751
[Gly5;Ile6]GpTx-1(1-34)	{H}-DCLGGIRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	752
[2-Abu5;Nle6]GpTx-1(1-34)	{H}-DCLG[2-Abu][Nle]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	753
[Gly5;Phe6;Glu10]GpTx-1(1-34)	{H}-DCLGGFRKCEPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	754
[Gly5;Phe6;Glu28]GpTx-1(1-34)	{H}-DCLGGFRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	755
4-Pen-[Ala5;Phe6;2-Abu13;Arg28]GpTx-1(1-34)	{4-Pen}-DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{酰胺}	756
4-Pen-[Ala5;Phe6;2-Abu13]GpTx-1(1-34)	{4-Pen}-DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	757
4-Pen-[2-Abu5,13;Leu6]GpTx-1(1-34)	{4-Pen}-DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	758
4-Pen-[Nva5;Leu6;2-Abu13;Arg28]GpTx-1(1-34)	{4-Pen}-DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{酰胺}	759
4-Pen-[Nva5;Leu6;2-Abu13]GpTx-1(1-34)	{4-Pen}-DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	760
[Ala5;Guf28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Guf]WCKYVF-{酰胺}	761
[Ala5;Dab28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Dab]WCKYVF-{酰胺}	762

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[Gln28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHQWCKYVF-{酰胺}	763
[Ala5;Phe28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHFWCKYVF-{酰胺}	764
[Ala5;Tyr28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHYWCKYVF-{酰胺}	765
[Ala5;Leu28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHLWCKYVF-{酰胺}	766
[Ala5;Asn28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHNWCKYVF-{酰胺}	767
[Ala5;Cit25]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCS[Cit]THKWCKYVF-{酰胺}	768
[Ala5;Asp28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHDWCKYVF-{酰胺}	769
[Ala5;Met28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHMWCKYVF-{酰胺}	770
[Ala5;K(Me)28]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[K(Me)]WCKYVF-{酰胺}	771
[pS28]GpTx-1(1-34)	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTH[pS]WCKYVF-{酰胺}	772
[Thr5;Asp10;Glu12]GpTx-1(1-34)	{H}-DCLGTMRKCDPENDKCCRPNLVCSRTHKWCKYVF-{酰胺}	773
[1-Nal10;Glu33]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYEF-{酰胺}	774
[1-Nal10;Glu32]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKEVF-{酰胺}	775
[1-Nal10;Glu31]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCEYVF-{酰胺}	776
[1-Nal10;Ala33]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYAF-{酰胺}	777
[1-Nal10;Ala32]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKAVF-{酰胺}	778
[1-Nal10;Ala31]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCAYVF-{酰胺}	779
[1-Nal10;Glu28]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	780
[1-Nal10;Glu15]GpTx-1(1-34)	{H}-DCLGFMRKC[1-Nal]PDNDECCRPNLVCSRTHKWCKYVF-{酰胺}	781
[Glu8;1-Nal10]GpTx-1(1-34)	{H}-DCLGFMREC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	782
[Glu4;1-Nal10]GpTx-1(1-34)	{H}-DCLEFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	783
[1-Nal1;Glu8]GpTx-1(1-34)	{H}-[1-Nal]CLGFMRECIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	784
[1-Nal1;Glu7]GpTx-1(1-34)	{H}-[1-Nal]CLGFMEKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	785
[1-Nal1;Glu6]GpTx-1(1-34)	{H}-[1-Nal]CLGFERKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	786
[Ala5;Glu26]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSREHKWCKYVF-{酰胺}	787
[Ala5;Glu27]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTEKWCKYVF-{酰胺}	788
[Ala5;Glu31]GpTx-1(1-34)	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCEYVF-{酰胺}	789

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[Ala5]GpTx-1(1-34)-Glu	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYVFE-{酰胺}	790
[Ala5,Met(O)6]GpTx-1 异构体1	{H}-DCLGA[METO1]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	791
[Ala5,Met(O)6]GpTx-1 异构体2	{H}-DCLGA[METO1]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	792
[Ala5;Phe6;Pra13]GpTx-1(1-34)	{H}-DCLGAFRKCIPD[Pra]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	793
[Ala5;Phe6;K(Ac-Pra)13]GpTx-1(1-34)	{H}-DCLGAFRKCIPD[K(Ac-Pra)]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	794
[Ala5;Phe6;K(Ac-Pra)13;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPD[K(Ac-Pra)]DKCCRPNLVCSRTHRWCKYVF-{酰胺}	795
[Ala5;Leu6,26;Pra13;Arg28]GpTx-1(1-34)	{H}-DCLGALRKCIPD[Pra]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	796
[2-Abu5;Leu6;Pra13]GpTx-1(1-34)	{H}-DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	797
[Ala5;Phe6;Glu10;Pra13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCEPD[Pra]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	798
[2-Abu5;Leu6;K(Ac-Pra)13]GpTx-1(1-34)	{H}-DCLG[2-Abu]LRKCIPD[K(Ac-Pra)]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	799
[Ala5;Leu6,26;Glu10;Pra13;Arg28]GpTx-1(1-34)	{H}-DCLGALRKCEPD[Pra]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	800
[2-Abu5;Leu6;K(4-Pen)13;Arg28]GpTx-1(1-34)	{H}-DCLG[2-Abu]LRKCIPD[K(4-Pen)]DKCCRPNLVCSRTHRWCKYVF-{酰胺}	801
[Ala5;Leu6,26;Pra12;Arg28]GpTx-1(1-34)	{H}-DCLGALRKCIP[Pra]NDKCCRPNLVCSRLHRWCKYVF-{酰胺}	802
[Ala5;Phe6;Pra12;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIP[Pra]NDKCCRPNLVCSRLHRWCKYVF-{酰胺}	803
[2-Abu5;Phe6;K(4-Pen)13]GpTx-1(1-34)	{H}-DCLG[2-Abu]FRKCIPD[K(4-Pen)]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	804
[Nva5;Leu6;K(4-Pen)13;Arg28]GpTx-1(1-34)	{H}-DCLG[Nva]LRKCIPD[K(4-Pen)]DKCCRPNLVCSRTHRWCKYVF-{酰胺}	805
[Nva5;Leu6;K(4-Pen)13]GpTx-1(1-34)	{H}-DCLG[Nva]LRKCIPD[K(4-Pen)]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	806
4-Pen-[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34)	{4-Pen}-DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{酰胺}	807
[2-Abu5;Leu6;K(4-Pen)13;Glu28]GpTx-1(1-34)	{H}-DCLG[2-Abu]LRKCIPD[K(4-Pen)]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	808
[Ala5;Phe6;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{ 酰胺}	809
[Ala5;Leu6;Arg28]GpTx-1(1-34)	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{ 酰胺}	810
Gly-Ser-[Ala5;Phe6;Arg28]GpTx-1(1-34)	{H}-GSDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{酰胺}	811
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{	812

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)	酰胺}	
[Ala5;Phe6;Arg28]GpTx-1(1-34)-Trp- 游离酸	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFW-{游离酸}	813
[Ala5;Leu6;Arg28]GpTx-1(1-34)-Trp-游离酸	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFW-{游离酸}	814
Gly-Ser-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Trp-游离酸	{H}-GSDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFW-{游离酸}	815
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Trp-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFW-{游离酸}	816
[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe- 游离酸	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	817
[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	818
Gly-Ser-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	819
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	820
Gly-Ser-[Ala5;Phe6;Arg28]GpTx-1(1-34)-游离酸	{H}-GSDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{游离酸}	821
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{游离酸}	822
[Ala5;Phe6;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{游离酸}	823
[Ala5,28;Phe6]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHAWCKYVF-{游离酸}	824
[Ala5;Phe6;Asp28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHDWCKYVF-{游离酸}	825
[Ala5;Phe6;Glu28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{游离酸}	826
[Ala5;Phe6;Gly28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHGWCKYVF-{游离酸}	827
[Ala5;Phe6;His28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHHWCKYVF-{游离酸}	828
[Ala5;Phe6]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{游离酸}	829
[Ala5;Phe6;Leu28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHLWCKYVF-{游离酸}	830
[Ala5;Phe6;Met28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHMWCKYVF-{游离酸}	831
[Ala5;Phe6;Asn28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHNWCKYVF-{游离酸}	832
[Ala5;Phe6;Pro28]G	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHPWCKYVF-{游	833

[0371]

pTx-1(1-34)-游离酸	离酸}	
[Ala5;Phe6;Gln28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHQWCKYVF-{游离酸}	834
[Ala5;Phe6;Ser28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHSWCKYVF-{游离酸}	835
[Ala5,13;Phe6;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDADKCCRPNLVCSRTHRWCKYVF-{游离酸}	836
[Ala5;Phe6;Asp13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDDDKCCRPNLVCSRTHRWCKYVF-{游离酸}	837
[Ala5;Phe6;Glu13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDEDKCCRPNLVCSRTHRWCKYVF-{游离酸}	838
[Ala5;Phe6,13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDFDKCCRPNLVCSRTHRWCKYVF-{游离酸}	839
[Ala5;Phe6;Gly13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDGDKCCRPNLVCSRTHRWCKYVF-{游离酸}	840
[Ala5;Phe6;His13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDHDKCCRPNLVCSRTHRWCKYVF-{游离酸}	841
[Ala5;Phe6;Ile13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDIDKCCRPNLVCSRTHRWCKYVF-{游离酸}	842
[Ala5;Phe6;Lys13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDKDKCCRPNLVCSRTHRWCKYVF-{游离酸}	843
[Ala5;Phe6;Leu13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDLDKCCRPNLVCSRTHRWCKYVF-{游离酸}	844
[Ala5;Phe6;Met13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDMDKCCRPNLVCSRTHRWCKYVF-{游离酸}	845
[Ala5;Phe6;Pro13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDPDKCCRPNLVCSRTHRWCKYVF-{游离酸}	846
[Ala5;Phe6;Gln13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDQDKCCRPNLVCSRTHRWCKYVF-{游离酸}	847
[Ala5;Phe6;Arg13,28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDRDKCCRPNLVCSRTHRWCKYVF-{游离酸}	848
[Ala5;Phe6;Ser13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDSDKCCRPNLVCSRTHRWCKYVF-{游离酸}	849
[Ala5;Phe6;Thr13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDTDKCCRPNLVCSRTHRWCKYVF-{游离酸}	850
[Ala5;Phe6;Val13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDVDKCCRPNLVCSRTHRWCKYVF-{游离酸}	851
[Ala5;Phe6;Trp13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGAFRKCIPDWDKCCRPNLVCSRTHRWCKYVF-{游离酸}	852

[0372]

[Ala5;Leu6;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{游离酸}	853
[Ala5;Leu6;Asp28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHDWCKYVF-{游离酸}	854
[Ala5;Leu6;Glu28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{游离酸}	855
[Ala5;Leu6,28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHLWCKYVF-{游离酸}	856
[Ala5;Leu6;Met28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHMWCKYVF-{游离酸}	857
[Ala5;Leu6;Gln28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHQWCKYVF-{游离酸}	858
[Ala5;Leu6;Ser28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHSWCKYVF-{游离酸}	859
[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVF-{游离酸}	860
[Ala5;Leu6;Asp13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDDDKCCRPNLVCSRTHRWCKYVF-{游离酸}	861
[Ala5;Leu6;Glu13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDEDKCCRPNLVCSRTHRWCKYVF-{游离酸}	862
[Ala5;Leu6;Phe13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDFDKCCRPNLVCSRTHRWCKYVF-{游离酸}	863
[Ala5;Leu6;His13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDHDKCCRPNLVCSRTHRWCKYVF-{游离酸}	864
[Ala5;Leu6;Ile13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDIDKCCRPNLVCSRTHRWCKYVF-{游离酸}	865
[Ala5;Leu6;Lys13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDKDKCCRPNLVCSRTHRWCKYVF-{游离酸}	866
[Ala5;Leu6,13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDLDKCCRPNLVCSRTHRWCKYVF-{游离酸}	867
[Ala5;Leu6;Met13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDMDKCCRPNLVCSRTHRWCKYVF-{游离酸}	868
[Ala5;Leu6;Gln13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDQDKCCRPNLVCSRTHRWCKYVF-{游离酸}	869
[Ala5;Leu6;Arg13,28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDRDKCCRPNLVCSRTHRWCKYVF-{游离酸}	870
[Ala5;Leu6;Ser13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDSDKCCRPNLVCSRTHRWCKYVF-{游离酸}	871
[Ala5;Leu6;Val13;Arg28]GpTx-1(1-34)-	{H}-DCLGALRKCIPDVDKCCRPNLVCSRTHRWCKYVF-{游离酸}	872

[0373]

游离酸		
[Ala5;Leu6;Tyr13;Arg28]GpTx-1(1-34)-游离酸	{H}-DCLGALRKCIPDYDKCCRPNLVCSRTHRWCKYVF-{ 游离酸}	873
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Gly-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFG-{游离酸}	874
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Gly-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFG -{游离酸}	875
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Gly- 游 离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFG -{游离酸}	876
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Ile-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFI-{游离酸}	877
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Ile-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFI-{游离酸}	878
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Ile-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFI-{游离酸}	879
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Ile-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFI-{游离酸}	880
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Leu-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFL-{游离酸}	881
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Leu-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFL -{游离酸}	882
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Leu-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFL-{游离酸}	883
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Leu- 游 离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFL -{游离酸}	884
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Ser-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFS-{游离酸}	885
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Ser-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFS -{游离酸}	886
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Ser-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFS-{游离酸}	887
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Ser- 游 离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFS -{游离酸}	888
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Thr-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFT-{游离酸}	889
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF	890

)-Phe-Thr-游离酸	T -{游离酸}	
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Thr-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFT-{游离酸}	891
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Thr- 游 离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFT -{游离酸}	892
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Tyr-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFY-{游离酸}	893
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Tyr-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFY -{游离酸}	894
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Tyr-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFY-{游离酸}	895
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Tyr- 游 离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFY -{游离酸}	896
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Ala-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFA-{游离酸}	897
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Ala-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFA -{游离酸}	898
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Phe-Ala-游 离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFFA -{游离酸}	899
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Tyr-Ala- 游 离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFYA -{游离酸}	900
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Leu-Ala-游 离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFLA -{游离酸}	901
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Ile-Ala- 游 离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFIA -{游离酸}	902
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Ala-Ala-游 离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFAA -{游离酸}	903
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Ser-Ala- 游 离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFSA -{游离酸}	904
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Thr-Ala-游 离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFTA -{游离酸}	905
Gly-Ser-[Ala5;Leu6;	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF	906

[0374]

[0375]

Arg28]GpTx-1(1-34)-Phe-Ala-Ala-游离酸	AA -{游离酸}	
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Gly-Ala-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFGA -{游离酸}	907
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Ala-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFA -{游离酸}	908
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Ala-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFA -{游离酸}	909
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Phe-Ala-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFFA -{游离酸}	910
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Tyr-Ala-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFYA -{游离酸}	911
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Leu-Ala-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFLA -{游离酸}	912
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Ile-Ala-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFIA -{游离酸}	913
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Ala-Ala-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFAA -{游离酸}	914
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Ser-Ala-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFSA -{游离酸}	915
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Thr-Ala-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFTA -{游离酸}	916
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Ala-Ala-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFAA-{游离酸}	917
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Gly-Ala-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFGA-{游离酸}	918
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Ala-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFA-{游离酸}	919
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Ala-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFA-{游离酸}	920

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Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Ala-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFA-{游离酸}	921
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-Ala-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFFA-{游离酸}	922
Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-Phe-游离酸	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFFF-{游离酸}	923
Gly-Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	924
Gly-Gly-Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	925
Gly-Gly-Gly-Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	926
Ser-Gly-Gly-Gly-Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-SGGGGSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	927
Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSGGGGSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	928
Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGSGGGGSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	929
Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGSGGGGSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	930
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSGGGGSDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	931
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSGGGGSDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	932
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5,13;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSGGGGSDCLGAFRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	933
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	934
Gly-Ser-[Ala5,13;Le	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFG	935

[0377]

u6;Arg28]GpTx-1(1-34)-Gly-Phe-游离酸	F-{游离酸}	
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	936
Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	937
Gly-Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	938
Gly-Gly-Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	939
Gly-Gly-Gly-Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	940
Ser-Gly-Gly-Gly-Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-SGGGGSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	941
Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSGGGGSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	942
Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGSGGGGSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	943
Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGSGGGGSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	944
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSGGGGSDCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	945
Gly-Ser-[Ala5;Leu6;Gly13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGALRKCIPDGDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	946
Gly-Ser-[Ala5;Leu6;Ser13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGALRKCIPDSDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	947
Gly-Ser-[Ala5;Leu6;Ile13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGALRKCIPDIDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	948
Gly-Ser-[Ala5;Leu6;Pro13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGALRKCIPDPDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	949
Gly-Ser-[Ala5;Leu6;	{H}-GSDCLGALRKCIPDMDKCCRPNLVCSRTHRWCKYVFF	950

[0378]

Met13;Arg28]GpTx-1(1-34)-Phe-游离酸	-{游离酸}	
Gly-Ser-[Ala5;Leu6;Val13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGALRKCIPDVDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	951
Gly-Ser-[Ala5;Leu6;Thr13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGALRKCIPDTDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	952
Gly-Ser-[Ala5;Leu6;Phe13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGALRKCIPDFDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	953
Gly-Ser-[Ala5;Leu6;Tyr13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGALRKCIPDYDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	954
Gly-Ser-[Ala5;Phe6;Gly13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGAFRKCIPDGDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	955
Gly-Ser-[Ala5;Phe6;Ser13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGAFRKCIPDSDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	956
Gly-Ser-[Ala5;Phe6;Ile13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGAFRKCIPDIDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	957
Gly-Ser-[Ala5;Phe6;Leu13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGAFRKCIPDLDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	958
Gly-Ser-[Ala5;Phe6;Met13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGAFRKCIPDMDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	959
Gly-Ser-[Ala5;Phe6;Val13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGAFRKCIPDVDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	960
Gly-Ser-[Ala5;Phe6;Thr13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGAFRKCIPDTDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	961
Gly-Ser-[Ala5;Phe6,13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGAFRKCIPDFDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	962
Gly-Ser-[Ala5;Phe6;Tyr13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GSDCLGAFRKCIPDYDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	963
Gly-Ile-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GIDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	964
Gly-Ala-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	965
Gly-Thr-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GTDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	966
Gly-Ala-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	967
Gly-Gly-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	968
Gly-Phe-[Ala5;Leu6	{H}-GFDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-	969

[0379]

;Arg28]GpTx-1(1-34)-Phe-游离酸	{游离酸}	
Gly-Tyr-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GYDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	970
Gly-Leu-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GLDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	971
Gly-Val-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GVDCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	972
Gly-Ile-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GIDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	973
Gly-Ala-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	974
Gly-Thr-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GTDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	975
Gly-Ala-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	976
Gly-Gly-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	977
Gly-Phe-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GFDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	978
Gly-Tyr-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GYDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	979
Gly-Leu-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GLDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	980
Gly-Val-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GVDCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	981
Gly-Ala-[Ala5;Phe6;Gly13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGAFRKCIPDGDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	982
Gly-Ala-[Ala5;Phe6;Ser13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGAFRKCIPDSDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	983
Gly-Ala-[Ala5;Phe6;Ile13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGAFRKCIPDIDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	984
Gly-Ala-[Ala5;Phe6;Leu13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGAFRKCIPDLDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	985
Gly-Ala-[Ala5;Phe6;Met13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGAFRKCIPDMDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	986
Gly-Ala-[Ala5;Phe6;Val13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGAFRKCIPDVDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	987
Gly-Ala-[Ala5;Phe6;	{H}-GADCLGAFRKCIPDTDKCCRPNLVCSRTHRWCKYVFF-	988

[0380]

Thr13;Arg28]GpTx-1(1-34)-Phe-游离酸	{游离酸}	
Gly-Ala-[Ala5;Phe6,13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGAFRKCIPDFDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	989
Gly-Ala-[Ala5;Phe6;Tyr13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGAFRKCIPDYDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	990
Gly-Ala-[Ala5;Leu6;Gly13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGALRKCIPDGDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	991
Gly-Ala-[Ala5;Leu6;Ser13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGALRKCIPDSDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	992
Gly-Ala-[Ala5;Leu6;Ile13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGALRKCIPDIDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	993
Gly-Ala-[Ala5;Leu6,13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGALRKCIPDLDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	994
Gly-Ala-[Ala5;Leu6;Met13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGALRKCIPDMDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	995
Gly-Ala-[Ala5;Leu6;Val13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGALRKCIPDVDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	996
Gly-Ala-[Ala5;Leu6;Thr13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGALRKCIPDTDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	997
Gly-Ala-[Ala5;Leu6;Phe13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGALRKCIPDFDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	998
Gly-Ala-[Ala5;Leu6;Tyr13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GADCLGALRKCIPDYDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	999
Gly-Gly-[Ser1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGSCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1000
Gly-Gly-[Trp1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGWCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1001
Gly-Gly-[Phe1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGFCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1002
Gly-Gly-[Ile1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGICLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1003
Gly-Gly-Ser-[Ser1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGSSCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1004

[0381]

Gly-Gly-Ser-[Trp1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGSWCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1005
Gly-Gly-Ser-[Phe1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGSFCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1006
Gly-Gly-Ser-[Ile1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGSICLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1007
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ile1;Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSGGGGSICLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1008
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Phe1;Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSGGGGSFCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1009
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Trp1;Ala5,13;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSGGGGSWCLGALRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1010
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ile1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSGGGGSICLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1011
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Phe1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSGGGGSFCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1012
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Trp1;Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSGGGGSWCLGALRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1013
Gly-Gly-[Ser1;Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGSCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1014
Gly-Gly-[Trp1;Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGWCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1015
Gly-Gly-[Phe1,6;Ala5;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGFCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1016
Gly-Gly-[Ile1;Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGICLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1017
Gly-Gly-Ser-[Ser1;Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游	{H}-GGSSCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1018

[0382]

离酸		
Gly-Gly-Ser-[Trp1;Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe- 游离酸	{H}-GGSWCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1019
Gly-Gly-Ser-[Phe1,6;Ala5;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGSFCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1020
Gly-Gly-Ser-[Ile1;Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe- 游离酸	{H}-GGSICLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1021
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ile1;Ala5,13;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSGGGGSICLGAFRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1022
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Phe1,6;Ala5,13;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSGGGGSFCLGAFRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1023
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Trp1;Ala5,13;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSGGGGSWCLGAFRKCIPDADKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1024
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Ile1;Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSGGGGSICLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1025
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Phe1,6;Ala5;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSGGGGSFCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1026
Gly-Gly-Gly-Gly-Ser-Gly-Gly-Gly-Gly-Ser-[Trp1;Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	{H}-GGGGSGGGGSWCLGAFRKCIPDNDKCCRPNLVCSRTHRWCKYVFF-{游离酸}	1027
[Ala5;Phe6;Atz13]GpTx-1(1-34)	DCLGAFRKCIPD[Atz]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	1028
生物素-Ahx-[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34)	{生物素}-[Ahx]DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{酰胺}	1029
[Ala5;Phe6;Glu10;K(生物素)13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCEPD[K(生物素)]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1030
生物素-Ahx--[Ala5,Phe6,Atz13,Leu26,Arg28]GpTx-1(1-34)}	{生物素}[Ahx]DCLGAFRKCIPD[Atz]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1031
DOTA-[Ala5]GpTx-	{DOTA}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYV	1032

[0383]

1(1-34)	F-{酰胺}	
[Ala5;Phe6;K(DOTA)13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPDK(DOTA)DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1033
[Ala5,Phe6,2-Abu13,Leu26,Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1034
[Ala5,Phe6,Glu10,2-Abu13,Leu26,Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCEPD[2-Abu]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1035
[Ala5,Leu6,2-Abu13,Leu26,Arg28]GpTx-1(1-34)	{H}-DCLGALRKCIPD[2-Abu]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1036
[Ala5,Phe6,Atz(PEG11-((2-羟乙基)硫代)乙酰胺)13,Leu26,Arg28]GpTx-1	{H}-DCLGAFRKCIPD[Atz(PEG11-((2-羟乙基)硫代)乙酰胺)]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1037
[Ala5,Phe6,Atz(**PEG3**-(2-羟乙基)硫代乙酰胺)13,Leu26,Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPD[Atz(PEG3-((2-羟乙基)硫代)乙酰胺)]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1038
[Ala5;Phe6;**Glu10**;Atz(PEG11-((2-羟乙基)硫代)乙酰胺)13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCEPD[Atz(PEG11-((2-羟乙基)硫代)乙酰胺)]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1039
[Ala5;Phe6;**Glu10**;Atz(**PEG3**-((2-羟乙基)硫代)乙酰胺)13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCEPD[Atz(PEG3-((2-羟乙基)硫代)乙酰胺)]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1040
((**2**-羟乙基)硫代)乙酰胺-**NPEG11**-三唑-[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34)	{((2-羟乙基)硫代)乙酰胺-NPEG11-三唑}-DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{酰胺}	1041
[2-Abu5,Leu6,K(乙基-三唑-PEG11-((2-羟乙基)硫代)乙酰胺)13,Arg28]GpTx-1(1-34)	{H}-DCLG[2-Abu]LRKCIPDK(乙基-三唑-PEG11-((2-羟乙基)硫代)乙酰胺)DKCCRPNLVCSRTHRWCKYVF-{酰胺}	1042
[Ala5;**Leu6**,26;Atz(PEG11-((2-羟乙基)硫代)乙酰胺)13;Arg28]GpTx-1(1-34)	{H}-DCLGALRKCIPD[Atz(PEG3-((2-羟乙基)硫代)乙酰胺)]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1043
[Ala5;**Leu6**,26;**Glu10**;Atz(PEG11-((2-羟乙基)硫代)乙酰胺)13;Arg28]GpTx-1(1-34)	{H}-DCLGALRKCEPD[Atz(PEG11-((2-羟乙基)硫代)乙酰胺)]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1044
((2-羟乙基)硫代)乙酰胺-NPEG11-三唑-[Ala5,Phe6,2-Abu13,Arg28]GpTx-1(1-3	{((2-羟乙基)硫代)乙酰胺-NPEG11-三唑}-DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{酰胺}	1045

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4)		
[Ala5;Phe6;Atz13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPD[Atz]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1046
[Ala5;Phe6;Glu10;Atz13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCEPD[Atz]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1047
[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34	{H}-DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{酰胺}	1048
[Ala5,Phe6,Atz(PEG11-溴乙酰胺)13,Leu26,Arg28]GpTx-1	{H}-DCLGAFRKCIPD[Atz(PEG11-溴乙酰胺)]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1062
[Ala5,Phe6,Atz(**PEG3-**溴乙酰胺)13,Leu26,Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCIPD[Atz(PEG3-溴乙酰胺)]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1063
[Ala5;Phe6;Glu10;Atz(PEG11-溴乙酰胺)13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCEPD[Atz(PEG11-溴乙酰胺)]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1064
[Ala5;Phe6;Glu10;Atz(PEG3-溴乙酰胺)13;Leu26;Arg28]GpTx-1(1-34)	{H}-DCLGAFRKCEPD[Atz(PEG3-溴乙酰胺)]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1065
溴乙酰胺-PEG11-三唑-[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34)	{溴乙酰胺-PEG11-三唑}-DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{酰胺}	1066
[2-Abu5,Leu6,K(乙基-三唑-PEG11-溴乙酰胺)13,Arg28]GpTx-1(1-34)	{H}-DCLG[2-Abu]LRKCIPDK(乙基-三唑-PEG11-溴乙酰胺)DKCCRPNLVCSRTHRWCKYVF-{酰胺}	1067
[Ala5;Leu6,26;Atz(PEG11-溴乙酰胺)13;Arg28]GpTx-1(1-34)	{H}-DCLGALRKCIPD[Atz(PEG3-溴乙酰胺)]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1068
[Ala5;Leu6,26;Glu10;Atz(PEG11-溴乙酰胺)13;Arg28]GpTx-1(1-34)	{H}-DCLGALRKCEPD[Atz(PEG11-溴乙酰胺)]DKCCRPNLVCSRLHRWCKYVF-{酰胺}	1069
溴乙酰胺-PEG11-三唑-[Ala5,Phe6,2-Abu13,Arg28]GpTx-1(1-34)	{溴乙酰胺-PEG11-三唑}-DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{酰胺}	1070

[0385]

表 5B. GpTx-1 和 GpTx-1 肽类似物的氨基酸序列。-{酰胺}=酰胺化 C 端。

氨基酸序列	命名	SEQ ID NO.
DCLGFMRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu13;Glu28]GpTx-1(1-34)	1071
DCLGFMRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Pra13;Glu28]GpTx-1(1-34)	1072
DCLGFMRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1073
DCLGFMRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Pra13;Leu26;Glu28]GpTx-1(1-34)	1074
DCLGFMRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Glu11,28;2-Abu13]GpTx-1(1-34)	1075
DCLGFMRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Glu10,28;2-Abu13]GpTx-1(1-34)	1076
DCLGFMRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1077
DCLGFFRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1078
DCLGFLRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu6;2-Abu13;Glu28]GpTx-1(1-34)	1079
DCLGF[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle6;2-Abu13;Glu28]GpTx-1(1-34)	1080
DCLGGMRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;2-Abu13;Glu28]GpTx-1(1-34)	1081
DCLGAMRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;2-Abu13;Glu28]GpTx-1(1-34)	1082
DCLG[2-Abu]MRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5,13;Glu28]GpTx-1(1-34)	1083
DCLG[Nva]MRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;2-Abu13;Glu28]GpTx-1(1-34)	1084

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DCLG[Nle]MRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;2-Abu13;Glu28]GpTx-1(1-34)	1085
DCLGVMRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;2-Abu13;Glu28]GpTx-1(1-34)	1086
DCLGLMRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;2-Abu13;Glu28]GpTx-1(1-34)	1087
DCLGIMRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;2-Abu13;Glu28]GpTx-1(1-34)	1088
DCLGFMRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Glu11,28;Pra13]GpTx-1(1-34)	1089
DCLGFMRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Glu10,28;Pra13]GpTx-1(1-34)	1090
DCLGFMRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Asp10;Pra13;Glu28]GpTx-1(1-34)	1091
DCLGFFRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Phe6;Pra13;Glu28]GpTx-1(1-34)	1092
DCLGFLRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu6;Pra13;Glu28]GpTx-1(1-34)	1093
DCLGF[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle6;Pra13;Glu28]GpTx-1(1-34)	1094
DCLGGMRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Pra13;Glu28]GpTx-1(1-34)	1095
DCLGAMRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Pra13;Glu28]GpTx-1(1-34)	1096
DCLG[2-Abu]MRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5;Pra13;Glu28]GpTx-1(1-34)	1097
DCLG[Nva]MRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Pra13;Glu28]GpTx-1(1-34)	1098
DCLG[Nle]MRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Pra13;Glu28]GpTx-1(1-34)	1099
DCLGVMRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Pra13;Glu28]GpTx-1(1-34)	1100
DCLGLMRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Pra13;Glu28]GpTx-1(1-34)	1101
DCLGIMRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Pra13;Glu28]GpTx-1(1-34)	1102
DCLGFMRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1103

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DCLGFMRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1104
DCLGFMRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1105
DCLGFFRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Phe6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1106
DCLGFLRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu6,26;2-Abu13;Glu28]GpTx-1(1-34)	1107
DCLGF[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1108
DCLGGMRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1109
DCLGAMRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1110
DCLG[2-Abu]MRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5,13;Leu26;Glu28]GpTx-1(1-34)	1111
DCLG[Nva]MRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1112
DCLG[Nle]MRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1113
DCLGVMRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1114
DCLGLMRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;2-Abu13;Glu28]GpTx-1(1-34)	1115
DCLGIMRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1116
DCLGFMRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1117
DCLGFMRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1118
DCLGFMRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1119
DCLGFFRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Phe6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1120
DCLGFLRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu6,26;Pra13;Glu28]GpTx-1(1-34)	1121

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DCLGF[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1122
DCLGGMRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Pra13;Leu26;Glu28]GpTx-1(1-34)	1123
DCLGAMRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Pra13;Leu26;Glu28]GpTx-1(1-34)	1124
DCLG[2-Abu]MRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5;Pra13;Leu26;Glu28]GpTx-1(1-34)	1125
DCLG[Nva]MRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Pra13;Leu26;Glu28]GpTx-1(1-34)	1126
DCLG[Nle]MRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Pra13;Leu26;Glu28]GpTx-1(1-34)	1127
DCLGVMRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Pra13;Leu26;Glu28]GpTx-1(1-34)	1128
DCLGLMRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Pra13;Glu28]GpTx-1(1-34)	1129
DCLGIMRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Pra13;Leu26;Glu28]GpTx-1(1-34)	1130
DCLGFFRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1131
DCLGFLRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu6;Glu11,28;2-Abu13]GpTx-1(1-34)	1132
DCLGF[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle6;Glu11,28;2-Abu13]GpTx-1(1-34)	1133
DCLGGMRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Glu11,28;2-Abu13]GpTx-1(1-34)	1134
DCLGAMRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Glu11,28;2-Abu13]GpTx-1(1-34)	1135
DCLG[2-Abu]MRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5,13;Glu11,28]GpTx-1(1-34)	1136
DCLG[Nva]MRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Glu11,28;2-Abu13]GpTx-1(1-34)	1137
DCLG[Nle]MRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Glu11,28;2-Abu13]GpTx-1(1-34)	1138
DCLGVMRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Glu11,28;2-Abu13]GpTx-1(1-34)	1139

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DCLGLMRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Glu11,28;2-Abu13]GpTx-1(1-34)	1140
DCLGIMRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Glu11,28;2-Abu13]GpTx-1(1-34)	1141
DCLGFFRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1142
DCLGFLRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu6;Glu10,28;2-Abu13]GpTx-1(1-34)	1143
DCLGF[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle6;Glu10,28;2-Abu13]GpTx-1(1-34)	1144
DCLGGMRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Glu10,28;2-Abu13]GpTx-1(1-34)	1145
DCLGAMRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Glu10,28;2-Abu13]GpTx-1(1-34)	1146
DCLG[2-Abu]MRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{ 酰胺}	[2-Abu5,13;Glu10,28]GpTx-1(1-34)	1147
DCLG[Nva]MRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{ 酰 胺}	[Nva5;Glu10,28;2-Abu13]GpTx-1(1-34)	1148
DCLG[Nle]MRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Glu10,28;2-Abu13]GpTx-1(1-34)	1149
DCLGVMRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Glu10,28;2-Abu13]GpTx-1(1-34)	1150
DCLGLMRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Glu10,28;2-Abu13]GpTx-1(1-34)	1151
DCLGIMRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Glu10,28;2-Abu13]GpTx-1(1-34)	1152
DCLGFFRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1153
DCLGFLRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1154
DCLGF[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1155
DCLGGMRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1156

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DCLGAMRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1157
DCLG[2-Abu]MRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5,13;Asp10;Glu28]GpTx-1(1-34)	1158
DCLG[Nva]MRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1159
DCLG[Nle]MRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1160
DCLGVMRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1161
DCLGLMRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1162
DCLGIMRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1163
DCLGGFRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1164
DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1165
DCLG[2-Abu]FRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5,13;Phe6;Glu28]GpTx-1(1-34)	1166
DCLG[Nva]FRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1167
DCLG[Nle]FRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1168
DCLGVFRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1169
DCLGLFRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1170
DCLGIFRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1171
DCLGGLRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Leu6;2-Abu13;Glu28]GpTx-1(1-34)	1172

[0391]

DCLGALRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Leu6;2-Abu13;Glu28]GpTx-1(1-34)	1173
DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺} [2-Abu5,13;Leu6;Glu28]GpTx-1(1-34)		1174
DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Leu6;2-Abu13;Glu28]GpTx-1(1-34)	1175
DCLG[Nle]LRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Leu6;2-Abu13;Glu28]GpTx-1(1-34)	1176
DCLGVLRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Leu6;2-Abu13;Glu28]GpTx-1(1-34)	1177
DCLGLLRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5,6;2-Abu13;Glu28]GpTx-1(1-34)	1178
DCLGILRKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Leu6;2-Abu13;Glu28]GpTx-1(1-34)	1179
DCLGG[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Nle6;2-Abu13;Glu28]GpTx-1(1-34)	1180
DCLGA[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Nle6;2-Abu13;Glu28]GpTx-1(1-34)	1181
DCLG[2-Abu][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Glu28]GpTx-1(1-34)	1182
DCLG[Nva][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Nle6;2-Abu13;Glu28]GpTx-1(1-34)	1183
DCLG[Nle][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5,6;2-Abu13;Glu28]GpTx-1(1-34)	1184
DCLGV[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Nle6;2-Abu13;Glu28]GpTx-1(1-34)	1185
DCLGL[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Nle6;2-Abu13;Glu28]GpTx-1(1-34)	1186
DCLGI[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Nle6;2-Abu13;Glu28]GpTx-1(1-34)	1187

[0392]

DCLGFFRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1188
DCLGFLRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu6;Glu11,28;Pra13]GpTx-1(1-34)	1189
DCLGF[Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1190
DCLGGMRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Glu11,28;Pra13]GpTx-1(1-34)	1191
DCLGAMRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Glu11,28;Pra13]GpTx-1(1-34)	1192
DCLG[2-Abu]MRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5;Glu11,28;Pra13]GpTx-1(1-34)	1193
DCLG[Nva]MRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Glu11,28;Pra13]GpTx-1(1-34)	1194
DCLG[Nle]MRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Glu11,28;Pra13]GpTx-1(1-34)	1195
DCLGVMRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Glu11,28;Pra13]GpTx-1(1-34)	1196
DCLGLMRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Glu11,28;Pra13]GpTx-1(1-34)	1197
DCLGIMRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Glu11,28;Pra13]GpTx-1(1-34)	1198
DCLGFFRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1199
DCLGFLRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu6;Glu10,28;Pra13]GpTx-1(1-34)	1200
DCLGF[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1201
DCLGGMRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Glu10,28;Pra13]GpTx-1(1-34)	1202
DCLGAMRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Glu10,28;Pra13]GpTx-1(1-34)	1203
DCLG[2-Abu]MRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5;Glu10,28;Pra13]GpTx-1(1-34)	1204
DCLG[Nva]MRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Glu10,28;Pra13]GpTx-1(1-34)	1205
DCLG[Nle]MRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Glu10,28;Pra13]GpTx-1(1-34)	1206

[0393]

DCLGVMRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Glu10,28;Pra13]GpTx-1(1-34)	1207
DCLGLMRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Glu10,28;Pra13]GpTx-1(1-34)	1208
DCLGIMRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Glu10,28;Pra13]GpTx-1(1-34)	1209
DCLGFFRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1210
DCLGFLRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1211
DCLGF[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1212
DCLGGMRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Asp10;Pra13;Glu28]GpTx-1(1-34)	1213
DCLGAMRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Asp10;Pra13;Glu28]GpTx-1(1-34)	1214
DCLG[2-Abu]MRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5;Asp10;Pra13;Glu28]GpTx-1(1-34)	1215
DCLG[Nva]MRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Asp10;Pra13;Glu28]GpTx-1(1-34)	1216
DCLG[Nle]MRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Asp10;Pra13;Glu28]GpTx-1(1-34)	1217
DCLGVMRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Asp10;Pra13;Glu28]GpTx-1(1-34)	1218
DCLGLMRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Asp10;Pra13;Glu28]GpTx-1(1-34)	1219
DCLGIMRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Asp10;Pra13;Glu28]GpTx-1(1-34)	1220
DCLGGFRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Phe6;Pra13;Glu28]GpTx-1(1-34)	1221
DCLGAFRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Phe6;Pra13;Glu28]GpTx-1(1-34)	1222
DCLG[2-Abu]FRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5;Phe6;Pra13;Glu28]GpTx-1(1-34)	1223
DCLG[Nva]FRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Phe6;Pra13;Glu28]GpTx-1(1-34)	1224
DCLG[Nle]FRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Phe6;Pra13;Glu28]GpTx-1(1-34)	1225

[0394]

DCLGVFRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Phe6;Pra13;Glu28]GpTx-1(1-34)	1226
DCLGLFRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Phe6;Pra13;Glu28]GpTx-1(1-34)	1227
DCLGIFRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Phe6;Pra13;Glu28]GpTx-1(1-34)	1228
DCLGGLRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Leu6;Pra13;Glu28]GpTx-1(1-34)	1229
DCLGALRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Leu6;Pra13;Glu28]GpTx-1(1-34)	1230
DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5;Leu6;Pra13;Glu28]GpTx-1(1-34)	1231
DCLG[Nva]LRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Leu6;Pra13;Glu28]GpTx-1(1-34)	1232
DCLG[Nle]LRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Leu6;Pra13;Glu28]GpTx-1(1-34)	1233
DCLGVLRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Leu6;Pra13;Glu28]GpTx-1(1-34)	1234
DCLGLLRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5,6;Pra13;Glu28]GpTx-1(1-34)	1235
DCLGILRKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Leu6;Pra13;Glu28]GpTx-1(1-34)	1236
DCLGG[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Nle6;Pra13;Glu28]GpTx-1(1-34)	1237
DCLGA[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Nle6;Pra13;Glu28]GpTx-1(1-34)	1238
DCLG[2-Abu][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5;Nle6;Pra13;Glu28]GpTx-1(1-34)	1239
DCLG[Nva][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Nle6;Pra13;Glu28]GpTx-1(1-34)	1240
DCLG[Nle][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5,6;Pra13;Glu28]GpTx-1(1-34)	1241
DCLGV[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Nle6;Pra13;Glu28]GpTx-1(1-34)	1242
DCLGL[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Nle6;Pra13;Glu28]GpTx-1(1-34)	1243

[0395]

DCLGI[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Nle6;Pra13;Glu28]GpTx-1(1-34)	1244
DCLGFFRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Phe6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1245
DCLGFLRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu6,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1246
DCLGF[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1247
DCLGGMRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1248
DCLGAMRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1249
DCLG[2-Abu]MRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5,13;Glu11,28;Leu26]GpTx-1(1-34)	1250
DCLG[Nva]MRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1251
DCLG[Nle]MRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1252
DCLGVMRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1253
DCLGLMRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1254
DCLGIMRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1255
DCLGFFRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Phe6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1256
DCLGFLRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu6,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1257
DCLGF[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1258
DCLGGMRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1259
DCLGAMRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1260
DCLG[2-Abu]MRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰	[2-Abu5,13;Glu10,28;Leu26]GpTx-1(1-34)	1261

[0396]

胺}		
DCLG[Nva]MRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{ 酰胺 }	[Nva5;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1262
DCLG[Nle]MRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1263
DCLGVMRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1264
DCLGLMRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1265
DCLGIMRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1266
DCLGFFRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Phe6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1267
DCLGFLRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu6,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1268
DCLGF[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1269
DCLGGMRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1270
DCLGAMRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1271
DCLG[2-Abu]MRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{ 酰胺}	[2-Abu5,13;Asp10;Leu26;Glu28]GpTx-1(1-34)	1272
DCLG[Nva]MRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{ 酰胺 }	[Nva5;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1273
DCLG[Nle]MRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{ 酰胺 }	[Nle5;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1274
DCLGVMRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1275

[0397]

DCLGLMRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1276
DCLGIMRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1277
DCLGGFRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Phe6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1278
DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Phe6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1279
DCLG[2-Abu]FRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺} }	[2-Abu5,13;Phe6;Leu26;Glu28]GpTx-1(1-34)	1280
DCLG[Nva]FRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Phe6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1281
DCLG[Nle]FRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Phe6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1282
DCLGVFRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Phe6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1283
DCLGLFRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Phe6;2-Abu13;Glu28]GpTx-1(1-34)	1284
DCLGIFRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Phe6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1285
DCLGGLRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Leu6,26;2-Abu13;Glu28]GpTx-1(1-34)	1286
DCLGALRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Leu6,26;2-Abu13;Glu28]GpTx-1(1-34)	1287
DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺} }	[2-Abu5,13;Leu6,26;Glu28]GpTx-1(1-34)	1288
DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Leu6,26;2-Abu13;Glu28]GpTx-1(1-34)	1289
DCLG[Nle]LRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Leu6,26;2-Abu13;Glu28]GpTx-1(1-34)	1290
DCLGVLRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Leu6,26;2-Abu13;Glu28]GpTx-1(1-34)	1291
DCLGLLRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,6,26;2-Abu13;Glu28]GpTx-1(1-34)	1292

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DCLGILRKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Leu6,26;2-Abu13;Glu28]GpTx-1(1-34)	1293
DCLGG[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Nle6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1294
DCLGA[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Nle6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1295
DCLG[2-Abu][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Leu26;Glu28]GpTx-1(1-34)	1296
DCLG[Nva][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Nle6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1297
DCLG[Nle][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5,6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1298
DCLGV[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Nle6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1299
DCLGL[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Nle6;2-Abu13;Glu28]GpTx-1(1-34)	1300
DCLGI[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Nle6;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1301
DCLGFFRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Phe6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1302
DCLGFLRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu6,26;Glu11,28;Pra13]GpTx-1(1-34)	1303
DCLGF[Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1304
DCLGGMRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1305
DCLGAMRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1306
DCLG[2-Abu]MRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1307
DCLG[Nva]MRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1308

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DCLG[Nle]MRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1309
DCLGVMRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1310
DCLGLMRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Glu11,28;Pra13]GpTx-1(1-34)	1311
DCLGIMRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1312
DCLGFFRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Phe6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1313
DCLGFLRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu6,26;Glu10,28;Pra13]GpTx-1(1-34)	1314
DCLGF[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1315
DCLGGMRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1316
DCLGAMRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1317
DCLG[2-Abu]MRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1318
DCLG[Nva]MRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1319
DCLG[Nle]MRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1320
DCLGVMRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1321
DCLGLMRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Glu10,28;Pra13]GpTx-1(1-34)	1322
DCLGIMRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1323
DCLGFFRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Phe6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1324
DCLGFLRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1325
DCLGF[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1326
DCLGGMRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1327

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DCLGAMRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1328
DCLG[2-Abu]MRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1329
DCLG[Nva]MRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1330
DCLG[Nle]MRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1331
DCLGVMRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1332
DCLGLMRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1333
DCLGIMRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1334
DCLGGFRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Phe6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1335
DCLGAFRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Phe6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1336
DCLG[2-Abu]FRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5;Phe6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1337
DCLG[Nva]FRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Phe6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1338
DCLG[Nle]FRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Phe6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1339
DCLGVFRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Phe6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1340
DCLGLFRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Phe6;Pra13;Glu28]GpTx-1(1-34)	1341
DCLGIFRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Phe6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1342
DCLGGLRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Leu6,26;Pra13;Glu28]GpTx-1(1-34)	1343
DCLGALRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Leu6,26;Pra13;Glu28]GpTx-1(1-34)	1344
DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5;Leu6,26;Pra13;Glu28]GpTx-1(1-34)	1345
DCLG[Nva]LRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Leu6,26;Pra13;Glu28]GpTx-1(1-34)	1346

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DCLG[Nle]LRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Leu6,26;Pra13;Glu28]GpTx-1(1-34)	1347
DCLGVLRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Leu6,26;Pra13;Glu28]GpTx-1(1-34)	1348
DCLGLLRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,6,26;Pra13;Glu28]GpTx-1(1-34)	1349
DCLGILRKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Leu6,26;Pra13;Glu28]GpTx-1(1-34)	1350
DCLGG[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Nle6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1351
DCLGA[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Nle6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1352
DCLG[2-Abu][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{ 酰胺}	[2-Abu5;Nle6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1353
DCLG[Nva][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Nle6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1354
DCLG[Nle][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5,6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1355
DCLGV[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Nle6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1356
DCLGL[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Nle6;Pra13;Glu28]GpTx-1(1-34)	1357
DCLGI[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Nle6;Pra13;Leu26;Glu28]GpTx-1(1-34)	1358
DCLGGFRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1359
DCLGAFRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1360
DCLG[2-Abu]FRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5,13;Phe6;Glu11,28]GpTx-1(1-34)	1361
DCLG[Nva]FRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1362
DCLG[Nle]FRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1363

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DCLGVFRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1364
DCLGLFRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1365
DCLGIFRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1366
DCLGGLRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Leu6;Glu11,28;2-Abu13]GpTx-1(1-34)	1367
DCLGALRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Leu6;Glu11,28;2-Abu13]GpTx-1(1-34)	1368
DCLG[2-Abu]LRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5,13;Leu6;Glu11,28]GpTx-1(1-34)	1369
DCLG[Nva]LRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Leu6;Glu11,28;2-Abu13]GpTx-1(1-34)	1370
DCLG[Nle]LRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Leu6;Glu11,28;2-Abu13]GpTx-1(1-34)	1371
DCLGVLRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Leu6;Glu11,28;2-Abu13]GpTx-1(1-34)	1372
DCLGLLRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5,6;Glu11,28;2-Abu13]GpTx-1(1-34)	1373
DCLGILRKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Leu6;Glu11,28;2-Abu13]GpTx-1(1-34)	1374
DCLGG[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Nle6;Glu11,28;2-Abu13]GpTx-1(1-34)	1375
DCLGA[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Nle6;Glu11,28;2-Abu13]GpTx-1(1-34)	1376
DCLG[2-Abu][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Glu11,28]GpTx-1(1-34)	1377
DCLG[Nva][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Nle6;Glu11,28;2-Abu13]GpTx-1(1-34)	1378
DCLG[Nle][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰	[Nle5,6;Glu11,28;2-Abu13]GpTx-1(1-34)	1379

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DCLGV[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Nle6;Glu11,28;2-Abu13]GpTx-1(1-34)	1380
DCLGL[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Nle6;Glu11,28;2-Abu13]GpTx-1(1-34)	1381
DCLGI[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Nle6;Glu11,28;2-Abu13]GpTx-1(1-34)	1382
DCLGGFRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1383
DCLGAFRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1384
DCLG[2-Abu]FRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{ 酰胺}	[2-Abu5,13;Phe6;Glu10,28]GpTx-1(1-34)	1385
DCLG[Nva]FRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1386
DCLG[Nle]FRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1387
DCLGVFRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1388
DCLGLFRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1389
DCLGIFRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1390
DCLGGLRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Leu6;Glu10,28;2-Abu13]GpTx-1(1-34)	1391
DCLGALRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Leu6;Glu10,28;2-Abu13]GpTx-1(1-34)	1392
DCLG[2-Abu]LRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{ 酰胺}	[2-Abu5,13;Leu6;Glu10,28]GpTx-1(1-34)	1393
DCLG[Nva]LRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Leu6;Glu10,28;2-Abu13]GpTx-1(1-34)	1394
DCLG[Nle]LRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Leu6;Glu10,28;2-Abu13]GpTx-1(1-34)	1395

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DCLGVLRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Leu6;Glu10,28;2-Abu13]GpTx-1(1-34)	1396
DCLGLLRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5,6;Glu10,28;2-Abu13]GpTx-1(1-34)	1397
DCLGILRKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Leu6;Glu10,28;2-Abu13]GpTx-1(1-34)	1398
DCLGG[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Nle6;Glu10,28;2-Abu13]GpTx-1(1-34)	1399
DCLGA[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Nle6;Glu10,28;2-Abu13]GpTx-1(1-34)	1400
DCLG[2-Abu][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Glu10,28]GpTx-1(1-34)	1401
DCLG[Nva][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Nle6;Glu10,28;2-Abu13]GpTx-1(1-34)	1402
DCLG[Nle][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5,6;Glu10,28;2-Abu13]GpTx-1(1-34)	1403
DCLGV[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Nle6;Glu10,28;2-Abu13]GpTx-1(1-34)	1404
DCLGL[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Nle6;Glu10,28;2-Abu13]GpTx-1(1-34)	1405
DCLGI[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Nle6;Glu10,28;2-Abu13]GpTx-1(1-34)	1406
DCLGGFRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1407
DCLGAFRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1408
DCLG[2-Abu]FRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5,13;Phe6;Asp10;Glu28]GpTx-1(1-34)	1409
DCLG[Nva]FRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1410

[0405]

DCLG[Nle]FRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1411
DCLGVFRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1412
DCLGLFRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1413
DCLGIFRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1414
DCLGGLRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Leu6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1415
DCLGALRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Leu6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1416
DCLG[2-Abu]LRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{ 酰胺}	[2-Abu5,13;Leu6;Asp10;Glu28]GpTx-1(1-34)	1417
DCLG[Nva]LRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Leu6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1418
DCLG[Nle]LRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Leu6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1419
DCLGVLRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Leu6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1420
DCLGLLRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5,6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1421
DCLGILRKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Leu6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1422
DCLGG[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Nle6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1423
DCLGA[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Nle6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1424
DCLG[2-Abu][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{ 酰胺}	[2-Abu5,13;Nle6;Asp10;Glu28]GpTx-1(1-34)	1425
DCLG[Nva][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Nle6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1426

[0406]

DCLG[Nle][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{ 酰胺}	[Nle5,6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1427
DCLGV[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Nle6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1428
DCLGL[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Nle6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1429
DCLGI[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Nle6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1430
DCLGGFRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1431
DCLGAFRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1432
DCLG[2-Abu]FRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1433
DCLG[Nva]FRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1434
DCLG[Nle]FRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1435
DCLGVFRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1436
DCLGLFRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1437
DCLGIFRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1438
DCLGGLRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Leu6;Glu11,28;Pra13]GpTx-1(1-34)	1439
DCLGALRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Leu6;Glu11,28;Pra13]GpTx-1(1-34)	1440
DCLG[2-Abu]LRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5;Leu6;Glu11,28;Pra13]GpTx-1(1-34)	1441
DCLG[Nva]LRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Leu6;Glu11,28;Pra13]GpTx-1(1-34)	1442
DCLG[Nle]LRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Leu6;Glu11,28;Pra13]GpTx-1(1-34)	1443
DCLGVLRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Leu6;Glu11,28;Pra13]GpTx-1(1-34)	1444

[0407]

DCLGLLRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5,6;Glu11,28;Pra13]GpTx-1(1-34)	1445
DCLGILRKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Leu6;Glu11,28;Pra13]GpTx-1(1-34)	1446
DCLGG[Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1447
DCLGA[Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1448
DCLG[2-Abu][Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5;Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1449
DCLG[Nva][Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1450
DCLG[Nle][Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5,6;Glu11,28;Pra13]GpTx-1(1-34)	1451
DCLGV[Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1452
DCLGL[Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1453
DCLGI[Nle]RKCIED[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1454
DCLGGFRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1455
DCLGAFRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1456
DCLG[2-Abu]FRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1457
DCLG[Nva]FRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1458
DCLG[Nle]FRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Phe6,Glu10,28;Pra13]GpTx-1(1-34)	1459
DCLGVFRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1460
DCLGLFRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1461
DCLGIFRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1462

[0408]

DCLGGLRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Leu6;Glu10,28;Pra13]GpTx-1(1-34)	1463
DCLGALRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Leu6;Glu10,28;Pra13]GpTx-1(1-34)	1464
DCLG[2-Abu]LRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5;Leu6;Glu10,28;Pra13]GpTx-1(1-34)	1465
DCLG[Nva]LRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Leu6;Glu10,28;Pra13]GpTx-1(1-34)	1466
DCLG[Nle]LRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Leu6;Glu10,28;Pra13]GpTx-1(1-34)	1467
DCLGVLRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Leu6;Glu10,28;Pra13]GpTx-1(1-34)	1468
DCLGLLRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5,6;Glu10,28;Pra13]GpTx-1(1-34)	1469
DCLGILRKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Leu6;Glu10,28;Pra13]GpTx-1(1-34)	1470
DCLGG[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1471
DCLGA[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1472
DCLG[2-Abu][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5;Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1473
DCLG[Nva][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1474
DCLG[Nle][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5,6;Glu10,28;Pra13]GpTx-1(1-34)	1475
DCLGV[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1476
DCLGL[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1477
DCLGI[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1478
DCLGGFRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1479

[0409]

DCLGAFRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1480
DCLG[2-Abu]FRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1481
DCLG[Nva]FRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1482
DCLG[Nle]FRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1483
DCLGVFRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1484
DCLGLFRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1485
DCLGIFRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1486
DCLGGLRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Leu6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1487
DCLGALRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Leu6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1488
DCLG[2-Abu]LRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu5;Leu6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1489
DCLG[Nva]LRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nva5;Leu6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1490
DCLG[Nle]LRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5;Leu6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1491
DCLGVLRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Leu6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1492
DCLGLLRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5,6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1493
DCLGILRKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Leu6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1494
DCLGG[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1495
DCLGA[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1496
DCLG[2-Abu][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{ 酰胺}	[2-Abu5;Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1497

[0410]

DCLG[Nva][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{ 酰 胺 }	[Nva5;Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1498
DCLG[Nle][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Nle5,6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1499
DCLGV[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Val5;Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1500
DCLGL[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Leu5;Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1501
DCLGI[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ile5;Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1502
DCLGGFRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Phe6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1503
DCLGAFRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Phe6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1504
DCLG[2-Abu]FRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺 }	[2-Abu5,13;Phe6;Glu11,28;Leu26]GpTx-1(1-34)	1505
DCLG[Nva]FRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Phe6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1506
DCLG[Nle]FRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Phe6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1507
DCLGVFRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Phe6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1508
DCLGLFRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Phe6;Glu11,28;2-Abu13]GpTx-1(1-34)	1509
DCLGIFRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Phe6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1510
DCLGGLRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Leu6,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1511
DCLGALRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Leu6,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1512
DCLG[2-Abu]LRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{ 酰 胺}	[2-Abu5,13;Leu6,26;Glu11,28]GpTx-1(1-34)	1513

[0411]

DCLG[Nva]LRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Leu6,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1514
DCLG[Nle]LRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Leu6,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1515
DCLGVLRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Leu6,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1516
DCLGLLRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5 6,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1517
DCLGILRKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Leu6,26;Glu11,28;2-Abu13]GpTx-1(1-34)	1518
DCLGG[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Nle6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1519
DCLGA[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Nle6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1520
DCLG[2-Abu][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Glu11,28;Leu26]GpTx-1(1-34)	1521
DCLG[Nva][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{ 酰胺}	[Nva5;Nle6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1522
DCLG[Nle][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{ 酰胺}	[Nle5,6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1523
DCLGV[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Nle6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1524
DCLGL[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Nle6;Glu11,28;2-Abu13]GpTx-1(1-34)	1525
DCLGI[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Nle6;Glu11,28;2-Abu13;Leu26]GpTx-1(1-34)	1526
DCLGGFRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Phe6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1527
DCLGAFRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Phe6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1528
DCLG[2-Abu]FRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{ 酰	[2-Abu5,13;Phe6;Glu10,28;Leu26]GpTx-1(1-34)	1529

[0412]

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DCLG[Nva]FRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Phe6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1530
DCLG[Nle]FRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Phe6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1531
DCLGVFRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Phe6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1532
DCLGLFRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Phe6;Glu10,28;2-Abu13]GpTx-1(1-34)	1533
DCLGIFRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Phe6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1534
DCLGGLRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Leu6,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1535
DCLGALRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Leu6,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1536
DCLG[2-Abu]LRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{ 酰胺}	[2-Abu5,13;Leu6,26;Glu10,28]GpTx-1(1-34)	1537
DCLG[Nva]LRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Leu6,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1538
DCLG[Nle]LRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Leu6,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1539
DCLGVLRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Leu6,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1540
DCLGLLRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,6,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1541
DCLGILRKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Leu6,26;Glu10,28;2-Abu13]GpTx-1(1-34)	1542
DCLGG[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Nle6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1543
DCLGA[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Nle6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1544
DCLG[2-Abu][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{ 酰胺}	[2-Abu5,13;Nle6;Glu10,28;Leu26]GpTx-1(1-34)	1545

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DCLG[Nva][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Nle6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1546
DCLG[Nle][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{ 酰胺}	[Nle5,6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1547
DCLGV[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Nle6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1548
DCLGL[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Nle6;Glu10,28;2-Abu13]GpTx-1(1-34)	1549
DCLGI[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Nle6;Glu10,28;2-Abu13;Leu26]GpTx-1(1-34)	1550
DCLGGFRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Phe6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1551
DCLGAFRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Phe6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1552
DCLG[2-Abu]FRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{ 酰胺}	[2-Abu5,13;Phe6;Asp10;Leu26;Glu28]GpTx-1(1-34)	1553
DCLG[Nva]FRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Phe6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1554
DCLG[Nle]FRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Phe6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1555
DCLGVFRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Phe6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1556
DCLGLFRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Phe6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1557
DCLGIFRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Phe6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1558
DCLGGLRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Leu6,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1559
DCLGALRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Leu6,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1560
DCLG[2-Abu]LRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{ 酰	[2-Abu5,13;Leu6,26;Asp10;Glu28]GpTx-1(1-34)	1561

[0414]

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DCLG[Nva]LRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Leu6,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1562
DCLG[Nle]LRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Leu6,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1563
DCLGVLRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Leu6,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1564
DCLGLLRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,6,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1565
DCLGILRKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Leu6,26;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1566
DCLGG[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Nle6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1567
DCLGA[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Nle6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1568
DCLG[2-Abu][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Asp10;Leu26;Glu28]GpTx-1(1-34)	1569
DCLG[Nva][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Nle6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1570
DCLG[Nle][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5,6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1571
DCLGV[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Nle6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1572
DCLGL[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Nle6;Asp10;2-Abu13;Glu28]GpTx-1(1-34)	1573
DCLGI[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Nle6;Asp10;2-Abu13;Leu26;Glu28]GpTx-1(1-34)	1574
DCLGGFRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Phe6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1575
DCLGAFRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Phe6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1576

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DCLG[2-Abu]FRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5;Phe6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1577
DCLG[Nva]FRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Phe6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1578
DCLG[Nle]FRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Phe6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1579
DCLGVFRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Phe6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1580
DCLGLFRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Phe6;Glu11,28;Pra13]GpTx-1(1-34)	1581
DCLGIFRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Phe6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1582
DCLGGLRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Leu6,26;Glu11,28;Pra13]GpTx-1(1-34)	1583
DCLGALRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Leu6,26;Glu11,28;Pra13]GpTx-1(1-34)	1584
DCLG[2-Abu]LRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5;Leu6,26;Glu11,28;Pra13]GpTx-1(1-34)	1585
DCLG[Nva]LRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Leu6,26;Glu11,28;Pra13]GpTx-1(1-34)	1586
DCLG[Nle]LRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Leu6,26;Glu11,28;Pra13]GpTx-1(1-34)	1587
DCLGVLRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Leu6,26;Glu11,28;Pra13]GpTx-1(1-34)	1588
DCLGLLRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,6,26;Glu11,28;Pra13]GpTx-1(1-34)	1589
DCLGILRKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Leu6,26;Glu11,28;Pra13]GpTx-1(1-34)	1590
DCLGG[Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Nle6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1591
DCLGA[Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Nle6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1592
DCLG[2-Abu][Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{ 酰胺}	[2-Abu5;Nle6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1593
DCLG[Nva][Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Nle6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1594

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DCLG[Nle][Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5,6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1595
DCLGV[Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Nle6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1596
DCLGL[Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Nle6;Glu11,28;Pra13]GpTx-1(1-34)	1597
DCLGI[Nle]RKCIED[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Nle6;Glu11,28;Pra13;Leu26]GpTx-1(1-34)	1598
DCLGGFRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Phe6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1599
DCLGAFRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Phe6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1600
DCLG[2-Abu]FRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5;Phe6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1601
DCLG[Nva]FRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Phe6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1602
DCLG[Nle]FRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Phe6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1603
DCLGVFRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Phe6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1604
DCLGLFRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Phe6;Glu10,28;Pra13]GpTx-1(1-34)	1605
DCLGIFRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Phe6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1606
DCLGGLRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Leu6,26;Glu10,28;Pra13]GpTx-1(1-34)	1607
DCLGALRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Leu6,26;Glu10,28;Pra13]GpTx-1(1-34)	1608
DCLG[2-Abu]LRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5;Leu6,26;Glu10,28;Pra13]GpTx-1(1-34)	1609
DCLG[Nva]LRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Leu6,26;Glu10,28;Pra13]GpTx-1(1-34)	1610
DCLG[Nle]LRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Leu6,26;Glu10,28;Pra13]GpTx-1(1-34)	1611
DCLGVLRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Leu6,26;Glu10,28;Pra13]GpTx-1(1-34)	1612
DCLGLLRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,6,26;Glu10,28;Pra13]GpTx-1(1-34)	1613

[0417]

DCLGILRKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Leu6,26;Glu10,28;Pra13]GpTx-1(1-34)	1614
DCLGG[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Nle6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1615
DCLGA[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Nle6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1616
DCLG[2-Abu][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{ 酰胺}	[2-Abu5;Nle6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1617
DCLG[Nva][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{ 酰胺 }	[Nva5;Nle6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1618
DCLG[Nle][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5,6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1619
DCLGV[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Nle6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1620
DCLGL[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Nle6;Glu10,28;Pra13]GpTx-1(1-34)	1621
DCLGI[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Nle6;Glu10,28;Pra13;Leu26]GpTx-1(1-34)	1622
DCLGGFRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Phe6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1623
DCLGAFRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Phe6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1624
DCLG[2-Abu]FRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5;Phe6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1625
DCLG[Nva]FRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Phe6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1626
DCLG[Nle]FRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Phe6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1627
DCLGVFRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Phe6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1628
DCLGLFRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Phe6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1629
DCLGIFRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Phe6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1630

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DCLGGLRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Leu6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1631
DCLGALRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Leu6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1632
DCLG[2-Abu]LRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5;Leu6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1633
DCLG[Nva]LRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Leu6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1634
DCLG[Nle]LRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5;Leu6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1635
DCLGVLRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Leu6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1636
DCLGLLRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1637
DCLGILRKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Leu6,26;Asp10;Pra13;Glu28]GpTx-1(1-34)	1638
DCLGG[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Gly5;Nle6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1639
DCLGA[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ala5;Nle6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1640
DCLG[2-Abu][Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[2-Abu5;Nle6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1641
DCLG[Nva][Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nva5;Nle6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1642
DCLG[Nle][Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Nle5,6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1643
DCLGV[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Val5;Nle6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1644
DCLGL[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Leu5,26;Nle6;Asp10;Pra13;Glu28]GpTx-1(1-34)	1645
DCLGI[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHEWCKYVF-{酰胺}	[Ile5;Nle6;Asp10;Pra13;Leu26;Glu28]GpTx-1(1-34)	1646

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DCLGFMRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu13,Asp28]GpTx-1(1-34)	1647
DCLGFMRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Pra13,Asp28]GpTx-1(1-34)	1648
DCLGFMRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu13,Leu26,Asp28]GpTx-1(1-34)	1649
DCLGFMRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Pra13,Leu26,Asp28]GpTx-1(1-34)	1650
DCLGFMRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Glu11,2-Abu13,Asp28]GpTx-1(1-34)	1651
DCLGFMRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Glu10,2-Abu13,Asp28]GpTx-1(1-34)	1652
DCLGFMRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Asp10,28,2-Abu13]GpTx-1(1-34)	1653
DCLGFFRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Phe6,2-Abu13,Asp28]GpTx-1(1-34)	1654
DCLGFLRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu6,2-Abu13,Asp28]GpTx-1(1-34)	1655
DCLGF[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle6,2-Abu13,Asp28]GpTx-1(1-34)	1656
DCLGGMRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5,2-Abu13,Asp28]GpTx-1(1-34)	1657
DCLGAMRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5,2-Abu13,Asp28]GpTx-1(1-34)	1658
DCLG[2-Abu]MRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5,13,Asp28]GpTx-1(1-34)	1659
DCLG[Nva]MRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5,2-Abu13,Asp28]GpTx-1(1-34)	1660
DCLG[Nle]MRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5,2-Abu13,Asp28]GpTx-1(1-34)	1661
DCLGVMRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5,2-Abu13,Asp28]GpTx-1(1-34)	1662
DCLGLMRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5,2-Abu13,Asp28]GpTx-1(1-34)	1663
DCLGIMRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5,2-Abu13,Asp28]GpTx-1(1-34)	1664

[0420]

DCLGFMRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Glu11;Pra13;Asp28]GpTx-1(1-34)	1665
DCLGFMRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Glu10;Pra13;Asp28]GpTx-1(1-34)	1666
DCLGFMRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Asp10,28;Pra13]GpTx-1(1-34)	1667
DCLGFFRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Phe6;Pra13;Asp28]GpTx-1(1-34)	1668
DCLGFLRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu6;Pra13;Asp28]GpTx-1(1-34)	1669
DCLGF[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle6;Pra13;Asp28]GpTx-1(1-34)	1670
DCLGGMRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Pra13;Asp28]GpTx-1(1-34)	1671
DCLGAMRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Pra13;Asp28]GpTx-1(1-34)	1672
DCLG[2-Abu]MRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5;Pra13;Asp28]GpTx-1(1-34)	1673
DCLG[Nva]MRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Pra13;Asp28]GpTx-1(1-34)	1674
DCLG[Nle]MRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Pra13;Asp28]GpTx-1(1-34)	1675
DCLGVMRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Pra13;Asp28]GpTx-1(1-34)	1676
DCLGLMRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Pra13;Asp28]GpTx-1(1-34)	1677
DCLGIMRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Pra13;Asp28]GpTx-1(1-34)	1678
DCLGFMRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1679
DCLGFMRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1680
DCLGFMRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1681
DCLGFFRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Phe6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1682
DCLGFLRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu6,26;2-Abu13;Asp28]GpTx-1(1-34)	1683

[0421]

DCLGF[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1684
DCLGGMRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1685
DCLGAMRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1686
DCLG[2-Abu]MRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5,13;Leu26;Asp28]GpTx-1(1-34)	1687
DCLG[Nva]MRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1688
DCLG[Nle]MRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1689
DCLGVMRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1690
DCLGLMRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;2-Abu13;Asp28]GpTx-1(1-34)	1691
DCLGIMRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1692
DCLGFMRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1693
DCLGFMRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1694
DCLGFMRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1695
DCLGFFRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Phe6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1696
DCLGFLRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu6,26;Pra13;Asp28]GpTx-1(1-34)	1697
DCLGF[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1698
DCLGGMRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Pra13;Leu26;Asp28]GpTx-1(1-34)	1699
DCLGAMRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Pra13;Leu26;Asp28]GpTx-1(1-34)	1700
DCLG[2-Abu]MRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5;Pra13;Leu26;Asp28]GpTx-1(1-34)	1701

[0422]

DCLG[Nva]MRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Pra13;Leu26;Asp28]GpTx-1(1-34)	1702
DCLG[Nle]MRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Pra13;Leu26;Asp28]GpTx-1(1-34)	1703
DCLGVMRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Pra13;Leu26;Asp28]GpTx-1(1-34)	1704
DCLGLMRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Pra13;Asp28]GpTx-1(1-34)	1705
DCLGIMRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Pra13;Leu26;Asp28]GpTx-1(1-34)	1706
DCLGFFRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1707
DCLGFLRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1708
DCLGF[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1709
DCLGGMRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1710
DCLGAMRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1711
DCLG[2-Abu]MRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5,13;Glu11;Asp28]GpTx-1(1-34)	1712
DCLG[Nva]MRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1713
DCLG[Nle]MRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1714
DCLGVMRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1715
DCLGLMRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1716
DCLGIMRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1717
DCLGFFRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1718
DCLGFLRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1719

[0423]

DCLGF[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1720
DCLGGMRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1721
DCLGAMRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1722
DCLG[2-Abu]MRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{ 酰胺}	[2-Abu5,13;Glu10;Asp28]GpTx-1(1-34)	1723
DCLG[Nva]MRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{ 酰胺 }	[Nva5;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1724
DCLG[Nle]MRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1725
DCLGVMRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1726
DCLGLMRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1727
DCLGIMRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1728
DCLGFFRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	1729
DCLGFLRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu6;Asp10,28;2-Abu13]GpTx-1(1-34)	1730
DCLGF[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle6;Asp10,28;2-Abu13]GpTx-1(1-34)	1731
DCLGGMRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Asp10,28;2-Abu13]GpTx-1(1-34)	1732
DCLGAMRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Asp10,28;2-Abu13]GpTx-1(1-34)	1733
DCLG[2-Abu]MRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{ 酰胺}	[2-Abu5,13;Asp10,28]GpTx-1(1-34)	1734
DCLG[Nva]MRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺	[Nva5;Asp10,28;2-Abu13]GpTx-1(1-34)	1735

[0424]

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DCLG[Nle]MRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{ 酰 胺 } [Nle5;Asp10,28;2-Abu13]GpTx-1(1-34)		1736
DCLGVMRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Asp10,28;2-Abu13]GpTx-1(1-34)	1737
DCLGLMRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Asp10,28;2-Abu13]GpTx-1(1-34)	1738
DCLGIMRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Asp10,28;2-Abu13]GpTx-1(1-34)	1739
DCLGGFRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1740
DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1741
DCLG[2-Abu]FRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺 } [2-Abu5,13;Phe6;Asp28]GpTx-1(1-34)		1742
DCLG[Nva]FRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1743
DCLG[Nle]FRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1744
DCLGVFRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1745
DCLGLFRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1746
DCLGIFRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1747
DCLGGLRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Leu6;2-Abu13;Asp28]GpTx-1(1-34)	1748
DCLGALRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Leu6;2-Abu13;Asp28]GpTx-1(1-34)	1749
DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{ 酰 胺} [2-Abu5,13;Leu6;Asp28]GpTx-1(1-34)		1750

[0425]

DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Leu6;2-Abu13;Asp28]GpTx-1(1-34)	1751
DCLG[Nle]LRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Leu6;2-Abu13;Asp28]GpTx-1(1-34)	1752
DCLGVLRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Leu6;2-Abu13;Asp28]GpTx-1(1-34)	1753
DCLGLLRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5,6;2-Abu13;Asp28]GpTx-1(1-34)	1754
DCLGILRKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Leu6;2-Abu13;Asp28]GpTx-1(1-34)	1755
DCLGG[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Nle6;2-Abu13;Asp28]GpTx-1(1-34)	1756
DCLGA[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Nle6;2-Abu13;Asp28]GpTx-1(1-34)	1757
DCLG[2-Abu][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Asp28]GpTx-1(1-34)	1758
DCLG[Nva][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Nle6;2-Abu13;Asp28]GpTx-1(1-34)	1759
DCLG[Nle][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5,6;2-Abu13;Asp28]GpTx-1(1-34)	1760
DCLGV[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Nle6;2-Abu13;Asp28]GpTx-1(1-34)	1761
DCLGL[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Nle6;2-Abu13;Asp28]GpTx-1(1-34)	1762
DCLGI[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Nle6;2-Abu13;Asp28]GpTx-1(1-34)	1763
DCLGFFRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	1764
DCLGFLRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu6;Glu11;Pra13;Asp28]GpTx-1(1-34)	1765
DCLGF[Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	1766

[0426]

DCLGGMRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Glu11;Pra13;Asp28]GpTx-1(1-34)	1767
DCLGAMRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Glu11;Pra13;Asp28]GpTx-1(1-34)	1768
DCLG[2-Abu]MRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5;Glu11;Pra13;Asp28]GpTx-1(1-34)	1769
DCLG[Nva]MRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Glu11;Pra13;Asp28]GpTx-1(1-34)	1770
DCLG[Nle]MRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Glu11;Pra13;Asp28]GpTx-1(1-34)	1771
DCLGVMRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Glu11;Pra13;Asp28]GpTx-1(1-34)	1772
DCLGLMRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Glu11;Pra13;Asp28]GpTx-1(1-34)	1773
DCLGIMRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Glu11;Pra13;Asp28]GpTx-1(1-34)	1774
DCLGFFRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	1775
DCLGFLRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu6;Glu10;Pra13;Asp28]GpTx-1(1-34)	1776
DCLGF[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	1777
DCLGGMRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Glu10;Pra13;Asp28]GpTx-1(1-34)	1778
DCLGAMRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Glu10;Pra13;Asp28]GpTx-1(1-34)	1779
DCLG[2-Abu]MRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5;Glu10;Pra13;Asp28]GpTx-1(1-34)	1780
DCLG[Nva]MRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Glu10;Pra13;Asp28]GpTx-1(1-34)	1781
DCLG[Nle]MRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Glu10;Pra13;Asp28]GpTx-1(1-34)	1782
DCLGVMRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Glu10;Pra13;Asp28]GpTx-1(1-34)	1783
DCLGLMRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Glu10;Pra13;Asp28]GpTx-1(1-34)	1784
DCLGIMRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Glu10;Pra13;Asp28]GpTx-1(1-34)	1785

[0427]

DCLGFFRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Phe6;Asp10,28;Pra13]GpTx-1(1-34)	1786
DCLGFLRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu6;Asp10,28;Pra13]GpTx-1(1-34)	1787
DCLGF[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle6;Asp10,28;Pra13]GpTx-1(1-34)	1788
DCLGGMRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Asp10,28;Pra13]GpTx-1(1-34)	1789
DCLGAMRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Asp10,28;Pra13]GpTx-1(1-34)	1790
DCLG[2-Abu]MRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5;Asp10,28;Pra13]GpTx-1(1-34)	1791
DCLG[Nva]MRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Asp10,28;Pra13]GpTx-1(1-34)	1792
DCLG[Nle]MRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Asp10,28;Pra13]GpTx-1(1-34)	1793
DCLGVMRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Asp10,28;Pra13]GpTx-1(1-34)	1794
DCLGLMRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Asp10,28;Pra13]GpTx-1(1-34)	1795
DCLGIMRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Asp10,28;Pra13]GpTx-1(1-34)	1796
DCLGGFRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Phe6;Pra13;Asp28]GpTx-1(1-34)	1797
DCLGAFRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Phe6;Pra13;Asp28]GpTx-1(1-34)	1798
DCLG[2-Abu]FRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5;Phe6;Pra13;Asp28]GpTx-1(1-34)	1799
DCLG[Nva]FRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Phe6;Pra13;Asp28]GpTx-1(1-34)	1800
DCLG[Nle]FRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Phe6;Pra13;Asp28]GpTx-1(1-34)	1801
DCLGVFRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Phe6;Pra13;Asp28]GpTx-1(1-34)	1802
DCLGLFRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Phe6;Pra13;Asp28]GpTx-1(1-34)	1803
DCLGIFRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Phe6;Pra13;Asp28]GpTx-1(1-34)	1804

[0428]

DCLGGLRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Leu6;Pra13;Asp28]GpTx-1(1-34)	1805
DCLGALRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Leu6;Pra13;Asp28]GpTx-1(1-34)	1806
DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5;Leu6;Pra13;Asp28]GpTx-1(1-34)	1807
DCLG[Nva]LRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Leu6;Pra13;Asp28]GpTx-1(1-34)	1808
DCLG[Nle]LRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Leu6;Pra13;Asp28]GpTx-1(1-34)	1809
DCLGVLRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Leu6;Pra13;Asp28]GpTx-1(1-34)	1810
DCLGLLRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5,6;Pra13;Asp28]GpTx-1(1-34)	1811
DCLGILRKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Leu6;Pra13;Asp28]GpTx-1(1-34)	1812
DCLGG[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Nle6;Pra13;Asp28]GpTx-1(1-34)	1813
DCLGA[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Nle6;Pra13;Asp28]GpTx-1(1-34)	1814
DCLG[2-Abu][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5;Nle6;Pra13;Asp28]GpTx-1(1-34)	1815
DCLG[Nva][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Nle6;Pra13;Asp28]GpTx-1(1-34)	1816
DCLG[Nle][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5,6;Pra13;Asp28]GpTx-1(1-34)	1817
DCLGV[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Nle6;Pra13;Asp28]GpTx-1(1-34)	1818
DCLGL[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Nle6;Pra13;Asp28]GpTx-1(1-34)	1819
DCLGI[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Nle6;Pra13;Asp28]GpTx-1(1-34)	1820
DCLGFFRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Phe6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1821
DCLGFLRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu6,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1822

[0429]

DCLGF[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1823
DCLGGMRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1824
DCLGAMRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1825
DCLG[2-Abu]MRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{ 酰胺}	[2-Abu5,13;Glu11;Leu26;Asp28]GpTx-1(1-34)	1826
DCLG[Nva]MRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{ 酰 胺}	[Nva5;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1827
DCLG[Nle]MRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1828
DCLGVMRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1829
DCLGLMRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1830
DCLGIMRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1831
DCLGFFRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Phe6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1832
DCLGFLRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu6,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1833
DCLGF[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1834
DCLGGMRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1835
DCLGAMRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1836
DCLG[2-Abu]MRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{ 酰胺}	[2-Abu5,13;Glu10;Leu26;Asp28]GpTx-1(1-34)	1837
DCLG[Nva]MRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{ 酰 胺	[Nva5;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1838

[0430]

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DCLG[Nle]MRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{ 酰 胺 }	[Nle5;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1839
DCLGVMRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1840
DCLGLMRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1841
DCLGIMRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1842
DCLGFFRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Phe6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1843
DCLGFLRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu6,26;Asp10,28;2-Abu13]GpTx-1(1-34)	1844
DCLGF[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1845
DCLGGMRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1846
DCLGAMRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1847
DCLG[2-Abu]MRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{ 酰 胺}	[2-Abu5,13;Asp10,28;Leu26]GpTx-1(1-34)	1848
DCLG[Nva]MRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{ 酰 胺 }	[Nva5;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1849
DCLG[Nle]MRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{ 酰 胺 }	[Nle5;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1850
DCLGVMRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1851
DCLGLMRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Asp10,28;2-Abu13]GpTx-1(1-34)	1852

[0431]

DCLGIMRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	1853
DCLGGFRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Phe6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1854
DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Phe6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1855
DCLG[2-Abu]FRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5,13;Phe6;Leu26;Asp28]GpTx-1(1-34)	1856
DCLG[Nva]FRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Phe6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1857
DCLG[Nle]FRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Phe6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1858
DCLGVFRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Phe6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1859
DCLGLFRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Phe6;2-Abu13;Asp28]GpTx-1(1-34)	1860
DCLGIFRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Phe6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1861
DCLGGLRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Leu6,26;2-Abu13;Asp28]GpTx-1(1-34)	1862
DCLGALRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Leu6,26;2-Abu13;Asp28]GpTx-1(1-34)	1863
DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5,13;Leu6,26;Asp28]GpTx-1(1-34)	1864
DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Leu6,26;2-Abu13;Asp28]GpTx-1(1-34)	1865
DCLG[Nle]LRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Leu6,26;2-Abu13;Asp28]GpTx-1(1-34)	1866
DCLGVLRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Leu6,26;2-Abu13;Asp28]GpTx-1(1-34)	1867
DCLGLLRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,6,26;2-Abu13;Asp28]GpTx-1(1-34)	1868
DCLGILRKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Leu6,26;2-Abu13;Asp28]GpTx-1(1-34)	1869

[0432]

DCLGG[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Nle6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1870
DCLGA[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Nle6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1871
DCLG[2-Abu][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Leu26;Asp28]GpTx-1(1-34)	1872
DCLG[Nva][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Nle6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1873
DCLG[Nle][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5,6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1874
DCLGV[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5:Nle6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1875
DCLGL[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Nle6;2-Abu13;Asp28]GpTx-1(1-34)	1876
DCLGI[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Nle6;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	1877
DCLGFFRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Phe6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1878
DCLGFLRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	1879
DCLGF[Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1880
DCLGGMRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1881
DCLGAMRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1882
DCLG[2-Abu]MRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1883
DCLG[Nva]MRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1884
DCLG[Nle]MRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1885

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DCLGVMRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1886
DCLGLMRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	1887
DCLGIMRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	1888
DCLGFFRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Phe6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1889
DCLGFLRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	1890
DCLGF[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1891
DCLGGMRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1892
DCLGAMRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1893
DCLG[2-Abu]MRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1894
DCLG[Nva]MRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1895
DCLG[Nle]MRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1896
DCLGVMRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1897
DCLGLMRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	1898
DCLGIMRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	1899
DCLGFFRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Phe6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1900
DCLGFLRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu6,26;Asp10,28;Pra13]GpTx-1(1-34)	1901
DCLGF[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1902
DCLGGMRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5:Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1903
DCLGAMRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1904

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DCLG[2-Abu]MRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{ 酰 胺 }	[2-Abu5;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1905
DCLG[Nva]MRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1906
DCLG[Nle]MRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1907
DCLGVMRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1908
DCLGLMRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Asp10,28;Pra13]GpTx-1(1-34)	1909
DCLGIMRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	1910
DCLGGFRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Phe6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1911
DCLGAFRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Phe6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1912
DCLG[2-Abu]FRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5;Phe6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1913
DCLG[Nva]FRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Phe6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1914
DCLG[Nle]FRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Phe6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1915
DCLGVFRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Phe6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1916
DCLGLFRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Phe6;Pra13;Asp28]GpTx-1(1-34)	1917
DCLGIFRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Phe6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1918
DCLGGLRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Leu6,26;Pra13;Asp28]GpTx-1(1-34)	1919
DCLGALRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Leu6,26;Pra13;Asp28]GpTx-1(1-34)	1920
DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5;Leu6,26;Pra13;Asp28]GpTx-1(1-34)	1921
DCLG[Nva]LRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Leu6,26;Pra13;Asp28]GpTx-1(1-34)	1922

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DCLG[Nle]LRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Leu6,26;Pra13;Asp28]GpTx-1(1-34)	1923
DCLGVLRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Leu6,26;Pra13;Asp28]GpTx-1(1-34)	1924
DCLGLLRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,6,26;Pra13;Asp28]GpTx-1(1-34)	1925
DCLGILRKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Leu6,26;Pra13;Asp28]GpTx-1(1-34)	1926
DCLGG[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Nle6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1927
DCLGA[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Nle6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1928
DCLG[2-Abu][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5;Nle6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1929
DCLG[Nva][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Nle6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1930
DCLG[Nle][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5,6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1931
DCLGV[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Nle6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1932
DCLGL[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Nle6;Pra13;Asp28]GpTx-1(1-34)	1933
DCLGI[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Nle6;Pra13;Leu26;Asp28]GpTx-1(1-34)	1934
DCLGGFRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1935
DCLGAFRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1936
DCLG[2-Abu]FRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5,13;Phe6;Glu11;Asp28]GpTx-1(1-34)	1937
DCLG[Nva]FRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1938
DCLG[Nle]FRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1939

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DCLGVFRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1940
DCLGLFRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1941
DCLGIFRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1942
DCLGGLRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Leu6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1943
DCLGALRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Leu6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1944
DCLG[2-Abu]LRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{ 酰胺}	[2-Abu5,13;Leu6;Glu11;Asp28]GpTx-1(1-34)	1945
DCLG[Nva]LRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Leu6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1946
DCLG[Nle]LRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Leu6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1947
DCLGVLRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Leu6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1948
DCLGLLRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5,6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1949
DCLGILRKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Leu6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1950
DCLGG[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Nle6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1951
DCLGA[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Nle6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1952
DCLG[2-Abu][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Glu11;Asp28]GpTx-1(1-34)	1953
DCLG[Nva][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{ 酰胺}	[Nva5;Nle6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1954
DCLG[Nle][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{ 酰	[Nle5,6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1955

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DCLGV[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Nle6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1956
DCLGL[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Nle6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1957
DCLGI[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Nle6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	1958
DCLGGFRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1959
DCLGAFRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1960
DCLG[2-Abu]FRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{ 酰胺}	[2-Abu5,13;Phe6;Glu10;Asp28]GpTx-1(1-34)	1961
DCLG[Nva]FRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1962
DCLG[Nle]FRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1963
DCLGVFRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1964
DCLGLFRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1965
DCLGIFRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1966
DCLGGLRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Leu6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1967
DCLGALRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Leu6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1968
DCLG[2-Abu]LRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{ 酰胺}	[2-Abu5,13;Leu6;Glu10;Asp28]GpTx-1(1-34)	1969
DCLG[Nva]LRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Leu6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1970
DCLG[Nle]LRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Leu6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1971

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DCLGVLRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Leu6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1972
DCLGLLRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5,6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1973
DCLGILRKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Leu6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1974
DCLGG[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Nle6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1975
DCLGA[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Nle6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1976
DCLG[2-Abu][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Glu10;Asp28]GpTx-1(1-34)	1977
DCLG[Nva][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Nle6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1978
DCLG[Nle][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{ 酰胺}	[Nle5,6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1979
DCLGV[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Nle6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1980
DCLGL[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Nle6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1981
DCLGI[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Nle6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	1982
DCLGGFRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	1983
DCLGAFRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	1984
DCLG[2-Abu]FRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{ 酰胺}	[2-Abu5,13;Phe6;Asp10,28]GpTx-1(1-34)	1985
DCLG[Nva]FRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	1986

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DCLG[Nle]FRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	1987
DCLGVFRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	1988
DCLGLFRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	1989
DCLGIFRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	1990
DCLGGLRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Leu6;Asp10,28;2-Abu13]GpTx-1(1-34)	1991
DCLGALRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Leu6;Asp10,28;2-Abu13]GpTx-1(1-34)	1992
DCLG[2-Abu]LRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{ 酰胺}	[2-Abu5,13;Leu6;Asp10,28]GpTx-1(1-34)	1993
DCLG[Nva]LRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{ 酰 胺}	[Nva5;Leu6;Asp10,28;2-Abu13]GpTx-1(1-34)	1994
DCLG[Nle]LRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Leu6;Asp10,28;2-Abu13]GpTx-1(1-34)	1995
DCLGVLRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Leu6;Asp10,28;2-Abu13]GpTx-1(1-34)	1996
DCLGLLRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5,6;Asp10,28;2-Abu13]GpTx-1(1-34)	1997
DCLGILRKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Leu6;Asp10,28;2-Abu13]GpTx-1(1-34)	1998
DCLGG[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Nle6;Asp10,28;2-Abu13]GpTx-1(1-34)	1999
DCLGA[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Nle6;Asp10,28;2-Abu13]GpTx-1(1-34)	2000
DCLG[2-Abu][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{ 酰胺}	[2-Abu5,13;Nle6;Asp10,28]GpTx-1(1-34)	2001
DCLG[Nva][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{	[Nva5;Nle6;Asp10,28;2-Abu13]GpTx-1(1-34)	2002

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酰胺}		
DCLG[Nle][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5,6;Asp10,28;2-Abu13]GpTx-1(1-34)	2003
DCLGV[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Nle6;Asp10,28;2-Abu13]GpTx-1(1-34)	2004
DCLGL[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Nle6;Asp10,28;2-Abu13]GpTx-1(1-34)	2005
DCLGI[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Nle6;Asp10,28;2-Abu13]GpTx-1(1-34)	2006
DCLGGFRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2007
DCLGAFRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2008
DCLG[2-Abu]FRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2009
DCLG[Nva]FRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2010
DCLG[Nle]FRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2011
DCLGVFRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2012
DCLGLFRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2013
DCLGIFRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2014
DCLGGLRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Leu6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2015
DCLGALRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Leu6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2016
DCLG[2-Abu]LRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5;Leu6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2017
DCLG[Nva]LRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Leu6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2018
DCLG[Nle]LRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Leu6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2019

[0441]

DCLGVLRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Leu6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2020
DCLGLLRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5,6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2021
DCLGILRKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Leu6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2022
DCLGG[Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2023
DCLGA[Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2024
DCLG[2-Abu][Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5;Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2025
DCLG[Nva][Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2026
DCLG[Nle][Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5,6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2027
DCLGV[Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2028
DCLGL[Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2029
DCLGI[Nle]RKCIED[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2030
DCLGGFRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2031
DCLGAFRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2032
DCLG[2-Abu]FRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2033
DCLG[Nva]FRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2034
DCLG[Nle]FRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2035
DCLGVFRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2036
DCLGLFRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2037

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DCLGIFRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2038
DCLGGLRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Leu6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2039
DCLGALRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Leu6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2040
DCLG[2-Abu]LRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5;Leu6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2041
DCLG[Nva]LRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Leu6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2042
DCLG[Nle]LRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Leu6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2043
DCLGVLRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Leu6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2044
DCLGLLRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5,6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2045
DCLGILRKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Leu6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2046
DCLGG[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2047
DCLGA[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2048
DCLG[2-Abu][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5;Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2049
DCLG[Nva][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2050
DCLG[Nle][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5,6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2051
DCLGV[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2052
DCLGL[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2053
DCLGI[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2054

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DCLGGFRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2055
DCLGAFRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2056
DCLG[2-Abu]FRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2057
DCLG[Nva]FRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2058
DCLG[Nle]FRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2059
DCLGVFRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2060
DCLGLFRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2061
DCLGIFRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2062
DCLGGLRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Leu6;Asp10,28;Pra13]GpTx-1(1-34)	2063
DCLGALRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Leu6;Asp10,28;Pra13]GpTx-1(1-34)	2064
DCLG[2-Abu]LRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[2-Abu5;Leu6;Asp10,28;Pra13]GpTx-1(1-34)	2065
DCLG[Nva]LRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nva5;Leu6;Asp10,28;Pra13]GpTx-1(1-34)	2066
DCLG[Nle]LRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Nle5;Leu6;Asp10,28;Pra13]GpTx-1(1-34)	2067
DCLGVLRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Leu6;Asp10,28;Pra13]GpTx-1(1-34)	2068
DCLGLLRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5,6;Asp10,28;Pra13]GpTx-1(1-34)	2069
DCLGILRKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Leu6;Asp10,28;Pra13]GpTx-1(1-34)	2070
DCLGG[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Gly5;Nle6;Asp10,28;Pra13]GpTx-1(1-34)	2071
DCLGA[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Nle6;Asp10,28;Pra13]GpTx-1(1-34)	2072
DCLG[2-Abu][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{ 酰	[2-Abu5;Nle6;Asp10,28;Pra13]GpTx-1(1-34)	2073

[0444]

胺}		
DCLG[Nva][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺 }	[Nva5;Nle6;Asp10,28;Pra13]GpTx-1(1-34)	2074
DCLG[Nle][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺 }	[Nle5,6;Asp10,28;Pra13]GpTx-1(1-34)	2075
DCLGV[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Val5;Nle6;Asp10,28;Pra13]GpTx-1(1-34)	2076
DCLGL[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Leu5;Nle6;Asp10,28;Pra13]GpTx-1(1-34)	2077
DCLGI[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ile5;Nle6;Asp10,28;Pra13]GpTx-1(1-34)	2078
DCLGGFRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Phe6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2079
DCLGAFRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Phe6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2080
DCLG[2-Abu]FRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰 胺}	[2-Abu5,13;Phe6;Glu11;Leu26;Asp28]GpTx-1(1-34)	2081
DCLG[Nva]FRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Phe6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2082
DCLG[Nle]FRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Phe6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2083
DCLGVFRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Phe6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2084
DCLGLFRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Phe6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2085
DCLGIFRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Phe6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2086
DCLGGLRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Leu6,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2087
DCLGALRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Leu6,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2088

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DCLG[2-Abu]LRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{ 酰胺}	[2-Abu5,13;Leu6,26;Glu11;Asp28]GpTx-1(1-34)	2089
DCLG[Nva]LRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Leu6,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2090
DCLG[Nle]LRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Leu6,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2091
DCLGVLRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Leu6,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2092
DCLGLLRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,6,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2093
DCLGILRKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Leu6,26;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2094
DCLGG[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Nle6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2095
DCLGA[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Nle6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2096
DCLG[2-Abu][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Glu11;Leu26;Asp28]GpTx-1(1-34)	2097
DCLG[Nva][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{ 酰胺}	[Nva5;Nle6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2098
DCLG[Nle][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{ 酰胺}	[Nle5,6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2099
DCLGV[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Nle6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2100
DCLGL[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Nle6;Glu11;2-Abu13;Asp28]GpTx-1(1-34)	2101
DCLGI[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Nle6;Glu11;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2102
DCLGGFRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Phe6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2103

[0446]

DCLGAFRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Phe6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2104
DCLG[2-Abu]FRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5,13;Phe6;Glu10;Leu26;Asp28]GpTx-1(1-34)	2105
DCLG[Nva]FRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Phe6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2106
DCLG[Nle]FRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Phe6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2107
DCLGVFRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Phe6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2108
DCLGLFRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Phe6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2109
DCLGIFRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Phe6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2110
DCLGGLRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Leu6,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2111
DCLGALRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Leu6,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2112
DCLG[2-Abu]LRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5,13;Leu6,26;Glu10;Asp28]GpTx-1(1-34)	2113
DCLG[Nva]LRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Leu6,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2114
DCLG[Nle]LRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Leu6,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2115
DCLGVLRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Leu6,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2116
DCLGLLRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,6,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2117
DCLGILRKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Leu6,26;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2118
DCLGG[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Nle6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2119
DCLGA[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Nle6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2120

[0447]

DCLG[2-Abu][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Glu10;Leu26;Asp28]GpTx-1(1-34)	2121
DCLG[Nva][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Nle6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2122
DCLG[Nle][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5,6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2123
DCLGV[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Nle6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2124
DCLGL[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Nle6;Glu10;2-Abu13;Asp28]GpTx-1(1-34)	2125
DCLGI[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Nle6;Glu10;2-Abu13;Leu26;Asp28]GpTx-1(1-34)	2126
DCLGGFRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Phe6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2127
DCLGAFRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Phe6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2128
DCLG[2-Abu]FRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5,13;Phe6;Asp10,28;Leu26]GpTx-1(1-34)	2129
DCLG[Nva]FRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Phe6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2130
DCLG[Nle]FRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Phe6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2131
DCLGVFRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Phe6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2132
DCLGLFRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Phe6;Asp10,28;2-Abu13]GpTx-1(1-34)	2133
DCLGIFRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Phe6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2134

[0448]

DCLGGLRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Leu6,26;Asp10,28;2-Abu13]GpTx-1(1-34)	2135
DCLGALRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Leu6,26;Asp10,28;2-Abu13]GpTx-1(1-34)	2136
DCLG[2-Abu]LRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{ 酰胺}	[2-Abu5,13;Leu6,26;Asp10,28]GpTx-1(1-34)	2137
DCLG[Nva]LRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{ 酰 胺}	[Nva5;Leu6,26;Asp10,28;2-Abu13]GpTx-1(1-34)	2138
DCLG[Nle]LRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Leu6,26;Asp10,28;2-Abu13]GpTx-1(1-34)	2139
DCLGVLRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Leu6,26;Asp10,28;2-Abu13]GpTx-1(1-34)	2140
DCLGLLRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,6,26;Asp10,28;2-Abu13]GpTx-1(1-34)	2141
DCLGILRKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Leu6,26;Asp10,28;2-Abu13]GpTx-1(1-34)	2142
DCLGG[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Nle6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2143
DCLGA[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Nle6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2144
DCLG[2-Abu][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{ 酰胺}	[2-Abu5,13;Nle6;Asp10,28;Leu26]GpTx-1(1-34)	2145
DCLG[Nva][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{ 酰胺}	[Nva5;Nle6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2146
DCLG[Nle][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰 胺}	[Nle5,6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2147
DCLGV[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Nle6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2148

[0449]

DCLGL[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Nle6;Asp10,28;2-Abu13]GpTx-1(1-34)	2149
DCLGI[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Nle6;Asp10,28;2-Abu13;Leu26]GpTx-1(1-34)	2150
DCLGGFRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Phe6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2151
DCLGAFRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Phe6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2152
DCLG[2-Abu]FRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5;Phe6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2153
DCLG[Nva]FRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Phe6;Glu11;Pra13,Leu26;Asp28]GpTx-1(1-34)	2154
DCLG[Nle]FRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Phe6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2155
DCLGVFRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Phe6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2156
DCLGLFRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Phe6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2157
DCLGIFRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Phe6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2158
DCLGGLRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Leu6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	2159
DCLGALRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Leu6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	2160
DCLG[2-Abu]LRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5;Leu6,26;Glu11,Pra13;Asp28]GpTx-1(1-34)	2161
DCLG[Nva]LRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Leu6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	2162
DCLG[Nle]LRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Leu6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	2163
DCLGVLRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Leu6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	2164
DCLGLLRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	2165
DCLGILRKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Leu6,26;Glu11;Pra13;Asp28]GpTx-1(1-34)	2166
DCLGG[Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Nle6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2167

[0450]

DCLGA[Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Nle6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2168
DCLG[2-Abu][Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5;Nle6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2169
DCLG[Nva][Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Nle6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2170
DCLG[Nle][Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5,6;Glu11;Pra13,Leu26;Asp28]GpTx-1(1-34)	2171
DCLGV[Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Nle6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2172
DCLGL[Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Nle6;Glu11;Pra13;Asp28]GpTx-1(1-34)	2173
DCLGI[Nle]RKCIED[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Nle6;Glu11;Pra13;Leu26;Asp28]GpTx-1(1-34)	2174
DCLGGFRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Phe6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2175
DCLGAFRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Phe6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2176
DCLG[2-Abu]FRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5;Phe6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2177
DCLG[Nva]FRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Phe6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2178
DCLG[Nle]FRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Phe6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2179
DCLGVFRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Phe6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2180
DCLGLFRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Phe6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2181
DCLGIFRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Phe6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2182
DCLGGLRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Leu6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	2183
DCLGALRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Leu6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	2184

[0451]

DCLG[2-Abu]LRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5;Leu6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	2185
DCLG[Nva]LRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Leu6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	2186
DCLG[Nle]LRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Leu6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	2187
DCLGVLRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Leu6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	2188
DCLGLLRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	2189
DCLGILRKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Leu6,26;Glu10;Pra13;Asp28]GpTx-1(1-34)	2190
DCLGG[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Nle6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2191
DCLGA[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Nle6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2192
DCLG[2-Abu][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{ 酰胺}	[2-Abu5;Nle6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2193
DCLG[Nva][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{ 酰胺 }	[Nva5;Nle6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2194
DCLG[Nle][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{ 酰胺 }	[Nle5,6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2195
DCLGV[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Nle6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2196
DCLGL[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Nle6;Glu10;Pra13;Asp28]GpTx-1(1-34)	2197
DCLGI[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Nle6;Glu10;Pra13;Leu26;Asp28]GpTx-1(1-34)	2198
DCLGGFRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Phe6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2199
DCLGAFRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Phe6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2200

[0452]

DCLG[2-Abu]FRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5;Phe6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2201
DCLG[Nva]FRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Phe6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2202
DCLG[Nle]FRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Phe6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2203
DCLGVFRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Phe6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2204
DCLGLFRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Phe6;Asp10,28;Pra13]GpTx-1(1-34)	2205
DCLGIFRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Phe6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2206
DCLGGLRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Leu6,26;Asp10,28;Pra13]GpTx-1(1-34)	2207
DCLGALRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Leu6,26;Asp10,28;Pra13]GpTx-1(1-34)	2208
DCLG[2-Abu]LRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5;Leu6,26;Asp10,28;Pra13]GpTx-1(1-34)	2209
DCLG[Nva]LRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nva5;Leu6,26;Asp10,28;Pra13]GpTx-1(1-34)	2210
DCLG[Nle]LRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Nle5;Leu6,26;Asp10,28;Pra13]GpTx-1(1-34)	2211
DCLGVLRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Leu6,26;Asp10,28;Pra13]GpTx-1(1-34)	2212
DCLGLLRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,6,26;Asp10,28;Pra13]GpTx-1(1-34)	2213
DCLGILRKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Leu6,26;Asp10,28;Pra13]GpTx-1(1-34)	2214
DCLGG[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Gly5;Nle6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2215
DCLGA[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ala5;Nle6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2216
DCLG[2-Abu][Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[2-Abu5;Nle6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2217
DCLG[Nva][Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺	[Nva5;Nle6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2218

[0453]

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DCLG[Nle][Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{ 酰 胺 }	[Nle5,6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2219
DCLGV[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Val5;Nle6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2220
DCLGL[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Leu5,26;Nle6;Asp10,28;Pra13]GpTx-1(1-34)	2221
DCLGI[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHDWCKYVF-{酰胺}	[Ile5;Nle6;Asp10,28;Pra13;Leu26]GpTx-1(1-34)	2222
DCLGFMRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu13;Gln28]GpTx-1(1-34)	2223
DCLGFMRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Pra13;Gln28]GpTx-1(1-34)	2224
DCLGFMRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2225
DCLGFMRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Pra13;Leu26;Gln28]GpTx-1(1-34)	2226
DCLGFMRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2227
DCLGFMRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2228
DCLGFMRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2229
DCLGFFRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2230
DCLGFLRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu6;2-Abu13;Gln28]GpTx-1(1-34)	2231
DCLGF[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle6;2-Abu13;Gln28]GpTx-1(1-34)	2232
DCLGGMRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;2-Abu13;Gln28]GpTx-1(1-34)	2233
DCLGAMRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;2-Abu13;Gln28]GpTx-1(1-34)	2234
DCLG[2-Abu]MRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{ 酰	[2-Abu5,13;Gln28]GpTx-1(1-34)	2235

[0454]

胺}		
DCLG[Nva]MRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;2-Abu13;Gln28]GpTx-1(1-34)	2236
DCLG[Nle]MRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;2-Abu13;Gln28]GpTx-1(1-34)	2237
DCLGVMRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;2-Abu13;Gln28]GpTx-1(1-34)	2238
DCLGLMRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;2-Abu13;Gln28]GpTx-1(1-34)	2239
DCLGIMRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;2-Abu13;Gln28]GpTx-1(1-34)	2240
DCLGFMRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Glu11;Pra13;Gln28]GpTx-1(1-34)	2241
DCLGFMRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Glu10;Pra13;Gln28]GpTx-1(1-34)	2242
DCLGFMRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Asp10;Pra13;Gln28]GpTx-1(1-34)	2243
DCLGFFRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Phe6;Pra13;Gln28]GpTx-1(1-34)	2244
DCLGFLRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu6;Pra13;Gln28]GpTx-1(1-34)	2245
DCLGF[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle6;Pra13;Gln28]GpTx-1(1-34)	2246
DCLGGMRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Pra13;Gln28]GpTx-1(1-34)	2247
DCLGAMRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Pra13;Gln28]GpTx-1(1-34)	2248
DCLG[2-Abu]MRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5;Pra13;Gln28]GpTx-1(1-34)	2249
DCLG[Nva]MRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Pra13;Gln28]GpTx-1(1-34)	2250
DCLG[Nle]MRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Pra13;Gln28]GpTx-1(1-34)	2251
DCLGVMRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Pra13;Gln28]GpTx-1(1-34)	2252
DCLGLMRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Pra13;Gln28]GpTx-1(1-34)	2253

[0455]

DCLGIMRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Pra13;Gln28]GpTx-1(1-34)	2254
DCLGFMRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2255
DCLGFMRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2256
DCLGFMRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2257
DCLGFFRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Phe6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2258
DCLGFLRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu6,26;2-Abu13;Gln28]GpTx-1(1-34)	2259
DCLGF[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2260
DCLGGMRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2261
DCLGAMRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2262
DCLG[2-Abu]MRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{ 酰胺}	[2-Abu5,13;Leu26;Gln28]GpTx-1(1-34)	2263
DCLG[Nva]MRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2264
DCLG[Nle]MRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2265
DCLGVMRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2266
DCLGLMRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;2-Abu13;Gln28]GpTx-1(1-34)	2267
DCLGIMRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2268
DCLGFMRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2269
DCLGFMRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2270
DCLGFMRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2271

[0456]

DCLGFFRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Phe6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2272
DCLGFLRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu6,26;Pra13;Gln28]GpTx-1(1-34)	2273
DCLGF[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2274
DCLGGMRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Pra13;Leu26;Gln28]GpTx-1(1-34)	2275
DCLGAMRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Pra13;Leu26;Gln28]GpTx-1(1-34)	2276
DCLG[2-Abu]MRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5;Pra13;Leu26;Gln28]GpTx-1(1-34)	2277
DCLG[Nva]MRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Pra13;Leu26;Gln28]GpTx-1(1-34)	2278
DCLG[Nle]MRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Pra13;Leu26;Gln28]GpTx-1(1-34)	2279
DCLGVMRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Pra13;Leu26;Gln28]GpTx-1(1-34)	2280
DCLGLMRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Pra13;Gln28]GpTx-1(1-34)	2281
DCLGIMRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Pra13;Leu26;Gln28]GpTx-1(1-34)	2282
DCLGFFRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2283
DCLGFLRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2284
DCLGF[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2285
DCLGGMRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2286
DCLGAMRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2287
DCLG[2-Abu]MRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5,13;Glu11;Gln28]GpTx-1(1-34)	2288
DCLG[Nva]MRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2289

[0457]

DCLG[Nle]MRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2290
DCLGVMRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2291
DCLGLMRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2292
DCLGIMRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2293
DCLGFFRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2294
DCLGFLRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2295
DCLGF[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2296
DCLGGMRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2297
DCLGAMRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2298
DCLG[2-Abu]MRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5,13;Glu10;Gln28]GpTx-1(1-34)	2299
DCLG[Nva]MRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2300
DCLG[Nle]MRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2301
DCLGVMRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2302
DCLGLMRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2303
DCLGIMRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2304
DCLGFFRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2305
DCLGFLRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2306

[0458]

DCLGF[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2307
DCLGGMRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2308
DCLGAMRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2309
DCLG[2-Abu]MRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{ 酰胺}	[2-Abu5,13;Asp10;Gln28]GpTx-1(1-34)	2310
DCLG[Nva]MRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺 }	[Nva5;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2311
DCLG[Nle]MRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{ 酰胺 }	[Nle5;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2312
DCLGVMRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2313
DCLGLMRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2314
DCLGIMRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2315
DCLGGFRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2316
DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2317
DCLG[2-Abu]FRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺 }	[2-Abu5,13;Phe6;Gln28]GpTx-1(1-34)	2318
DCLG[Nva]FRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2319
DCLG[Nle]FRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2320
DCLGVFRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2321

[0459]

DCLGLFRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2322
DCLGIFRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2323
DCLGGLRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Leu6;2-Abu13;Gln28]GpTx-1(1-34)	2324
DCLGALRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Leu6;2-Abu13;Gln28]GpTx-1(1-34)	2325
DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5,13;Leu6;Gln28]GpTx-1(1-34)	2326
DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Leu6;2-Abu13;Gln28]GpTx-1(1-34)	2327
DCLG[Nle]LRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Leu6;2-Abu13;Gln28]GpTx-1(1-34)	2328
DCLGVLRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Leu6;2-Abu13;Gln28]GpTx-1(1-34)	2329
DCLGLLRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5,6;2-Abu13;Gln28]GpTx-1(1-34)	2330
DCLGILRKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Leu6;2-Abu13;Gln28]GpTx-1(1-34)	2331
DCLGG[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Nle6;2-Abu13;Gln28]GpTx-1(1-34)	2332
DCLGA[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Nle6;2-Abu13;Gln28]GpTx-1(1-34)	2333
DCLG[2-Abu][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Gln28]GpTx-1(1-34)	2334
DCLG[Nva][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Nle6;2-Abu13;Gln28]GpTx-1(1-34)	2335
DCLG[Nle][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5,6;2-Abu13;Gln28]GpTx-1(1-34)	2336

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DCLGV[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Nle6;2-Abu13;Gln28]GpTx-1(1-34)	2337
DCLGL[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Nle6;2-Abu13;Gln28]GpTx-1(1-34)	2338
DCLGI[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Nle6;2-Abu13;Gln28]GpTx-1(1-34)	2339
DCLGFFRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2340
DCLGFLRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2341
DCLGF[Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2342
DCLGGMRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Glu11;Pra13;Gln28]GpTx-1(1-34)	2343
DCLGAMRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Glu11;Pra13;Gln28]GpTx-1(1-34)	2344
DCLG[2-Abu]MRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5;Glu11;Pra13;Gln28]GpTx-1(1-34)	2345
DCLG[Nva]MRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Glu11;Pra13;Gln28]GpTx-1(1-34)	2346
DCLG[Nle]MRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Glu11;Pra13;Gln28]GpTx-1(1-34)	2347
DCLGVMRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Glu11;Pra13;Gln28]GpTx-1(1-34)	2348
DCLGLMRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Glu11;Pra13;Gln28]GpTx-1(1-34)	2349
DCLGIMRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Glu11;Pra13;Gln28]GpTx-1(1-34)	2350
DCLGFFRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2351
DCLGFLRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2352
DCLGF[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2353
DCLGGMRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Glu10;Pra13;Gln28]GpTx-1(1-34)	2354
DCLGAMRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Glu10;Pra13;Gln28]GpTx-1(1-34)	2355

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DCLG[2-Abu]MRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5;Glu10;Pra13;Gln28]GpTx-1(1-34)	2356
DCLG[Nva]MRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Glu10;Pra13;Gln28]GpTx-1(1-34)	2357
DCLG[Nle]MRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Glu10;Pra13;Gln28]GpTx-1(1-34)	2358
DCLGVMRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Glu10;Pra13;Gln28]GpTx-1(1-34)	2359
DCLGLMRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Glu10;Pra13;Gln28]GpTx-1(1-34)	2360
DCLGIMRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Glu10;Pra13;Gln28]GpTx-1(1-34)	2361
DCLGFFRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2362
DCLGFLRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2363
DCLGF[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2364
DCLGGMRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Asp10;Pra13;Gln28]GpTx-1(1-34)	2365
DCLGAMRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Asp10;Pra13;Gln28]GpTx-1(1-34)	2366
DCLG[2-Abu]MRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5;Asp10;Pra13;Gln28]GpTx-1(1-34)	2367
DCLG[Nva]MRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Asp10;Pra13;Gln28]GpTx-1(1-34)	2368
DCLG[Nle]MRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Asp10;Pra13;Gln28]GpTx-1(1-34)	2369
DCLGVMRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Asp10;Pra13;Gln28]GpTx-1(1-34)	2370
DCLGLMRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Asp10;Pra13;Gln28]GpTx-1(1-34)	2371
DCLGIMRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Asp10;Pra13;Gln28]GpTx-1(1-34)	2372
DCLGGFRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Phe6;Pra13;Gln28]GpTx-1(1-34)	2373
DCLGAFRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Phe6;Pra13;Gln28]GpTx-1(1-34)	2374

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DCLG[2-Abu]FRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5;Phe6;Pra13;Gln28]GpTx-1(1-34)	2375
DCLG[Nva]FRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Phe6;Pra13;Gln28]GpTx-1(1-34)	2376
DCLG[Nle]FRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Phe6;Pra13;Gln28]GpTx-1(1-34)	2377
DCLGVFRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Phe6;Pra13;Gln28]GpTx-1(1-34)	2378
DCLGLFRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Phe6;Pra13;Gln28]GpTx-1(1-34)	2379
DCLGIFRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Phe6;Pra13;Gln28]GpTx-1(1-34)	2380
DCLGGLRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Leu6;Pra13;Gln28]GpTx-1(1-34)	2381
DCLGALRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Leu6;Pra13;Gln28]GpTx-1(1-34)	2382
DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5;Leu6;Pra13;Gln28]GpTx-1(1-34)	2383
DCLG[Nva]LRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Leu6;Pra13;Gln28]GpTx-1(1-34)	2384
DCLG[Nle]LRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Leu6;Pra13;Gln28]GpTx-1(1-34)	2385
DCLGVLRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Leu6;Pra13;Gln28]GpTx-1(1-34)	2386
DCLGLLRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5,6;Pra13;Gln28]GpTx-1(1-34)	2387
DCLGILRKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Leu6;Pra13;Gln28]GpTx-1(1-34)	2388
DCLGG[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Nle6;Pra13;Gln28]GpTx-1(1-34)	2389
DCLGA[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Nle6;Pra13;Gln28]GpTx-1(1-34)	2390
DCLG[2-Abu][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5;Nle6;Pra13;Gln28]GpTx-1(1-34)	2391
DCLG[Nva][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Nle6;Pra13;Gln28]GpTx-1(1-34)	2392

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DCLG[Nle][Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5,6;Pra13;Gln28]GpTx-1(1-34)	2393
DCLGV[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Nle6;Pra13;Gln28]GpTx-1(1-34)	2394
DCLGL[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Nle6;Pra13;Gln28]GpTx-1(1-34)	2395
DCLGI[Nle]RKCIPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Nle6;Pra13;Gln28]GpTx-1(1-34)	2396
DCLGFFRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Phe6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2397
DCLGFLRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu6,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2398
DCLGF[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2399
DCLGGMRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2400
DCLGAMRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2401
DCLG[2-Abu]MRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{ 酰胺}	[2-Abu5,13;Glu11;Leu26;Gln28]GpTx-1(1-34)	2402
DCLG[Nva]MRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{ 酰 胺}	[Nva5;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2403
DCLG[Nle]MRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2404
DCLGVMRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2405
DCLGLMRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2406
DCLGIMRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2407
DCLGFFRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Phe6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2408
DCLGFLRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu6,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2409

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DCLGF[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2410
DCLGGMRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2411
DCLGAMRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2412
DCLG[2-Abu]MRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{ 酰胺}	[2-Abu5,13;Glu10;Leu26;Gln28]GpTx-1(1-34)	2413
DCLG[Nva]MRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{ 酰胺 }	[Nva5;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2414
DCLG[Nle]MRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{ 酰胺 }	[Nle5;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2415
DCLGVMRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2416
DCLGLMRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2417
DCLGIMRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2418
DCLGFFRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Phe6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2419
DCLGFLRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu6,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2420
DCLGF[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2421
DCLGGMRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2422
DCLGAMRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2423
DCLG[2-Abu]MRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{ 酰胺}	[2-Abu5,13;Asp10;Leu26;Gln28]GpTx-1(1-34)	2424

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DCLG[Nva]MRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2425
DCLG[Nle]MRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2426
DCLGVMRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2427
DCLGLMRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2428
DCLGIMRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2429
DCLGGFRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Phe6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2430
DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Phe6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2431
DCLG[2-Abu]FRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5,13;Phe6;Leu26;Gln28]GpTx-1(1-34)	2432
DCLG[Nva]FRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Phe6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2433
DCLG[Nle]FRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Phe6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2434
DCLGVFRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Phe6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2435
DCLGLFRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Phe6;2-Abu13;Gln28]GpTx-1(1-34)	2436
DCLGIFRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Phe6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2437
DCLGGLRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Leu6,26;2-Abu13;Gln28]GpTx-1(1-34)	2438
DCLGALRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Leu6,26;2-Abu13;Gln28]GpTx-1(1-34)	2439
DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰	[2-Abu5,13;Leu6,26;Gln28]GpTx-1(1-34)	2440

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DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Leu6,26;2-Abu13;Gln28]GpTx-1(1-34)	2441
DCLG[Nle]LRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Leu6,26;2-Abu13;Gln28]GpTx-1(1-34)	2442
DCLGVLRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Leu6,26;2-Abu13;Gln28]GpTx-1(1-34)	2443
DCLGLLRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,6,26;2-Abu13;Gln28]GpTx-1(1-34)	2444
DCLGILRKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Leu6,26;2-Abu13;Gln28]GpTx-1(1-34)	2445
DCLGG[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Nle6;2-Abu13,Leu26;Gln28]GpTx-1(1-34)	2446
DCLGA[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Nle6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2447
DCLG[2-Abu][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Leu26;Gln28]GpTx-1(1-34)	2448
DCLG[Nva][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Nle6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2449
DCLG[Nle][Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5,6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2450
DCLGV[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Nle6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2451
DCLGL[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Nle6;2-Abu13;Gln28]GpTx-1(1-34)	2452
DCLGI[Nle]RKCIPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Nle6;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2453
DCLGFFRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Phe6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2454
DCLGFLRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2455

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DCLGF[Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2456
DCLGGMRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2457
DCLGAMRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2458
DCLG[2-Abu]MRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2459
DCLG[Nva]MRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2460
DCLG[Nle]MRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2461
DCLGVMRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2462
DCLGLMRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2463
DCLGIMRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2464
DCLGFFRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Phe6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2465
DCLGFLRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2466
DCLGF[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2467
DCLGGMRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2468
DCLGAMRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2469
DCLG[2-Abu]MRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2470
DCLG[Nva]MRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2471
DCLG[Nle]MRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2472
DCLGVMRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2473
DCLGLMRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2474

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DCLGIMRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2475
DCLGFFRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Phe6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2476
DCLGFLRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2477
DCLGF[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2478
DCLGGMRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2479
DCLGAMRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2480
DCLG[2-Abu]MRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{ 酰 胺 }	[2-Abu5;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2481
DCLG[Nva]MRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2482
DCLG[Nle]MRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2483
DCLGVMRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2484
DCLGLMRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2485
DCLGIMRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2486
DCLGGFRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Phe6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2487
DCLGAFRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Phe6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2488
DCLG[2-Abu]FRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5;Phe6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2489
DCLG[Nva]FRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Phe6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2490
DCLG[Nle]FRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Phe6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2491
DCLGVFRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Phe6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2492

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DCLGLFRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Phe6;Pra13;Gln28]GpTx-1(1-34)	2493
DCLGIFRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Phe6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2494
DCLGGLRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Leu6,26;Pra13;Gln28]GpTx-1(1-34)	2495
DCLGALRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Leu6,26;Pra13;Gln28]GpTx-1(1-34)	2496
DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5;Leu6,26;Pra13;Gln28]GpTx-1(1-34)	2497
DCLG[Nva]LRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Leu6,26;Pra13;Gln28]GpTx-1(1-34)	2498
DCLG[Nle]LRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Leu6,26;Pra13;Gln28]GpTx-1(1-34)	2499
DCLGVLRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Leu6,26;Pra13;Gln28]GpTx-1(1-34)	2500
DCLGLLRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,6,26;Pra13;Gln28]GpTx-1(1-34)	2501
DCLGILRKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Leu6,26;Pra13;Gln28]GpTx-1(1-34)	2502
DCLGG[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Nle6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2503
DCLGA[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Nle6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2504
DCLG[2-Abu][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5;Nle6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2505
DCLG[Nva][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Nle6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2506
DCLG[Nle][Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5,6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2507
DCLGV[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Nle6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2508
DCLGL[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Nle6;Pra13;Gln28]GpTx-1(1-34)	2509
DCLGI[Nle]RKCIPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Nle6;Pra13;Leu26;Gln28]GpTx-1(1-34)	2510

[0470]

DCLGGFRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2511
DCLGAFRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2512
DCLG[2-Abu]FRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5,13;Phe6;Glu11;Gln28]GpTx-1(1-34)	2513
DCLG[Nva]FRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2514
DCLG[Nle]FRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2515
DCLGVFRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2516
DCLGLFRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2517
DCLGIFRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2518
DCLGGLRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Leu6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2519
DCLGALRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Leu6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2520
DCLG[2-Abu]LRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5,13;Leu6;Glu11;Gln28]GpTx-1(1-34)	2521
DCLG[Nva]LRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Leu6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2522
DCLG[Nle]LRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Leu6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2523
DCLGVLRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Leu6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2524
DCLGLLRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5,6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2525
DCLGILRKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Leu6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2526
DCLGG[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Nle6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2527

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DCLGA[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Nle6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2528
DCLG[2-Abu][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Glu11;Gln28]GpTx-1(1-34)	2529
DCLG[Nva][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Nle6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2530
DCLG[Nle][Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5,6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2531
DCLGV[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Nle6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2532
DCLGL[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Nle6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2533
DCLGI[Nle]RKCIED[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Nle6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2534
DCLGGFRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2535
DCLGAFRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2536
DCLG[2-Abu]FRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5,13;Phe6;Glu10;Gln28]GpTx-1(1-34)	2537
DCLG[Nva]FRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2538
DCLG[Nle]FRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2539
DCLGVFRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2540
DCLGLFRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2541
DCLGIFRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2542

[0472]

DCLGGLRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Leu6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2543
DCLGALRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Leu6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2544
DCLG[2-Abu]LRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{ 酰胺}	[2-Abu5,13;Leu6;Glu10;Gln28]GpTx-1(1-34)	2545
DCLG[Nva]LRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Leu6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2546
DCLG[Nle]LRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Leu6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2547
DCLGVLRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Leu6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2548
DCLGLLRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5,6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2549
DCLGILRKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Leu6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2550
DCLGG[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Nle6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2551
DCLGA[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Nle6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2552
DCLG[2-Abu][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Glu10;Gln28]GpTx-1(1-34)	2553
DCLG[Nva][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Nle6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2554
DCLG[Nle][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{ 酰胺}	[Nle5,6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2555
DCLGV[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Nle6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2556
DCLGL[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Nle6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2557

[0473]

DCLGI[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Nle6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2558
DCLGGFRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2559
DCLGAFRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2560
DCLG[2-Abu]FRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{ 酰胺}	[2-Abu5,13;Phe6;Asp10;Gln28]GpTx-1(1-34)	2561
DCLG[Nva]FRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2562
DCLG[Nle]FRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2563
DCLGVFRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2564
DCLGLFRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2565
DCLGIFRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2566
DCLGGLRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Leu6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2567
DCLGALRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Leu6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2568
DCLG[2-Abu]LRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{ 酰胺}	[2-Abu5,13;Leu6;Asp10;Gln28]GpTx-1(1-34)	2569
DCLG[Nva]LRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{ 酰 胺}	[Nva5;Leu6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2570
DCLG[Nle]LRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Leu6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2571
DCLGVLRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Leu6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2572
DCLGLLRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5,6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2573

[0474]

DCLGILRKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Leu6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2574
DCLGG[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Nle6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2575
DCLGA[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Nle6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2576
DCLG[2-Abu][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Asp10;Gln28]GpTx-1(1-34)	2577
DCLG[Nva][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Nle6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2578
DCLG[Nle][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5,6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2579
DCLGV[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Nle6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2580
DCLGL[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Nle6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2581
DCLGI[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Nle6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2582
DCLGGFRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2583
DCLGAFRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2584
DCLG[2-Abu]FRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2585
DCLG[Nva]FRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2586
DCLG[Nle]FRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2587
DCLGVFRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2588
DCLGLFRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2589

[0475]

DCLGIFRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2590
DCLGGLRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Leu6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2591
DCLGALRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Leu6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2592
DCLG[2-Abu]LRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5;Leu6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2593
DCLG[Nva]LRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Leu6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2594
DCLG[Nle]LRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Leu6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2595
DCLGVLRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Leu6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2596
DCLGLLRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5,6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2597
DCLGILRKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Leu6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2598
DCLGG[Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2599
DCLGA[Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2600
DCLG[2-Abu][Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{ 酰胺}	[2-Abu5;Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2601
DCLG[Nva][Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2602
DCLG[Nle][Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5,6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2603
DCLGV[Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2604
DCLGL[Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2605
DCLGI[Nle]RKCIED[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2606
DCLGGFRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2607

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DCLGAFRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2608
DCLG[2-Abu]FRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2609
DCLG[Nva]FRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2610
DCLG[Nle]FRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2611
DCLGVFRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2612
DCLGLFRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5,Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2613
DCLGIFRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2614
DCLGGLRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Leu6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2615
DCLGALRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Leu6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2616
DCLG[2-Abu]LRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5;Leu6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2617
DCLG[Nva]LRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Leu6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2618
DCLG[Nle]LRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Leu6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2619
DCLGVLRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Leu6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2620
DCLGLLRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5,6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2621
DCLGILRKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Leu6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2622
DCLGG[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2623
DCLGA[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2624
DCLG[2-Abu][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5;Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2625

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DCLG[Nva][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{ 酰 胺 }	[Nva5;Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2626
DCLG[Nle][Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5,6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2627
DCLGV[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2628
DCLGL[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2629
DCLGI[Nle]RKCEPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2630
DCLGGFRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2631
DCLGAFRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2632
DCLG[2-Abu]FRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2633
DCLG[Nva]FRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2634
DCLG[Nle]FRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2635
DCLGVFRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2636
DCLGLFRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2637
DCLGIFRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2638
DCLGGLRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Leu6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2639
DCLGALRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Leu6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2640
DCLG[2-Abu]LRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5;Leu6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2641
DCLG[Nva]LRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Leu6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2642
DCLG[Nle]LRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5;Leu6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2643

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DCLGVLRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Leu6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2644
DCLGLLRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5,6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2645
DCLGILRKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Leu6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2646
DCLGG[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gly5;Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2647
DCLGA[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ala5;Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2648
DCLG[2-Abu][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[2-Abu5;Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2649
DCLG[Nva][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nva5;Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2650
DCLG[Nle][Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Nle5,6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2651
DCLGV[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Val5;Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2652
DCLGL[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Leu5;Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2653
DCLGI[Nle]RKCDPD[Pra]DKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Ile5;Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2654
DCLGGFRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Phe6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2655
DCLGAFRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Phe6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2656
DCLG[2-Abu]FRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5,13;Phe6;Glu11;Leu26;Gln28]GpTx-1(1-34)	2657
DCLG[Nva]FRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Phe6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2658

[0479]

DCLG[Nle]FRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Phe6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2659
DCLGVFRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Phe6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2660
DCLGLFRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Phe6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2661
DCLGIFRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Phe6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2662
DCLGGLRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Leu6,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2663
DCLGALRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Leu6,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2664
DCLG[2-Abu]LRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5,13;Leu6,26;Glu11;Gln28]GpTx-1(1-34)	2665
DCLG[Nva]LRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Leu6,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2666
DCLG[Nle]LRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Leu6,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2667
DCLGVLRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Leu6,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2668
DCLGLLRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,6,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2669
DCLGILRKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Leu6,26;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2670
DCLGG[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Nle6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2671
DCLGA[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Nle6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2672
DCLG[2-Abu][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Glu11;Leu26;Gln28]GpTx-1(1-34)	2673
DCLG[Nva][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Nle6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2674

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DCLG[Nle][Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{ 酰胺}	[Nle5,6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2675
DCLGV[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Nle6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2676
DCLGL[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Nle6;Glu11;2-Abu13;Gln28]GpTx-1(1-34)	2677
DCLGI[Nle]RKCIED[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Nle6;Glu11;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2678
DCLGGFRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Phe6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2679
DCLGAFRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Phe6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2680
DCLG[2-Abu]FRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{ 酰胺}	[2-Abu5,13;Phe6;Glu10;Leu26;Gln28]GpTx-1(1-34)	2681
DCLG[Nva]FRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Phe6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2682
DCLG[Nle]FRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Phe6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2683
DCLGVFRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Phe6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2684
DCLGLFRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Phe6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2685
DCLGIFRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Phe6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2686
DCLGGLRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Leu6,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2687
DCLGALRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Leu6,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2688
DCLG[2-Abu]LRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{ 酰胺}	[2-Abu5,13;Leu6,26;Glu10;Gln28]GpTx-1(1-34)	2689
DCLG[Nva]LRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Leu6,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2690

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DCLG[Nle]LRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Leu6,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2691
DCLGVLRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Leu6,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2692
DCLGLLRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,6,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2693
DCLGILRKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Leu6,26;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2694
DCLGG[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Nle6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2695
DCLGA[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Nle6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2696
DCLG[2-Abu][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Glu10;Leu26;Gln28]GpTx-1(1-34)	2697
DCLG[Nva][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Nle6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2698
DCLG[Nle][Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{ 酰胺}	[Nle5,6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2699
DCLGV[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Nle6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2700
DCLGL[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Nle6;Glu10;2-Abu13;Gln28]GpTx-1(1-34)	2701
DCLGI[Nle]RKCEPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Nle6;Glu10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2702
DCLGGFRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Phe6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2703
DCLGAFRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Phe6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2704
DCLG[2-Abu]FRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{ 酰胺}	[2-Abu5,13;Phe6;Asp10;Leu26;Gln28]GpTx-1(1-34)	2705

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DCLG[Nva]FRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{ 酰 胺 }	[Nva5;Phe6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2706
DCLG[Nle]FRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Phe6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2707
DCLGVFRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Phe6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2708
DCLGLFRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Phe6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2709
DCLGIFRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Phe6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2710
DCLGGLRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Leu6,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2711
DCLGALRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Leu6,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2712
DCLG[2-Abu]LRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{ 酰 胺}	[2-Abu5,13;Leu6,26;Asp10;Gln28]GpTx-1(1-34)	2713
DCLG[Nva]LRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{ 酰 胺 }	[Nva5;Leu6,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2714
DCLG[Nle]LRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Leu6,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2715
DCLGVLRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Leu6,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2716
DCLGLLRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,6,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2717
DCLGILRKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Leu6,26;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2718
DCLGG[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Nle6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2719
DCLGA[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Nle6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2720
DCLG[2-Abu][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{	[2-Abu5,13;Nle6;Asp10;Leu26;Gln28]GpTx-1(1-34)	2721

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酰胺}		
DCLG[Nva][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Nle6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2722
DCLG[Nle][Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5,6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2723
DCLGV[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Nle6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2724
DCLGL[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Nle6;Asp10;2-Abu13;Gln28]GpTx-1(1-34)	2725
DCLGI[Nle]RKCDPD[2-Abu]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Nle6;Asp10;2-Abu13;Leu26;Gln28]GpTx-1(1-34)	2726
DCLGGFRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Phe6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2727
DCLGAFRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Phe6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2728
DCLG[2-Abu]FRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5;Phe6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2729
DCLG[Nva]FRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Phe6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2730
DCLG[Nle]FRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Phe6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2731
DCLGVFRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Phe6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2732
DCLGLFRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Phe6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2733
DCLGIFRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Phe6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2734
DCLGGLRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Leu6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2735
DCLGALRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Leu6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2736
DCLG[2-Abu]LRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5;Leu6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2737

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DCLG[Nva]LRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Leu6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2738
DCLG[Nle]LRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Leu6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2739
DCLGVLRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Leu6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2740
DCLGLLRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2741
DCLGILRKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Leu6,26;Glu11;Pra13;Gln28]GpTx-1(1-34)	2742
DCLGG[Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Nle6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2743
DCLGA[Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Nle6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2744
DCLG[2-Abu][Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{ 酰胺}	[2-Abu5;Nle6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2745
DCLG[Nva][Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{ 酰 胺}	[Nva5;Nle6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2746
DCLG[Nle][Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5,6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2747
DCLGV[Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Nle6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2748
DCLGL[Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Nle6;Glu11;Pra13;Gln28]GpTx-1(1-34)	2749
DCLGI[Nle]RKCIED[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Nle6;Glu11;Pra13;Leu26;Gln28]GpTx-1(1-34)	2750
DCLGGFRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Phe6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2751
DCLGAFRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Phe6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2752
DCLG[2-Abu]FRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5;Phe6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2753
DCLG[Nva]FRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Phe6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2754

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DCLG[Nle]FRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Phe6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2755
DCLGVFRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Phe6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2756
DCLGLFRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Phe6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2757
DCLGIFRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Phe6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2758
DCLGGLRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Leu6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2759
DCLGALRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Leu6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2760
DCLG[2-Abu]LRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5;Leu6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2761
DCLG[Nva]LRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Leu6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2762
DCLG[Nle]LRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Leu6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2763
DCLGVLRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Leu6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2764
DCLGLLRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2765
DCLGILRKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Leu6,26;Glu10;Pra13;Gln28]GpTx-1(1-34)	2766
DCLGG[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Nle6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2767
DCLGA[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Nle6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2768
DCLG[2-Abu][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{ 酰胺}	[2-Abu5;Nle6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2769
DCLG[Nva][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{ 酰胺 }	[Nva5;Nle6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2770
DCLG[Nle][Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{ 酰胺	[Nle5,6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2771

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DCLGV[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Nle6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2772
DCLGL[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Nle6;Glu10;Pra13;Gln28]GpTx-1(1-34)	2773
DCLGI[Nle]RKCEPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Nle6;Glu10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2774
DCLGGFRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Phe6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2775
DCLGAFRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Phe6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2776
DCLG[2-Abu]FRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5;Phe6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2777
DCLG[Nva]FRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Phe6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2778
DCLG[Nle]FRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Phe6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2779
DCLGVFRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Phe6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2780
DCLGLFRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Phe6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2781
DCLGIFRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Phe6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2782
DCLGGLRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Leu6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2783
DCLGALRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Leu6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2784
DCLG[2-Abu]LRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5;Leu6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2785
DCLG[Nva]LRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Leu6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2786
DCLG[Nle]LRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5;Leu6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2787
DCLGVLRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Leu6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2788
DCLGLLRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2789

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DCLGILRKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Leu6,26;Asp10;Pra13;Gln28]GpTx-1(1-34)	2790
DCLGG[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Gly5;Nle6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2791
DCLGA[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ala5;Nle6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2792
DCLG[2-Abu]-[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[2-Abu5;Nle6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2793
DCLG[Nva]-[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nva5;Nle6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2794
DCLG[Nle]-[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Nle5,6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2795
DCLGV[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Val5;Nle6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2796
DCLGL[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Leu5,26;Nle6;Asp10;Pra13;Gln28]GpTx-1(1-34)	2797
DCLGI[Nle]RKCDPD[Pra]DKCCRPNLVCSRLHQWCKYVF-{酰胺}	[Ile5;Nle6;Asp10;Pra13;Leu26;Gln28]GpTx-1(1-34)	2798
DCLGFMRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu13;Glu26]GpTx-1(1-34)	2799
DCLGFMRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Pra13;Glu26]GpTx-1(1-34)	2800
DCLGFMRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Glu11,26;2-Abu13]GpTx-1(1-34)	2801
DCLGFMRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Glu10,26;2-Abu13]GpTx-1(1-34)	2802
DCLGFMRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2803
DCLGFFRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Phe6;2-Abu13;Glu26]GpTx-1(1-34)	2804
DCLGFLRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu6;2-Abu13;Glu26]GpTx-1(1-34)	2805

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DCLGF[Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle6;2-Abu13;Glu26]GpTx-1(1-34)	2806
DCLGGMRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;2-Abu13;Glu26]GpTx-1(1-34)	2807
DCLGAMRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;2-Abu13;Glu26]GpTx-1(1-34)	2808
DCLG[2-Abu]MRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5,13;Glu26]GpTx-1(1-34)	2809
DCLG[Nva]MRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;2-Abu13;Glu26]GpTx-1(1-34)	2810
DCLG[Nle]MRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;2-Abu13;Glu26]GpTx-1(1-34)	2811
DCLGVMRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;2-Abu13;Glu26]GpTx-1(1-34)	2812
DCLGLMRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;2-Abu13;Glu26]GpTx-1(1-34)	2813
DCLGIMRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;2-Abu13;Glu26]GpTx-1(1-34)	2814
DCLGFMRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Glu11,26;Pra13]GpTx-1(1-34)	2815
DCLGFMRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Glu10,26;Pra13]GpTx-1(1-34)	2816
DCLGFMRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Asp10;Pra13;Glu26]GpTx-1(1-34)	2817
DCLGFFRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Phe6;Pra13;Glu26]GpTx-1(1-34)	2818
DCLGFLRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu6;Pra13;Glu26]GpTx-1(1-34)	2819
DCLGF[Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle6;Pra13;Glu26]GpTx-1(1-34)	2820
DCLGGMRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Pra13;Glu26]GpTx-1(1-34)	2821
DCLGAMRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Pra13;Glu26]GpTx-1(1-34)	2822
DCLG[2-Abu]MRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5;Pra13;Glu26]GpTx-1(1-34)	2823

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DCLG[Nva]MRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Pra13;Glu26]GpTx-1(1-34)	2824
DCLG[Nle]MRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Pra13;Glu26]GpTx-1(1-34)	2825
DCLGVMRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Pra13;Glu26]GpTx-1(1-34)	2826
DCLGLMRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Pra13;Glu26]GpTx-1(1-34)	2827
DCLGIMRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Pra13;Glu26]GpTx-1(1-34)	2828
DCLGFFRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Phe6;Glu11,26;2-Abu13]GpTx-1(1-34)	2829
DCLGFLRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu6;Glu11,26;2-Abu13]GpTx-1(1-34)	2830
DCLGF[Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle6;Glu11,26;2-Abu13]GpTx-1(1-34)	2831
DCLGGMRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Glu11,26;2-Abu13]GpTx-1(1-34)	2832
DCLGAMRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Glu11,26;2-Abu13]GpTx-1(1-34)	2833
DCLG[2-Abu]MRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰胺}	[2-Abu5,13;Glu11,26]GpTx-1(1-34)	2834
DCLG[Nva]MRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰 胺 }	[Nva5;Glu11,26;2-Abu13]GpTx-1(1-34)	2835
DCLG[Nle]MRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Glu11,26;2-Abu13]GpTx-1(1-34)	2836
DCLGVMRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Glu11,26;2-Abu13]GpTx-1(1-34)	2837
DCLGLMRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Glu11,26;2-Abu13]GpTx-1(1-34)	2838
DCLGIMRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Glu11,26;2-Abu13]GpTx-1(1-34)	2839
DCLGFFRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Phe6;Glu10,26;2-Abu13]GpTx-1(1-34)	2840

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DCLGFLRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu6;Glu10,26;2-Abu13]GpTx-1(1-34)	2841
DCLGF[Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle6;Glu10,26;2-Abu13]GpTx-1(1-34)	2842
DCLGGMRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Glu10,26;2-Abu13]GpTx-1(1-34)	2843
DCLGAMRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Glu10,26;2-Abu13]GpTx-1(1-34)	2844
DCLG[2-Abu]MRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰胺}	[2-Abu5,13;Glu10,26]GpTx-1(1-34)	2845
DCLG[Nva]MRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰胺 }	[Nva5;Glu10,26;2-Abu13]GpTx-1(1-34)	2846
DCLG[Nle]MRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰胺 }	[Nle5;Glu10,26;2-Abu13]GpTx-1(1-34)	2847
DCLGVMRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Glu10,26;2-Abu13]GpTx-1(1-34)	2848
DCLGLMRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Glu10,26;2-Abu13]GpTx-1(1-34)	2849
DCLGIMRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Glu10,26;2-Abu13]GpTx-1(1-34)	2850
DCLGFFRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Phe6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2851
DCLGFLRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2852
DCLGF[Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2853
DCLGGMRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2854
DCLGAMRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2855
DCLG[2-Abu]MRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰	[2-Abu5,13;Asp10;Glu26]GpTx-1(1-34)	2856

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胺}		
DCLG[Nva]MRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺 }	[Nva5;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2857
DCLG[Nle]MRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰 胺 }	[Nle5;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2858
DCLGVMRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2859
DCLGLMRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2860
DCLGIMRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2861
DCLGGFRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Phe6;2-Abu13;Glu26]GpTx-1(1-34)	2862
DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Phe6;2-Abu13;Glu26]GpTx-1(1-34)	2863
DCLG[2-Abu]FRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰 胺}	[2-Abu5,13;Phe6;Glu26]GpTx-1(1-34)	2864
DCLG[Nva]FRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Phe6;2-Abu13;Glu26]GpTx-1(1-34)	2865
DCLG[Nle]FRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Phe6;2-Abu13;Glu26]GpTx-1(1-34)	2866
DCLGVFRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Phe6;2-Abu13;Glu26]GpTx-1(1-34)	2867
DCLGLFRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Phe6;2-Abu13;Glu26]GpTx-1(1-34)	2868
DCLGIFRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Phe6;2-Abu13;Glu26]GpTx-1(1-34)	2869
DCLGGLRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Leu6;2-Abu13;Glu26]GpTx-1(1-34)	2870
DCLGALRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Leu6;2-Abu13;Glu26]GpTx-1(1-34)	2871

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DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰胺}	[2-Abu5,13;Leu6;Glu26]GpTx-1(1-34)	2872
DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Leu6;2-Abu13;Glu26]GpTx-1(1-34)	2873
DCLG[Nle]LRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Leu6;2-Abu13;Glu26]GpTx-1(1-34)	2874
DCLGVLRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Leu6;2-Abu13;Glu26]GpTx-1(1-34)	2875
DCLGLLRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5,6;2-Abu13;Glu26]GpTx-1(1-34)	2876
DCLGILRKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Leu6;2-Abu13;Glu26]GpTx-1(1-34)	2877
DCLGG[Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Nle6;2-Abu13;Glu26]GpTx-1(1-34)	2878
DCLGA[Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Nle6;2-Abu13;Glu26]GpTx-1(1-34)	2879
DCLG[2-Abu][Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Glu26]GpTx-1(1-34)	2880
DCLG[Nva][Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰胺}	[Nva5;Nle6;2-Abu13;Glu26]GpTx-1(1-34)	2881
DCLG[Nle][Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰胺}	[Nle5,6;2-Abu13;Glu26]GpTx-1(1-34)	2882
DCLGV[Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Nle6;2-Abu13;Glu26]GpTx-1(1-34)	2883
DCLGL[Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Nle6;2-Abu13;Glu26]GpTx-1(1-34)	2884
DCLGI[Nle]RKCIPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Nle6;2-Abu13;Glu26]GpTx-1(1-34)	2885
DCLGFFRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Phe6;Glu11,26;Pra13]GpTx-1(1-34)	2886

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DCLGFLRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu6;Glu11,26;Pra13]GpTx-1(1-34)	2887
DCLGF[Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle6;Glu11,26;Pra13]GpTx-1(1-34)	2888
DCLGGMRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Glu11,26;Pra13]GpTx-1(1-34)	2889
DCLGAMRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Glu11,26;Pra13]GpTx-1(1-34)	2890
DCLG[2-Abu]MRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5;Glu11,26;Pra13]GpTx-1(1-34)	2891
DCLG[Nva]MRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Glu11,26;Pra13]GpTx-1(1-34)	2892
DCLG[Nle]MRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Glu11,26;Pra13]GpTx-1(1-34)	2893
DCLGVMRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Glu11,26;Pra13]GpTx-1(1-34)	2894
DCLGLMRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Glu11,26;Pra13]GpTx-1(1-34)	2895
DCLGIMRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Glu11,26;Pra13]GpTx-1(1-34)	2896
DCLGFFRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Phe6;Glu10,26;Pra13]GpTx-1(1-34)	2897
DCLGFLRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu6;Glu10,26;Pra13]GpTx-1(1-34)	2898
DCLGF[Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle6;Glu10,26;Pra13]GpTx-1(1-34)	2899
DCLGGMRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Glu10,26;Pra13]GpTx-1(1-34)	2900
DCLGAMRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Glu10,26;Pra13]GpTx-1(1-34)	2901
DCLG[2-Abu]MRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5;Glu10,26;Pra13]GpTx-1(1-34)	2902
DCLG[Nva]MRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Glu10,26;Pra13]GpTx-1(1-34)	2903
DCLG[Nle]MRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Glu10,26;Pra13]GpTx-1(1-34)	2904
DCLGVMRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Glu10,26;Pra13]GpTx-1(1-34)	2905

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DCLGLMRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Glu10,26;Pra13]GpTx-1(1-34)	2906
DCLGIMRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Glu10,26;Pra13]GpTx-1(1-34)	2907
DCLGFFRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	2908
DCLGFLRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu6;Asp10;Pra13;Glu26]GpTx-1(1-34)	2909
DCLGF[Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle6;Asp10;Pra13;Glu26]GpTx-1(1-34)	2910
DCLGGMRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Asp10;Pra13;Glu26]GpTx-1(1-34)	2911
DCLGAMRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Asp10;Pra13;Glu26]GpTx-1(1-34)	2912
DCLG[2-Abu]MRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{ 酰胺 }	[2-Abu5;Asp10;Pra13;Glu26]GpTx-1(1-34)	2913
DCLG[Nva]MRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Asp10;Pra13;Glu26]GpTx-1(1-34)	2914
DCLG[Nle]MRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Asp10;Pra13;Glu26]GpTx-1(1-34)	2915
DCLGVMRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Asp10;Pra13;Glu26]GpTx-1(1-34)	2916
DCLGLMRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Asp10;Pra13;Glu26]GpTx-1(1-34)	2917
DCLGIMRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Asp10;Pra13;Glu26]GpTx-1(1-34)	2918
DCLGGFRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Phe6;Pra13;Glu26]GpTx-1(1-34)	2919
DCLGAFRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Phe6;Pra13;Glu26]GpTx-1(1-34)	2920
DCLG[2-Abu]FRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5;Phe6;Pra13;Glu26]GpTx-1(1-34)	2921
DCLG[Nva]FRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Phe6;Pra13;Glu26]GpTx-1(1-34)	2922
DCLG[Nle]FRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Phe6;Pra13;Glu26]GpTx-1(1-34)	2923

[0495]

DCLGVFRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Phe6;Pra13;Glu26]GpTx-1(1-34)	2924
DCLGLFRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Phe6;Pra13;Glu26]GpTx-1(1-34)	2925
DCLGIFRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Phe6;Pra13;Glu26]GpTx-1(1-34)	2926
DCLGGLRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Leu6;Pra13;Glu26]GpTx-1(1-34)	2927
DCLGALRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Leu6;Pra13;Glu26]GpTx-1(1-34)	2928
DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5;Leu6;Pra13;Glu26]GpTx-1(1-34)	2929
DCLG[Nva]LRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Leu6;Pra13;Glu26]GpTx-1(1-34)	2930
DCLG[Nle]LRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Leu6;Pra13;Glu26]GpTx-1(1-34)	2931
DCLGVLRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Leu6;Pra13;Glu26]GpTx-1(1-34)	2932
DCLGLLRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5,6;Pra13;Glu26]GpTx-1(1-34)	2933
DCLGILRKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Leu6;Pra13;Glu26]GpTx-1(1-34)	2934
DCLGG[Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Nle6;Pra13;Glu26]GpTx-1(1-34)	2935
DCLGA[Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Nle6;Pra13;Glu26]GpTx-1(1-34)	2936
DCLG[2-Abu][Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5;Nle6;Pra13;Glu26]GpTx-1(1-34)	2937
DCLG[Nva][Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Nle6;Pra13;Glu26]GpTx-1(1-34)	2938
DCLG[Nle][Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5,6;Pra13;Glu26]GpTx-1(1-34)	2939
DCLGV[Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Nle6;Pra13;Glu26]GpTx-1(1-34)	2940
DCLGL[Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Nle6;Pra13;Glu26]GpTx-1(1-34)	2941

[0496]

DCLGI[Nle]RKCIPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Nle6;Pra13;Glu26]GpTx-1(1-34)	2942
DCLGGFRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Phe6;Glu11,26;2-Abu13]GpTx-1(1-34)	2943
DCLGAFRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Phe6;Glu11,26;2-Abu13]GpTx-1(1-34)	2944
DCLG[2-Abu]FRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5,13;Phe6;Glu11,26]GpTx-1(1-34)	2945
DCLG[Nva]FRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Phe6;Glu11,26;2-Abu13]GpTx-1(1-34)	2946
DCLG[Nle]FRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Phe6;Glu11,26;2-Abu13]GpTx-1(1-34)	2947
DCLGVFRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Phe6;Glu11,26;2-Abu13]GpTx-1(1-34)	2948
DCLGLFRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Phe6;Glu11,26;2-Abu13]GpTx-1(1-34)	2949
DCLGIFRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Phe6;Glu11,26;2-Abu13]GpTx-1(1-34)	2950
DCLGGLRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Leu6;Glu11,26;2-Abu13]GpTx-1(1-34)	2951
DCLGALRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Leu6;Glu11,26;2-Abu13]GpTx-1(1-34)	2952
DCLG[2-Abu]LRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5,13;Leu6;Glu11,26]GpTx-1(1-34)	2953
DCLG[Nva]LRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Leu6;Glu11,26;2-Abu13]GpTx-1(1-34)	2954
DCLG[Nle]LRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Leu6;Glu11,26;2-Abu13]GpTx-1(1-34)	2955
DCLGVLRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Leu6;Glu11,26;2-Abu13]GpTx-1(1-34)	2956
DCLGLLRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5,6;Glu11,26;2-Abu13]GpTx-1(1-34)	2957
DCLGILRKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Leu6;Glu11,26;2-Abu13]GpTx-1(1-34)	2958

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DCLGG[Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Nle6;Glu11,26;2-Abu13]GpTx-1(1-34)	2959
DCLGA[Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Nle6;Glu11,26;2-Abu13]GpTx-1(1-34)	2960
DCLG[2-Abu][Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Glu11,26]GpTx-1(1-34)	2961
DCLG[Nva][Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Nle6;Glu11,26;2-Abu13]GpTx-1(1-34)	2962
DCLG[Nle][Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5,6;Glu11,26;2-Abu13]GpTx-1(1-34)	2963
DCLGV[Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Nle6;Glu11,26;2-Abu13]GpTx-1(1-34)	2964
DCLGL[Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Nle6;Glu11,26;2-Abu13]GpTx-1(1-34)	2965
DCLGI[Nle]RKCIED[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Nle6;Glu11,26;2-Abu13]GpTx-1(1-34)	2966
DCLGGFRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Phe6;Glu10,26;2-Abu13]GpTx-1(1-34)	2967
DCLGAFRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Phe6;Glu10,26;2-Abu13]GpTx-1(1-34)	2968
DCLG[2-Abu]FRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5,13;Phe6;Glu10,26]GpTx-1(1-34)	2969
DCLG[Nva]FRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Phe6;Glu10,26;2-Abu13]GpTx-1(1-34)	2970
DCLG[Nle]FRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Phe6;Glu10,26;2-Abu13]GpTx-1(1-34)	2971
DCLGVFRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Phe6;Glu10,26;2-Abu13]GpTx-1(1-34)	2972
DCLGLFRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Phe6;Glu10,26;2-Abu13]GpTx-1(1-34)	2973

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DCLGIFRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Phe6;Glu10,26;2-Abu13]GpTx-1(1-34)	2974
DCLGGLRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Leu6;Glu10,26;2-Abu13]GpTx-1(1-34)	2975
DCLGALRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Leu6;Glu10,26;2-Abu13]GpTx-1(1-34)	2976
DCLG[2-Abu]LRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰胺}	[2-Abu5,13;Leu6;Glu10,26]GpTx-1(1-34)	2977
DCLG[Nva]LRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Leu6;Glu10,26;2-Abu13]GpTx-1(1-34)	2978
DCLG[Nle]LRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Leu6;Glu10,26;2-Abu13]GpTx-1(1-34)	2979
DCLGVLRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Leu6;Glu10,26;2-Abu13]GpTx-1(1-34)	2980
DCLGLLRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5,6;Glu10,26;2-Abu13]GpTx-1(1-34)	2981
DCLGILRKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Leu6;Glu10,26;2-Abu13]GpTx-1(1-34)	2982
DCLGG[Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Nle6;Glu10,26;2-Abu13]GpTx-1(1-34)	2983
DCLGA[Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Nle6;Glu10,26;2-Abu13]GpTx-1(1-34)	2984
DCLG[2-Abu][Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Glu10,26]GpTx-1(1-34)	2985
DCLG[Nva][Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Nle6;Glu10,26;2-Abu13]GpTx-1(1-34)	2986
DCLG[Nle][Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰胺}	[Nle5,6;Glu10,26;2-Abu13]GpTx-1(1-34)	2987
DCLGV[Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Nle6;Glu10,26;2-Abu13]GpTx-1(1-34)	2988

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DCLGL[Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Nle6;Glu10,26;2-Abu13]GpTx-1(1-34)	2989
DCLGI[Nle]RKCEPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Nle6;Glu10,26;2-Abu13]GpTx-1(1-34)	2990
DCLGGFRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Phe6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2991
DCLGAFRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Phe6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2992
DCLG[2-Abu]FRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰胺}	[2-Abu5,13;Phe6;Asp10;Glu26]GpTx-1(1-34)	2993
DCLG[Nva]FRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰 胺}	[Nva5;Phe6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2994
DCLG[Nle]FRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Phe6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2995
DCLGVFRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Phe6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2996
DCLGLFRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Phe6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2997
DCLGIFRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Phe6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2998
DCLGGLRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Leu6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	2999
DCLGALRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Leu6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3000
DCLG[2-Abu]LRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰胺}	[2-Abu5,13;Leu6;Asp10;Glu26]GpTx-1(1-34)	3001
DCLG[Nva]LRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{ 酰 胺}	[Nva5;Leu6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3002
DCLG[Nle]LRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Leu6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3003

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DCLGVLRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Leu6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3004
DCLGLLRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5,6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3005
DCLGILRKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Leu6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3006
DCLGG[Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Nle6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3007
DCLGA[Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Nle6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3008
DCLG[2-Abu][Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5,13;Nle6;Asp10;Glu26]GpTx-1(1-34)	3009
DCLG[Nva][Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Nle6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3010
DCLG[Nle][Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5,6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3011
DCLGV[Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Nle6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3012
DCLGL[Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Nle6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3013
DCLGI[Nle]RKCDPD[2-Abu]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Nle6;Asp10;2-Abu13;Glu26]GpTx-1(1-34)	3014
DCLGGFRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Phe6;Glu11,26;Pra13]GpTx-1(1-34)	3015
DCLGAFRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Phe6;Glu11,26;Pra13]GpTx-1(1-34)	3016
DCLG[2-Abu]FRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5;Phe6;Glu11,26;Pra13]GpTx-1(1-34)	3017
DCLG[Nva]FRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Phe6;Glu11,26;Pra13]GpTx-1(1-34)	3018
DCLG[Nle]FRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Phe6;Glu11,26;Pra13]GpTx-1(1-34)	3019

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DCLGVFRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Phe6;Glu11,26;Pra13]GpTx-1(1-34)	3020
DCLGLFRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Phe6;Glu11,26;Pra13]GpTx-1(1-34)	3021
DCLGIFRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Phe6;Glu11,26;Pra13]GpTx-1(1-34)	3022
DCLGGLRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Leu6;Glu11,26;Pra13]GpTx-1(1-34)	3023
DCLGALRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Leu6;Glu11,26;Pra13]GpTx-1(1-34)	3024
DCLG[2-Abu]LRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5;Leu6;Glu11,26;Pra13]GpTx-1(1-34)	3025
DCLG[Nva]LRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Leu6;Glu11,26;Pra13]GpTx-1(1-34)	3026
DCLG[Nle]LRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Leu6;Glu11,26;Pra13]GpTx-1(1-34)	3027
DCLGVLRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Leu6;Glu11,26;Pra13]GpTx-1(1-34)	3028
DCLGLLRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5,6;Glu11,26;Pra13]GpTx-1(1-34)	3029
DCLGILRKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Leu6;Glu11,26;Pra13]GpTx-1(1-34)	3030
DCLGG[Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Nle6;Glu11,26;Pra13]GpTx-1(1-34)	3031
DCLGA[Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Nle6;Glu11,26;Pra13]GpTx-1(1-34)	3032
DCLG[2-Abu][Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5;Nle6;Glu11,26;Pra13]GpTx-1(1-34)	3033
DCLG[Nva][Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Nle6;Glu11,26;Pra13]GpTx-1(1-34)	3034
DCLG[Nle][Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5,6;Glu11,26;Pra13]GpTx-1(1-34)	3035
DCLGV[Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Nle6;Glu11,26;Pra13]GpTx-1(1-34)	3036

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DCLGL[Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Nle6;Glu11,26;Pra13]GpTx-1(1-34)	3037
DCLGI[Nle]RKCIED[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Nle6;Glu11,26;Pra13]GpTx-1(1-34)	3038
DCLGGFRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Phe6;Glu10,26;Pra13]GpTx-1(1-34)	3039
DCLGAFRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Phe6;Glu10,26;Pra13]GpTx-1(1-34)	3040
DCLG[2-Abu]FRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5;Phe6;Glu10,26;Pra13]GpTx-1(1-34)	3041
DCLG[Nva]FRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Phe6;Glu10,26;Pra13]GpTx-1(1-34)	3042
DCLG[Nle]FRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Phe6;Glu10,26;Pra13]GpTx-1(1-34)	3043
DCLGVFRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Phe6;Glu10,26;Pra13]GpTx-1(1-34)	3044
DCLGLFRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Phe6;Glu10,26;Pra13]GpTx-1(1-34)	3045
DCLGIFRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Phe6;Glu10,26;Pra13]GpTx-1(1-34)	3046
DCLGGLRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Leu6;Glu10,26;Pra13]GpTx-1(1-34)	3047
DCLGALRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Leu6;Glu10,26;Pra13]GpTx-1(1-34)	3048
DCLG[2-Abu]LRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5;Leu6;Glu10,26;Pra13]GpTx-1(1-34)	3049
DCLG[Nva]LRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Leu6;Glu10,26;Pra13]GpTx-1(1-34)	3050
DCLG[Nle]LRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Leu6;Glu10,26;Pra13]GpTx-1(1-34)	3051
DCLGVLRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Leu6;Glu10,26;Pra13]GpTx-1(1-34)	3052
DCLGLLRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5,6;Glu10,26;Pra13]GpTx-1(1-34)	3053
DCLGILRKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Leu6;Glu10,26;Pra13]GpTx-1(1-34)	3054
DCLGG[Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Nle6;Glu10,26;Pra13]GpTx-1(1-34)	3055

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DCLGA[Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Nle6;Glu10,26;Pra13]GpTx-1(1-34)	3056
DCLG[2-Abu][Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{ 酰胺}	[2-Abu5;Nle6;Glu10,26;Pra13]GpTx-1(1-34)	3057
DCLG[Nva][Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{ 酰 胺 }	[Nva5;Nle6;Glu10,26;Pra13]GpTx-1(1-34)	3058
DCLG[Nle][Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{ 酰 胺 }	[Nle5,6;Glu10,26;Pra13]GpTx-1(1-34)	3059
DCLGV[Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Nle6;Glu10,26;Pra13]GpTx-1(1-34)	3060
DCLGL[Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Nle6;Glu10,26;Pra13]GpTx-1(1-34)	3061
DCLGI[Nle]RKCEPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Nle6;Glu10,26;Pra13]GpTx-1(1-34)	3062
DCLGGFRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3063
DCLGAFRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3064
DCLG[2-Abu]FRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5;Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3065
DCLG[Nva]FRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3066
DCLG[Nle]FRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3067
DCLGVFRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3068
DCLGLFRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3069
DCLGIFRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Phe6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3070
DCLGGLRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Leu6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3071

[0504]

DCLGALRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Leu6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3072
DCLG[2-Abu]LRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5;Leu6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3073
DCLG[Nva]LRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Leu6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3074
DCLG[Nle]LRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5;Leu6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3075
DCLGVLRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Leu6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3076
DCLGLLRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5,6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3077
DCLGILRKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Leu6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3078
DCLGG[Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Gly5;Nle6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3079
DCLGA[Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Nle6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3080
DCLG[2-Abu][Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[2-Abu5;Nle6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3081
DCLG[Nva][Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nva5;Nle6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3082
DCLG[Nle][Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Nle5,6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3083
DCLGV[Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Val5;Nle6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3084
DCLGL[Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Leu5;Nle6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3085
DCLGI[Nle]RKCDPD[Pra]DKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ile5;Nle6;Asp10;Pra13;Glu26]GpTx-1(1-34)	3086

[0505] 如上文所述，根据本发明，本发明物质组合物的肽部分也可通过已知的有机化学技术在一个或多个氨基酸残基处进行化学衍生化。“化学衍生物”或“化学衍生化的”是指

具有一个或多个通过官能性侧基的反应而化学衍生化的残基的主题肽。此类衍生化分子包括例如其中游离氨基已衍生化形成胺盐酸盐、对甲苯磺酰基、苄氧羰基、叔丁氧羰基、氯乙酰基或甲酰基的那些分子。游离羧基可衍生化形成盐、甲酯和乙酯或其他类型的酯或酰肼。游离羟基可衍生化形成 O- 酰基或 O- 烷基衍生物。组氨酸的咪唑氮可衍生化形成 N-im- 苄基组氨酸。也作为化学衍生物包括在内的是包含一个或多个 20 个规范氨基酸的非天然存在的氨基酸衍生物（无论是 L- 还是 D- 形式）的那些肽。例如，4- 羟脯氨酸可被脯氨酸取代；5- 羟赖氨酸可被赖氨酸取代；3- 甲基组氨酸可被组氨酸取代；高丝氨酸可被丝氨酸取代；以及鸟氨酸可被赖氨酸取代。

[0506] 可用的衍生化在一些实施方案中包括其中肽的氨基末端被化学封端使得将阻止在 N 端的游离氨基处发生与媒介物的偶联的那些衍生化。这样的修饰可以存在其他有益效果，例如降低毒素肽类似物对于酶促蛋白水解的易感性。N 端可被酰化或修饰成取代的胺，或用另一官能团诸如芳族部分（例如吲哚酸、苄基 (Bzl 或 Bn)、二苄基 (DiBzl 或 Bn_2) 或苄氧羰基 (Cbz 或 Z))、N,N- 二甲基甘氨酸或肌酸修饰。例如，在一些实施方案中，诸如但不限于甲酰基、乙酰基 (Ac)、丙酰基、丁酰基、庚酰基、己酰基、辛酰基或壬酰基的酰基部分可共价连接到肽的 N 端末端，这可防止在媒介物与肽的偶联中发生不需要的副反应。其他示例性 N 端衍生基团包括 $-NRR^1$（而非 $-NH_2$）、$-NRC(O)R^1$、$-NRC(O)OR^1$、$-NRS(O)_2R^1$、$-NHC(O)NHR^1$、琥珀酰亚胺或苄氧羰基 -NH-(Cbz-NH-)，其中 R 和 R^1 各自独立地为氢或低级烷基并且其中苯环可被 1 至 3 个选自以下的取代基取代：C_1-C_4 烷基、C_1-C_4 烷氧基、氯和溴。

[0507] 在一些实施方案中，氨基酸残基之间的一个或多个肽基 [-C(O)NR-] 键合（键）可被非肽基键合替换。示例性非肽基键合为 $-CH_2-$ 氨基甲酸 $[-CH_2-OC(O)NR-]$、膦酸、$-CH_2-$ 磺酰胺 $[-CH_2-S(O)_2NR-]$、脲 [-NHC(O)NH-]、$-CH_2-$ 仲胺以及烷基化肽 $[-C(O)NR^6-$，其中 R^6 为低级烷基]。

[0508] 在一些实施方案中，可对一个或多个单独的氨基酸残基进行衍生化。已知多种衍生化试剂与选定的侧链或末端残基发生特异性反应，如在下文以举例的方式详细描述。

[0509] 赖氨酰残基和氨基末端残基可与琥珀酸或其他羧酸酐反应，它们可使赖氨酰残基的电荷反转。其他适于使含 α- 氨基的残基衍生化的试剂包括酰亚胺酯，诸如甲基吡啶亚胺甲酯；磷酸吡哆醛；吡哆醛；氯硼氢化物；三硝基苯磺酸；O- 甲基异脲；2,4- 戊二酮；以及与乙醛酸的转氨酶催化反应。

[0510] 精氨酰残基可通过与若干常规试剂的任何一种或组合反应而修饰，这些试剂包括苯甲酰甲醛、2,3- 丁二酮、1,2- 环己二酮和茚三酮。精氨酰残基的衍生化由于胍官能团的高 pKa 而需要反应在碱性条件下进行。此外，这些试剂可与赖氨酸的基团以及精氨酸 ε- 氨基反应。

[0511] 酪氨酰残基的具体修饰已得到了广泛的研究，其中尤其关注通过与芳族重氮化合物或四硝基甲烷反应而向酪氨酰残基中引入光谱标记。最常见的是，将 N- 乙酰基咪唑和四硝基甲烷分别用于形成 O- 乙酰基酪氨酰物质和 3- 硝基衍生物。

[0512] 羧基侧链基团（天冬氨酰或谷氨酰）可通过与碳二亚胺 (R′ -N = C = N-R′) 诸如 1- 环己基 -3-(2- 吗啉基 -(4- 乙基）碳二亚胺或 1- 乙基 -3-(4- 氮鎓 -4,4- 二甲基戊基）碳二亚胺反应而选择性修饰。此外，天冬氨酰和谷氨酰残基可通过与铵离子反应而转化成天冬氨酰胺酰 (asparaginyl) 和谷氨酰胺酰 (glutaminyl) 残基。

[0513] 谷氨酰胺酰和冬氨酰胺酰残基可去酰胺化形成相应的谷氨酰和天冬氨酰残基。可选地，这些残基在适度的酸性条件下去酰胺化。这些残基的任一形式均落在本发明的范围内。

[0514] 半胱氨酰残基可通过氨基酸残基或其他部分替代以消除二硫键或者反之使交联稳定。（参见例如 Bhatnagar 等人，J.Med.Chem.，39 :3814-3819(1996)）。

[0515] 通过双官能试剂的衍生化可用于将肽或其官能衍生物交联到水不溶性载体基质（根据需要）或交联到其他大分子媒介物。常用的交联剂包括例如 1,1- 双（重氮乙酰基）-2- 苯基乙烷、戊二醛、N- 羟基琥珀酰亚胺酯（例如与 4- 叠氮基水杨酸形成的酯）、同双官能酰亚胺酯（包括二琥珀酰亚氨基酯，诸如 3,3′ - 二硫代双（琥珀酰亚氨基丙酸酯））以及双官能马来酰亚胺（诸如双 -N- 马来酰亚胺基 -1,8- 辛烷）。诸如 3-[（对叠氮苯基）二硫代] 丙亚氨酸甲酯的衍生化试剂产生在存在光的情况下能够形成交联的光可活化的中间体。可选地，采用反应性水不溶基质诸如溴化氰活化的碳水化合物和反应性底物（例如，如在美国专利号 3,969,287、3,691,016、4,195,128、4,247,642、4,229,537 和 4,330,440 中所述）进行蛋白固定。

[0516] 其他可能的修饰包括脯氨酸和赖氨酸的羟化，丝氨酰或苏氨酰残基的羟基的磷酸化，Cys 中硫原子的氧化，赖氨酸、精氨酸和组氨酸侧链的 α - 氨基的甲基化。Creighton，Proteins :Structure and Molecule Properties(W.H.Freeman & Co.，San Francisco)，79-86(1983)。

[0517] 衍生化的以上实例不旨在详尽探讨，而仅仅是示例性的。

[0518] 物质组合物的产生在适用时还可以涉及合适的蛋白纯化技术。在本发明物质组合物的一些实施方案中，可将分子制备为包含合适的同位素标记（例如 ^{125}I、^{14}C、^{13}C、^{35}S、^{3}H、^{2}H、^{13}N、^{15}N、^{18}O、^{17}O 等）以便于定量或检测。

[0519] 半衰期延长部分。任选地，为了调节分子的药动学形式以满足治疗性需要，本发明的组合物可包含多种质量和构型的一个或多个半衰期延长部分，所述一个或多个半衰期延长部分可共价稠合、附接、连接或偶联到毒素肽类似物。“半衰期延长部分”是指与毒素肽类似物的非偶联形式相比具有以下作用的分子 :防止或减少蛋白水解或其他导致活性降低的化学修饰产生的体内降解，延长体内半衰期或增强其他药动学性质诸如但不限于增加吸收率，降低毒性，降低免疫原性，提高溶解性，增加毒素肽类似物对所关注靶标的生物活性和 / 或靶标选择性，和 / 或提高可制造性。根据本发明，半衰期延长部分是药学上可接受的部分。

[0520] 半衰期延长部分的选择可使得本发明的组合物实现足够的流体动力学尺寸以防止被体内肾脏过滤清除。例如，可以选择基本上呈直链、支链 (br) 或树枝状形式的为聚合物大分子的半衰期延长部分。可选地，半衰期延长部分的选择可使得在体内本发明的物质组合物将结合到血清蛋白形成复合物，使得因而形成的复合物避免显著的肾清除。半衰期延长部分可以为例如脂质 ;胆固醇基团（诸如类固醇）;碳水化合物或低聚糖 ;或结合到补救受体 (salvage receptor) 的任何天然或合成蛋白、多肽或肽。

[0521] 可以根据本发明使用的示例性半衰期延长部分包括免疫球蛋白 Fc 结构域或其部分，或生物学合适的聚合物或共聚物，例如聚亚烷基二醇化合物，诸如聚乙二醇 (PEG) 或聚丙二醇。其他合适的聚亚烷基二醇化合物包括但不限于以下类型的带电或中性聚合物 :葡

聚糖、聚赖氨酸、多聚乙酰神经氨糖酸或其他碳水化合物类聚合物、氨基酸聚合物以及生物素衍生物。在一些单体融合或偶联蛋白实施方案中，免疫球蛋白（包含轻链和重链）或其部分可用作半衰期延长部分，优选地为人源免疫球蛋白，并包括免疫球蛋白的任一种，诸如但不限于 IgG1、IgG2、IgG3 或 IgG4。

[0522] 根据本发明的半衰期延长部分的其他示例包括：乙二醇的共聚物，丙二醇的共聚物，羧甲基纤维素，聚乙烯吡咯烷酮，聚 -1,3- 二氧戊环、聚 -1,3,6- 三噁烷，乙烯 - 马来酸酐共聚物，聚氨基酸（例如聚赖氨酸或聚鸟氨酸），葡聚糖 N- 乙烯基吡咯烷酮，聚 N- 乙烯基吡咯烷酮，丙二醇均聚物，环氧丙烷聚合物，环氧乙烷聚合物，聚氧乙烯化多元醇，聚乙烯醇，直链或支链糖基化链，聚缩醛，长链脂肪酸，长链疏水性脂族基团或聚唾液酸（例如 PolyXen™ 技术；Gregoriadis 等人，Improving the therapeutic efficacy of peptides and proteins：a role for polysialic acids，Intl.J.Pharmaceutics，300：125-30(2005)，该文献以引用方式整体并入本文）。

[0523] 在物质组合物的其他实施方案中，半衰期延长部分为共价连接到毒素肽类似物的 N 端的带阴离子电荷的化学实体，该带阴离子电荷的化学实体包括但不限于磷酸酪氨酸、磷酸丝氨酸、对膦酰基（二氟甲基）- 苯丙氨酸 (Pfp)、对膦酰基 - 甲基 - 苯丙氨酸 (Pmp)、对磷脂酰基 - 苯丙氨酸 (Ppa) 或对膦酰基 - 甲基酮 - 苯丙氨酸 (Pkp)，它们可共价连接到毒素肽类似物的 N 端，任选地通过如本文所述的 AEEA 接头或其他接头间接连接。（参见 Chandy 等人，Analogs of ShK toxin and their uses in selective inhibition of Kv1.3potassium channels，WO2006/042151A2；Beeton 等 人，Targeting effector memory T cells with a selective peptide inhibitor of Kv1.3channels for therapy of autoimmune diseases，Molec.Pharmacol.67(4)：1369-81(2005)；Pennington 等 人，Engineering a stable and selective peptide blocker of the Kv1.3channel in T lymphocytes，Molecular Pharmacology Fast Forward，2009 年 1 月 2 日作为 doi：10.1124/mol.108.052704 公布 (2009)，所有这些参考文献均以引用方式整体并入本文）。AEEA 是 2-(2-(2- 氨基乙氧基）乙氧基）乙酸（也称为 8- 氨基 -3,6- 二氧杂辛酸）。（参见例如 Beeton 等人，Targeting effector memory T cells with a selective peptide inhibitor of Kv1.3channels for therapy of autoimmune diseases，Molec.Pharmacol.67(4)：1369-81(2005)）。

[0524] 根据本发明的半衰期延长部分的其他实施方案包括在温度、pH 和离子强度生理条件下具有与长半衰期血清蛋白的结合亲和力的肽配体或小（有机）分子配体。实例包括白蛋白结合肽或小分子配体，转甲状腺素蛋白结合肽或小分子配体，甲状腺素结合球蛋白结合肽或小分子配体，抗体结合肽或小分子配体，或具有与长半衰期血清蛋白的亲和力的另一肽或小分子。（参见例如 Blaney 等人，Method and compositions for increasing the serum half-life of pharmacologically active agents by binding to transthyretin-selective ligands，美国专利号 5,714,142；Sato 等人，Serum albumin binding moieties，US2003/0069395A1；Jones 等人，Pharmaceutical active conjugates，美国专利号 6,342,225）。“长半衰期血清蛋白”是溶于哺乳动物血浆的数百种不同蛋白之一，包括所谓的“载体蛋白”（诸如白蛋白、转铁蛋白和触珠蛋白）、纤维蛋白原和其他凝血因子、补体成分、免疫球蛋白、酶抑制剂、诸如紧张素和缓激肽的物质的前体以及许多

其他类型的蛋白。本发明涵盖使用药学上可接受的半衰期延长部分的任何单一物质，诸如但不限于在本文所述的那些，或使用两种或更多种不同的半衰期延长部分的组合，诸如 PEG 和免疫球蛋白 Fc 结构域或其部分（参见例如 Feige 等人，Modified peptides as therapeutic agents，美国专利号 6,660,843），诸如 Fc 的 CH2 结构域、白蛋白（例如人血清白蛋白 (HSA)；参见例如 Rosen 等人，Albumin fusion proteins，美国专利号 6,926,898 和 US2005/0054051；Bridon 等人，Protection of endogenous therapeutic peptides from peptidase activity through conjugation to blood components，US6,887,470）、转甲状腺素蛋白 (TTR；参见例如 Walker 等人，Use of transthyretin peptide/protein fusions to increase the serum half-life of pharmacologically active peptides/proteins，US2003/0195154A1；2003/0191056A1）或甲状腺素结合球蛋白 (TBG)，或诸如免疫球蛋白（轻链 + 重链）和 Fc 结构域的组合（异三聚组合，所谓的“半体”），例如，如以引用方式整体并入本文的 Sullivan 等人，Toxin Peptide Therapeutic Agents，PCT/US2007/022831（作为 WO2008/088422 公开）中所述。

[0525] 一个或多个毒素肽类似物与一个或多个半衰期延长部分的偶联可通过毒素肽的 N 端和 / 或 C 端进行，或可插入其一级氨基酸序列，F1 的连接更接近毒素肽类似物的 N 端。

[0526] 尤其可用的半衰期延长部分包括免疫球蛋白（例如人免疫球蛋白，包括 IgG1、IgG2、IgG3 或 IgG4）。术语“免疫球蛋白”涵盖包含两条各自共价连接到轻链 (LC) 的二聚重链 (HC) 的全抗体；单条未二聚化的免疫球蛋白重链和共价连接的轻链 (HC+LC)；或嵌合免疫球蛋白（轻链 + 重链）-Fc 异三聚体（所谓的“半体”）。图 12A-N 和图 88-91 示出了此类免疫球蛋白 - 毒素肽偶联物的多个不同实施方案。

[0527] 本发明的 GpTx-1 肽类似物与 IgG1、IgG2、IgG3 或 IgG4 同种型任一者的重组免疫球蛋白的重组融合或化学偶联可用于延长药动学半衰期。（参见例如 Doellgast 等人，WO2010/108153A2）。在 Doellgast 等人，WO2010/108153A2 或 Walker 等人，PCT/US2011/052841 中公开的载体免疫球蛋白的任一者，或者它们之中包含不同同种型恒定结构域的任一者的同种型转化，或者本领域已知的其他载体免疫球蛋白均可在本发明的范围内用作半衰期延长部分。

[0528] 人 IgG2 重链 (HC) 恒定区的一个实例具有以下氨基酸序列：

[0529] ASTKGPSVFPLAPCSRSTSESTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFP

[0530] AVLQSSGLYSLSSVVTVPSSNFGTQTYTCNVDHKPSNTKVDKTVERKCCVECPP

[0531] CPAPPVAGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVQFNWYVDGVE

[0532] VHNAKTKPREEQFNSTFRVVSVLTVVHQDWLNGKEYKCKVSNKGLPAPIEKTI

[0533] SKTKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDLAVEWESNGQPENN

[0534] YKTTPPMLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSL

[0535] SPGK//SEQ.ID NO：3090.

[0536] 如果需要，IgG1、IgG2、IgG3 或 IgG4 免疫球蛋白同种型的其他 IgG 同种型恒定区序列是本领域已知的。一般来讲，在不需要效应子功能时可将人 IgG2 可用于靶标，而在需要此类效应子功能（例如抗体依赖性细胞毒性 (ADCC)）的情形下可以使用人 IgG1。人 IgG3 具有相对短的半衰期，而人 IgG4 会形成抗体“半分子”。人 IgG1 存在四种已知的同种异型。优选的同种异型称为“hIgG1z”，也称为“KEEM”同种异型。人 IgG1 同种异型“hIgG1za”(KDEL)、

“hIgG1f”(REEM)和“hIgG1fa”也是可用的;所有的似乎都具有ADCC效应子功能。

[0537] 人hIgG1z重链(HC)恒定结构域具有以下氨基酸序列:

[0538] ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFP

[0539] AVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHT

[0540] CPPCPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV

[0541] DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAP

[0542] IEKTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNG

[0543] QPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYT

[0544] QKSLSLSPGK//SEQ ID NO:3091.

[0545] 人hIgG1za重链(HC)恒定结构域具有以下氨基酸序列:

[0546] ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFP

[0547] AVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHT

[0548] CPPCPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV

[0549] DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAP

[0550] IEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDLAVEWESNGQ

[0551] PENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQ

[0552] KSLSLSPGK//SEQ ID NO:3092.

[0553] 人hIgG1f重链(HC)恒定结构域具有以下氨基酸序列:

[0554] ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFP

[0555] AVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHT

[0556] CPPCPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV

[0557] DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAP

[0558] IEKTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNG

[0559] QPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYT

[0560] QKSLSLSPGK//SEQ ID NO:3093.

[0561] 人hIgG1fa重链(HC)恒定结构域具有以下氨基酸序列:

[0562] ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFP

[0563] AVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHT

[0564] CPPCPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV

[0565] DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAP

[0566] IEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQ

[0567] PENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQ

[0568] KSLSLSPGK//SEQ ID NO:3094.

[0569] 人免疫球蛋白轻链(LC)恒定区序列的一个实例如下(指定为“CL-1”):

[0570] GQPKANPTVTLFPPSSEELQANKATLVCLISDFYPGAVTVAWKADGSPVKAGV

[0571] ETTKPSKQSNNKYAASSYLSLTPEQWKSHRSYSCQVTHEGSTVEKTVAPTECS//

[0572] SEQ ID NO:3095.

[0573] CL-1可用于增加抗体的pI,并且是便利的。存在三个其他的人免疫球蛋白轻链恒定区,指定为“CL-2”、“CL-3”和“CL-7”,它们也可在本发明的范围内使用。CL-2和CL-3在

人类种群中更常见。

[0574] CL-2 人轻链 (LC) 恒定结构域具有以下氨基酸序列 :

[0575] GQPKAAPSVTLFPPSSEELQANKATLVCLISDFYPGAVTVAWKADSSPVKAGVE

[0576] TTTPSKQSNNKYAASSYLSLTPEQWKSHRSYSCQVTHEGSTVEKTVAPTECS//

[0577] SEQ ID NO :3096.

[0578] CL-3 人 LC 恒定结构域具有以下氨基酸序列 :

[0579] GQPKAAPSVTLFPPSSEELQANKATLVCLISDFYPGAVTVAWKADSSPVKAGVE

[0580] TTTPSKQSNNKYAASSYLSLTPEQWKSHKSYSCQVTHEGSTVEKTVAPTECS//

[0581] SEQ ID NO :3097.

[0582] CL-7 人 LC 恒定结构域具有以下氨基酸序列 :

[0583] GQPKAAPSVTLFPPSSEELQANKATLVCLVSDFYPGAVTVAWKADGSPVKVGV

[0584] ETTKPSKQSNNKYAASSYLSLTPEQWKSHRSYSCRVTHEGSTVEKTVAPAECS//

[0585] SEQ ID NO :3098.

[0586] 免疫球蛋白链的可变区通常表现出相同的总体结构,该结构包含通过三个高变区接合的相对保守的骨架区 (FR),而高变区又更通常地被称为“互补决定区”或 CDR。上述每个重链 / 轻链对的两条重链中的 CDR 通常通过骨架区对齐,以形成与靶蛋白上的特定表位或结构域 (若有) 特异性结合的结构。从 N 端或 C 端起,天然存在的轻链和重链可变区均通常都符合这些元件的以下顺序 :FR1、CDR1、FR2、CDR2、FR3、CDR3 和 FR4。已经设计了编号系统向占据这些结构域每一者中的位置的氨基酸赋予数值。该编号系统在 Kabat Sequences of Proteins of Immunological Interest(1987 和 1991, NIH, Bethesda, MD) 或 Chothia & Lesk,1987,J.Mol.Biol.196 :901-917 ;Chothia 等人,1989,Nature342 :878-883 中有所定义。

[0587] “抗体”或可互换地称为“Ab”是四聚糖蛋白。在天然存在的抗体中,每个四聚体由两对相同的多肽链组成,每一对具有一条约 220 个氨基酸 (约 25kDa) 的“轻”链和一条约 440 个氨基酸 (约 50-70kDa) 的“重”链。每条链的氨基末端部分包含主要负责抗原识别的约 100 至 110 或更多个氨基酸的“可变”(“V”) 区。每条链的羧基末端部分限定主要负责效应子功能的恒定区。不同的抗体中的可变区不同。不同的抗体中的恒定区相同。在每条重链或轻链的可变区内,存在三个高变亚区,它们有助于决定抗体的抗原特异性。高变区之间的可变结构域残基称为骨架残基,并且通常在不同的抗体之中有一定程度的同源性。免疫球蛋白可根据它们重链恒定区的氨基酸序列而分配到不同的类别。人轻链被分类为 kappa(κ) 和 lambda(λ) 轻链。在轻链和重链内,可变区和恒定区通过约 12 或更多个氨基酸的″ J″区接合,而重链还包含约 10 多个氨基酸的″ D″区。一般可参见 Fundamental Immunology,Ch.7(Paul,W. 编辑,第 2 版 Raven Press,N.Y.(1989))。在本发明的范围内,“抗体”还涵盖重组制备的抗体以及缺乏糖基化的抗体。

[0588] 术语“轻链”或“免疫球蛋白轻链”包括全长轻链及其具有足够的可变区序列以赋予结合亲和性的片段。全长轻链包含可变区结构域 VL 和恒定区结构域 CL。轻链的可变区结构域位于多肽的氨基末端。轻链包括 kappa 链和 lambda 链。术语“重链”或“免疫球蛋白重链”包括全长重链及其具有足够的可变区序列以赋予结合亲和性的片段。全长重链包含可变区结构域、V_H 以及三个恒定区结构域 :C_H1、C_H2 和 C_H3。V_H 结构域位于多肽的氨基末端,

C_H 结构域位于羧基末端，而 C_H3 最靠近多肽的羧基末端。重链被分类为 mu（μ）、delta（Δ）、gamma（γ）、alpha（α）和 epsilon（ε）并将抗体同种型分别限定为 IgM、IgD、IgG、IgA 和 IgE。在本发明的单独实施方案中，重链可以具有任何同种型，包括 IgG（包括 IgG1、IgG2、IgG3 和 IgG4 亚型）、IgA（包括 IgA1 和 IgA2 亚型）、IgM 和 IgE。其中几种可进一步划分成亚类或同种型，例如 IgG1、IgG2、IgG3、IgG4、IgA1 和 IgA2。每个轻链 / 重链对的可变区通常形成抗体的抗原结合位点，但是可用的载体抗体不必具有已知的抗原结合位点也能使用。（参见例如 Doellgast 等人，WO2010/108153A2 ;Walker 等人，PCT/US2011/052841）。不同的 IgG 同种型可具有不同的效应子功能（由 Fc 区域介导），诸如抗体依赖性细胞毒性 (ADCC) 和补体依赖性细胞毒性 (CDC)。在 ADCC 中，抗体的 Fc 区结合到诸如自然杀伤细胞和巨噬细胞的免疫效应细胞表面上的 Fc 受体 (FcγR)，从而导致靶向的细胞发生吞噬或裂解。在 CDC 中，抗体通过在细胞表面触发补体级联反应而杀伤靶向的细胞。

[0589] “Fc 区”或在本文可互换使用的“Fc 结构域”或“免疫球蛋白 Fc 结构域”包含两个重链片段，这些片段在全长抗体中包含抗体的 C_H1 和 C_H2 结构域。两个重链片段通过两个或更多个二硫键并通过 C_H3 结构域的疏水相互作用保持在一起。

[0590] 术语“补救受体结合表位”是指负责延长 IgG 分子体内血清半衰期的 IgG 分子（例如 IgG_1、IgG_2、IgG_3 或 IgG_4）的 Fc 区的表位。

[0591] “同种异型”是在抗体序列中通常在恒定区中的变型形式，其可以为免疫原性的并在人类中由特异性等位基因编码。已经鉴定出了人类 IGHC 基因中的五种即 IGHG1、IGHG2、IGHG3、IGHA2 和 IGHE 基因的同种异型，并分别指定为 G1m、G2m、G3m、A2m 和 Em 同种异型。至少 18 种 Gm 同种异型是已知的 :nG1m(1)、nG1m(2)、G1m(1、2、3、17) 或 G1m(a、x、f、z)、G2m(23) 或 G2m(n)、G3m(5、6、10、11、13、14、15、16、21、24、26、27、28) 或 G3m(b1、c3、b5、b0、b3、b4、s、t、g1、c5、u、v、g5)。存在两种 A2m 同种异型 :A2m(1) 和 A2m(2)。

[0592] 有关抗体的结构和生成的详细说明，参见以引用方式整体并入本文的 Roth, D.B. 和 Craig,N.L,Cell,94 :411414(1998)。简而言之，生成编码重链和轻链免疫球蛋白序列的过程主要在发育中的 B 细胞中发生。在重新排列和接合各种免疫球蛋白基因片段前，V、D、J 和恒定 (C) 基因片段通常相对靠近地存在于单条染色体上。在 B 细胞分化期间，V、D、J（或就轻链基因而言只有 V 和 J）基因片段的合适家族成员的每一者之一重组形成功能重排的重链和轻链免疫球蛋白基因的可变区。该基因片段重排过程似乎是按顺序进行的。首先，进行重链 D 与 J 接合，然后是重链 V 与 DJ 接合和轻链 V 与 J 接合。除了 V、D 和 J 片段的重排外，还通过轻链中 V 与 J 片段接合位置以及重链 D 与 J 片段接合位置处的可变重组在免疫球蛋白重链和轻链一级库 (primary repertoire) 中产生了其他多样性。轻链中的这种变化通常在 V 基因片段的最后一个密码子以及 J 片段的第一个密码子内发生。接合中相似的不精确性出现在重链染色体上 D 与 J_H 片段之间，并可延伸多达 10 个核苷酸。此外，若干核苷酸可插入不由基因组 DNA 编码的 D 与 J_H 基因片段之间以及 V_H 与 D 基因片段之间。这些核苷酸的添加称为 N 区多样性。可变区基因片段的此类重排以及可在这种接合期间发生的可变重组的净效果是产生一抗库。

[0593] 术语“高变”区是指抗体中负责抗原结合的氨基酸残基。高变区包含来自互补决定区或 CDR 的氨基酸残基 [即，轻链可变结构域中的残基 24-34(L1)、50-56(L2) 和 89-97(L3) 以及重链可变结构域中的残基 31-35(H1)、50-65(H2) 和 95-102(H3)，如 Kabat 等人，

Sequences of Proteins of Immunological Interest,第 5 版,Public Health Service, National Institutes of Health,Bethesda,Md.(1991) 所述]。即使单一 CDR 可识别并结合抗原,但亲和力低于含有所有 CDR 的完整抗原结合位点。

[0594] 来自高变“环”的残基的替代性定义由 Chothia 等人,J.Mol.Biol.196:901-917(1987) 描述为轻链可变结构域中的残基 26-32(L1)、50-52(L2) 和 91-96(L3) 以及重链可变结构域中的残基 26-32(H1)、53-55(H2) 和 96-101(H3)。

[0595] “骨架”或“FR”残基是除高变区残基以外的那些可变区残基。

[0596] “抗体片段”包括完整全长抗体的一部分,优选地为完整抗体的抗原结合区或可变区。抗体片段的实例包括 Fab、Fab′、$F(ab')_2$ 和 Fv 片段;双抗体;线性抗体 (zapata 等人,Protein Eng.,8(10):1057-1062(1995));单链抗体分子;以及由抗体片段形成的多特异性抗体。

[0597] 抗体的木瓜蛋白酶消化产生两个相同的抗原结合片段,称为“Fab”片段,其各自具有单个抗原结合位点;以及残余“Fc”片段,其包含恒定区。Fab 片段含有整个可变结构域,以及轻链恒定结构域和重链第一恒定结构域 (CH1)。Fc 片段呈现碳水化合物并负责许多抗体效应功能 (诸如结合补体和细胞受体),其使一类抗体区别于另一类。

[0598] 胃蛋白酶处理产生具有两个包含抗体 VH 和 VL 结构域的“单链 Fv”或“scFv”抗体片段的 $F(ab')_2$ 片段,其中这些结构域存在于单条多肽链中。Fab 片段因在重链 CH1 结构域的羧基末端包含几个另外的残基 (包括来自抗体铰链区的一个或多个半胱氨酸) 而与 Fab′ 片段不同。优选地,Fv 多肽还包含 VH 与 VL 结构域之间的多肽接头,其使得 Fv 能够形成抗原结合的所需结构。有关 scFv 的综述,参见 Pluckthun in The Pharmacology of Monoclonal Antibodies,vol.113,Rosenburg 和 Moore 编辑,Springer-Verlag,New York,pp.269-315(1994)。

[0599] “Fab 片段”由一条轻链以及一条重链的 C_H1 和可变区构成。Fab 分子的重链不能与另一重链分子形成二硫键。

[0600] “Fab′ 片段”含有一条轻链以及一条重链中含 V_H 结构域和 C_H1 结构域及 C_H1 结构域与 C_H2 结构域之间的区域的部分,使得在两个 Fab′ 片段的两条重链之间可以形成链间二硫键以形成 $F(ab')_2$ 分子。

[0601] “$F(ab')_2$ 片段”含有两条轻链以及两条含 C_H1 结构域与 C_H2 结构域之间的一部分恒定区的重链,使得在两条重链之间形成链间二硫键。因此,$F(ab')_2$ 片段由两条重链之间的二硫键保持在一起的两个 Fab′ 片段构成。

[0602] “Fv”是含有完整抗原识别和结合位点的最小抗体片段。该区域由紧密、非共价缔合的一个重链可变结构域与一个轻链可变结构域的二聚体组成。在此构型中,各可变结构域的三个 CDR 相互作用以界定 VH VL 二聚体表面上的抗原结合位点。单一可变结构域 (或仅含三个抗原特异性 CDR 的 Fv 的一半) 能够识别并结合抗原,但亲和力低于完整结合位点。

[0603] “单链抗体”是重链可变区和轻链可变区已通过柔性接头连接以形成单条多肽链的 Fv 分子,该单条多肽链形成抗原结合区。单链抗体在国际专利申请公开号 WO88/01649 和美国专利号 4,946,778 与 5,260,203 中有详细的讨论,这些专利的公开内容以引用方式整体并入。

[0604] “单链 Fv”或“scFv”抗体片段包含抗体的 V_H 和 V_L 结构域，其中这些结构域存在于单条多肽链中，并任选地在 V_H 与 V_L 结构域之间包含使 Fv 能够形成抗原结合的所需结构的多肽接头 (Bird 等人，Science242 :423-426，1988，和 Huston 等人，Proc.Natl.Acad.Sci.USA85 :5879-5883，1988)。“Fd”片段由 V_H 和 C_H1 结构域组成。

[0605] 术语“双抗体”是指具有两个抗原结合位点的小抗体片段，这些片段包含连接到同一多肽链 (VH VL) 中的轻链可变结构域 (VL) 的重链可变结构域 (VH)。通过使用过短而无法使同一链上的两个结构域配对的接头，迫使这些结构域与另一条链的互补结构域配对并产生两个抗原结合位点。双抗体在例如 EP404,097、WO93/11161 和 Hollinger 等人，Proc.Natl.Acad.Sci.USA,90 :6444-6448(1993) 中有更全面的描述。

[0606] “结构域抗体”是仅含有重链可变区或轻链可变区的免疫功能性免疫球蛋白片段。在一些情况下，两个或更多个 V_H 区与肽接头共价接合以产生二价结构域抗体。二价结构域抗体的两个 V_H 区可靶向相同或不同的抗原。

[0607] 术语“表位”是分子中由抗原结合蛋白（例如抗体）结合的部分。该术语包括能够特异性结合到抗原结合蛋白（诸如抗体）或结合到 T 细胞受体的任何决定子。表位可为连续或非连续的（例如在单链多肽中，在多肽序列中彼此不连续但在分子背景下由抗原结合蛋白结合的氨基酸残基）。在某些实施方案中，表位可为模拟物，因为其包含与用于产生抗原结合蛋白的表位相似的三维结构，但不包含或仅包含一些存在于用于产生抗原结合蛋白的该表位中的氨基酸残基。最常见的是，表位位于蛋白上，但在一些情况下，可位于其他种类的分子诸如核酸上。表位决定子可包括分子的化学活性表面基团，诸如氨基酸、糖侧链、磷酰基或磺酰基，并且可具有特定的三维结构特性和 / 或比电荷特性。一般来讲，对特定标靶抗原具有特异性的抗体将优先识别蛋白和 / 或大分子复杂混合物中靶抗原上的表位。

[0608] 术语“同一性”是指两个或更多个多肽分子或两个或更多个核酸分子的序列之间的关系，如通过比对和比较序列而测定。“百分比同一性”意指所比较的分子中氨基酸或核苷酸之间相同残基的百分比，并基于所比较的最小分子的大小进行计算。对于这些计算，必须通过特定的数学模型或计算机程序（即“算法”）来处理比对中的空位（若存在）。可用于计算进行比对的核酸或多肽的同一性的方法包括在以下文献中所述的那些 :Computational Molecular Biology，(Lesk，A.M. 编辑)，1988，New York :Oxford University Press ;Biocomputing Informatics and Genome Projects，(Smith，D.W. 编辑)，1993，New York :Academic Press ;Computer Analysis of Sequence Data，Part I，(Griffin，A.M. 和 Griffin，H.G.，编辑)，1994，New Jersey :Humana Press ;von Heinje，G.，1987，Sequence Analysis in Molecular Biology，New York :Academic Press ;Sequence Analysis Primer，(Gribskov，M. 和 Devereux，J.，编辑)，1991，New York :M.Stockton Press 以及 Carillo 等人，1988，SIAM J.Applied Math.48 :1073。例如，可通过通常用于比较两个多肽的氨基酸位置相似性的标准方法来测定序列同一性。使用诸如 BLAST 或 FASTA 的计算机程序，比对两个多肽序列或两个多核苷酸序列以获得其相应残基的最佳匹配（沿一个或两个序列的全长，或沿一个或两个序列的预定部分）。这些程序提供默认开放罚分和默认空位罚分，并且可结合计算机程序使用评分矩阵，诸如 PAM250[标准评分矩阵 ;参见 Dayhoff 等人，于 Atlas of Protein Sequence and Structure，vol.5，supp.3(1978)]。例如，然后可如下计算百分比同一性 :相同匹配的总数乘以 100，然后除以

所匹配跨度内较长序列的长度与引入较长序列中以比对两个序列的空位数之和。在计算百分比同一性时，以在序列之间产生最大匹配的方式比对进行比较的序列。

[0609] GCG 程序包是可用于测定百分比同一性的计算机程序，该程序包包括 GAP(Devereux等人，1984，Nucl. Acid Res. 12 :387 ;Genetics Computer Group，University of Wisconsin，Madison，WI)。使用计算机算法 GAP 来比对待测定百分比序列同一性的两个多肽或两个多核苷酸。对序列进行比对，以获得其相应氨基酸或核苷酸的最佳匹配 (“匹配的跨度”，如通过算法测定)。与算法相结合使用空位开放罚分 (其计算方式为 3× 平均对角线，其中“平均对角线”是所用比较矩阵的对角线的平均值 ;“对角线”是特定比较矩阵分配给各完美氨基酸匹配的评分或数值) 和空位延伸罚分 (其通常为空位开放罚分的 1/10) 以及比较矩阵 (诸如 PAM250 或 BLOSUM62)。在某些实施方案中，算法还使用标准比较矩阵 (对于 PAM250 比较矩阵，参见 Dayhoff 等人，1978，Atlas of Protein Sequence and Structure5 :345-352 ;对于BLOSUM62 比较矩阵，参见Henikoff 等人，1992，Proc. Natl. Acad. Sci. U. S. A. 89 :10915-10919)。

[0610] 使用 GAP 程序测定多肽或核苷酸序列的百分比同一性的推荐参数包括以下 :

[0611] 算法 :Needleman 等人，1970，J. Mol. Biol. 48 :443-453 ;

[0612] 比较矩阵 :来自 Henikoff 等人，1992，同上的 BLOSUM62 ;

[0613] 空位罚分 :12(但无末端空位的罚分)

[0614] 空位长度罚分 :4

[0615] 相似性阈值 :0

[0616] 用于比对两个氨基酸序列的某些比对方案可导致仅匹配两个序列的较短区域，并且此小比对区域可具有极高的序列同一性，即使两个全长序列之间不存在明显关系。因此，如果需要实现跨越靶多肽的至少 50 个连续氨基酸的比对，则可调整所选的比对方法 (GAP 程序)。

[0617] 术语“修饰”在结合免疫球蛋白 (包括本发明的抗体和抗体片段) 使用时包括但不限于一个或多个氨基酸变化 (包括取代、插入或缺失) ;化学修饰 ;偶联到治疗剂或诊断剂的共价修饰 ;进行标记 (例如使用放射性核素或各种酶) ;共价聚合物连接，诸如聚乙二醇化 (用聚乙二醇衍生化) 以及通过化学合成非天然氨基酸实现的插入或取代。

[0618] 术语“衍生物”在结合本发明范围内的免疫球蛋白 (包括抗体和抗体片段) 使用时是指通过偶联到治疗剂或诊断剂、进行标记 (例如使用放射性核素或各种酶)、共价聚合物连接 (诸如聚乙二醇化，即用聚乙二醇衍生化) 以及通过化学合成非天然氨基酸实现的插入或取代而共价修饰的免疫球蛋白。本发明的衍生物将保留本发明的未衍生化分子的结合性质。

[0619] 在本发明的一些实施方案中，半衰期延长部分是免疫球蛋 Fc 结构域 (例如人免疫球蛋白 Fc 结构域，包括同种异型 IgG1、IgG2、IgG3 或 IgG4 的 Fc) 或其部分 (例如 Fc 结构域的 CH2 结构域)、人血清白蛋白 (HSA) 或聚 (乙二醇)(PEG)，尤其是分子量为约 1000Da 至约 100000Da 的 PEG。

[0620] 单价二聚或二价二聚 Fc- 毒素肽类似物融合体或偶联物是本发明物质组合物的可用实施方案。“单价二聚”Fc- 毒素肽类似物融合体或偶联物或可互换地称为“单价二聚体”或可互换地称为“单价异二聚体”是包含仅结合一个二聚 Fc 结构域的毒素肽类似物的

Fc- 毒素肽类似物融合体或偶联物（例如，如 Sullivan 等人，Toxin Peptide Therapeutic Agents，US2007/0071764 和 Sullivan 等人，Toxin Peptide Therapeutic Agents，PCT/US2007/022831（作为 WO2008/088422 公开）的图 2B 中示意性图示，两者均以引用方式整体并入本文）。“二价二聚”Fc- 毒素肽类似物融合体或可互换地称为“二价二聚体”或“二价同二聚体”是具有两个各自独立地与毒素肽类似物偶联的二聚 Fc 结构域的 Fc- 毒素肽类似物融合体或偶联物（例如，如 Sullivan 等人，Toxin Peptide Therapeutic Agents，US2007/0071764 和 Sullivan 等人，Toxin Peptide Therapeutic Agents，PCT/US2007/022831（作为 WO2008/088422 公开）的图 2C 中示意性图示）。

[0621] 免疫球蛋白 Fc 结构域包括 Fc 变体，这些 Fc 变体是本发明范围内的合适半衰期延长部分。天然 Fc 可经广泛修饰以形成根据本发明的 Fc 变体，前提是保持与补救受体的结合；参见例如 WO97/34631、WO96/32478 和 WO04/110472。在此类 Fc 变体中，可移除天然 Fc 中一或多个提供本发明融合体或偶联物分子不需要的结构特征或功能活性的位点。可通过例如取代或缺失残基、向位点中插入残基或截短含有相应位点的部分来移除这些位点。插入或取代的残基也可以是发生改变的氨基酸，诸如模拟肽或 D- 氨基酸。Fc 变体可因许多原因而合乎需要，其中多种原因描述于下。示例性 Fc 变体包括如下分子和序列，其中：

[0622] 1. 移除了涉及二硫键形成的位点。这种移除可避免与用于产生本发明分子的宿主细胞中所存在的其他含半胱氨酸蛋白反应。为此，可截短 N 端的含半胱氨酸片段，或者使半胱氨酸残基缺失或用其他氨基酸（例如丙氨酰、丝氨酰）取代。具体地讲，可以截短 SEQ ID NO:478 的 N 端 20 个氨基酸片段：

[0623] Met Glu Trp Ser Trp Val Phe Leu Phe Phe Leu Ser Val Thr Thr Gly

[0624] Val His Ser Asp Lys Thr His Thr Cys Pro Pro Cys Pro Ala Pro Glu

[0625] Leu Leu Gly Gly Pro Ser Val Phe Lcu Phe Pro Pro Lys Pro Lys Asp

[0626] Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val Asp

[0627] Val Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val Asp Gly

[0628] Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn

[0629] Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp Trp

[0630] Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Ala Leu Pro

[0631] Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg Gln

[0632] Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn

[0633] Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile

[0634] Ala Val Glu Trp Gln Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr

[0635] Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys

[0636] Leu Thr Val Asp Lys Ser Arg Trp Gln Gln Gly Asn Val Phe Ser Cys

[0637] Ser Val Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser Leu

[0638] Ser Leu Ser Pro Gly Lys//SEQ ID NO:478.

[0639] 或缺失或取代 SEQ ID NO:478 的第 7 和 10 位的半胱氨酸残基即使在移除半胱氨酸残基时，单链 Fc 结构域仍可形成以非共价方式保持在一起的二聚 Fc 结构域。

[0640] 2. 修饰天然 Fc 以使其与所选的宿主细胞更相容。例如，可移除典型天然 Fc 的 N 端附近的 PA 二肽序列，该序列可由大肠杆菌中的消化酶（诸如脯氨酸亚胺基肽酶）识别。

也可添加N端甲硫氨酸残基，尤其是将分子在细菌细胞诸如大肠杆菌中重组表达时。SEQ ID NO :478 的 Fc 结构域是一个这样的 Fc 变体。

[0641] 3. 移除天然 Fc N 端的一部分以防止在所选宿主细胞中表达时出现 N 端异质性。为此，可使 N 端前 20 个氨基酸残基中的任一者，尤其是第 1、2、3、4 和 5 位的那些缺失。

[0642] 4. 移除一个或多个糖基化位点。通常发生糖基化的残基（例如天冬酰胺）可赋予细胞溶解反应。此类残基可缺失或用未糖基化的残基（例如丙氨酸）取代。

[0643] 5. 移除涉及与补体相互作用的位点，诸如 C1q 结合位点。例如，可缺失或取代人类 IgG1 的 EKK 三肽序列。补体募集可能对本发明的分子不利并因此可通过这样的 Fc 变体而加以避免。

[0644] 5. 移除将对结合除补救受体之外的 Fc 受体产生影响的位点。天然 Fc 可具有与某些白血球相互作用的位点，本发明的融合体或偶联物分子不需要这些位点并因此可将其移除。

[0645] 7. 将 ADCC 位点移除以降低或消除 ADCC 效应功能，或者可选地，通过非岩藻糖基化或去岩藻糖基化进行修饰以增强 ADCC 效应功能。ADCC 位点在本领域中是已知的；关于 IgG1 中的 ADCC 位点，参见例如 Molec. Immunol. 29(5) :633-9(1992)。本发明的融合体或偶联物分子也不需要这些位点，并因此可将其移除，或在需要时增强 ADCC 效应功能。（参见 Iida 等人，Two mechanisms of the enhanced antibody-dependent cellular cytotoxicity(ADCC)efficacy of non-fucosylated therapeutic antibodies in human blood，BMC Cancer9 :58doi :10.1186/1471-2407-9-58(2009)）。

[0646] 8. 当天然 Fc 来源于非人类抗体时，可将天然 Fc 人源化。通常，为了人源化天然 Fc，将用通常存在于人类天然 Fc 中的残基取代非人类天然 Fc 中的所选残基。抗体人源化技术在本领域中是熟知的。

[0647] 9. 可将一个或多个毒素肽类似物序列插入免疫球蛋白 Fc 结构域的环区域内的一个或多个内部偶联位点中，如美国专利号 7,442,778、7,645,861、7,655,764、7,655,765、7,662,931、7,750,127 和 7,750,128 中所公开。术语“环”区域或“Fc- 环”区域是指氨基酸残基的一级序列，其在环区域一级结构的紧接 N 端和 C 端方向连接两个包含二级结构（诸如 α 螺旋或 β 折叠）的区域。实例包括但不限于 CH2 或 CH3 环区域。本领域的技术人员理解，环区域虽然自身不含二级结构，但是可影响或有助于二级或更高级蛋白结构。术语“内部”偶联位点意指一个或多个毒素肽类似物部分不处于末端，即不经由 Fc 结构域的 α - 氨基位点或 α - 羧基位点，但在 Fc 结构域的 N 端和 / 或 C 端也可任选地存在另外的末端偶联部分。

[0648] 10. 具有合适长度和电中性的接头诸如“L25”(GGGGSGGGGSGGGGSGGGGSGGGGS ;SEQ ID NO :493) 或“L20”(GGGGSGGGGSGGGGSGGGGS ;SEQ ID NO :477) 可在 Fc 结构域一个单体的 C 端与第二 Fc 结构域单体的 N 端之间共价融合，其中毒素肽类似物融合到第一 Fc 结构域单体的 N 端或第二 Fc 结构域单体的 C 端，或第一和 / 或第二 Fc 结构域单体的环区域内。这样的分子可在细菌或哺乳动物细胞中重组表达以产生变体“单价二聚”Fc- 毒素肽类似物融合体或偶联物，其中 Fc 单体之间形成典型的二硫键。（参见例如本文的实施例 13）。Fc 变体的其他实例包括以下 :在 SEQ ID NO :478 中，可用谷氨酸取代第 15 位的亮氨酸 ;用丙氨酸取代第 99 位的谷氨酸 ;以及用丙氨酸取代第 101 和 103 位的赖氨酸。此外，苯丙氨酸

残基可替代一或多个酪氨酸残基。出于本发明的目的，变体 Fc 结构域也可以为单体免疫球蛋白重链、抗体或异三聚半体 (LC+HC+Fc) 的一部分。

[0649] 替代性半衰期延长部分将为能够结合到补救受体的蛋白、多肽、肽、抗体、抗体片段或小分子（例如拟肽化合物）。例如，可使用如 1998 年 4 月 14 日授予 Presta 等人的美国专利号 5,739,277 中所述的多肽作为半衰期延长部分。也可通过噬菌体展示来选择结合到 FcRn 补救受体的肽。此类补救受体结合化合物也包括在“半衰期延长部分”的含义内和本发明的范围内。应选择此类半衰期延长部分以延长半衰期（例如通过避免由蛋白酶识别的序列）并降低免疫原性（例如通过偏好非免疫原性序列，如在抗体人源化中所发现）。

[0650] 如上所述，也可使用聚合物半衰期延长部分。当前可获得用于附接可用作半衰期延长部分的化学部分的各种手段，参见例如以引用方式整体并入本文的标题为“N-Terminally Chemically Modified Protein Compositions and Methods”的专利合作条约（“PCT”）国际公开号 WO96/11953。此 PCT 公开案尤其公开了水溶性聚合物选择性附接到蛋白的 N 端。

[0651] 在本发明组合物的一些实施方案中，聚合物半衰期延长部分是共价连接在毒素肽类似物的 N 端、C 端或一条或多条插入侧链的聚乙二醇 (PEG)。本发明物质组合物的一些实施方案还包括一个或多个偶联到非 PEG 半衰期延长部分或偶联到毒素肽类似物或偶联到任何这些物质的任何组合的 PEG 部分。例如，可通过还原性烷基化工艺使本发明组合物中的 Fc 结构域或其部分单聚乙二醇化、二聚乙二醇化或者多聚乙二醇化。

[0652] 蛋白和肽与聚（乙二醇）(PEG) 的共价偶联已被广泛认为是明显延长治疗性蛋白体内循环半衰期的途径。聚乙二醇化主要通过延迟肾清除来实现此效应，因为 PEG 部分显著增加蛋白质的流体动力学半径。(Zalipsky, S. 等人，Use of functionalized poly(ethylene glycol)s for modification of polypeptides.，in poly(ethylene glycol)chemistry :Biotechnical and biomedical applications.，J.M.Harris 编辑，Plenum Press :New York.，347-370(1992))。蛋白和肽的聚乙二醇化通常所赋予的另外益处包括增加溶解度、耐蛋白水解降解以及降低治疗性多肽的免疫原性。若干聚乙二醇化蛋白的商业化证明了蛋白聚乙二醇化的优点，包括 PEG- 腺苷脱胺酶 (Adagen™/Enzon Corp.)、PEG-L- 天冬酰胺酶 (Oncaspar™/Enzon Corp.)、PEG- 干扰素 α-2b(PEG-Intron™/Schering/Enzon)、PEG- 干扰素 α-2a(PEGASYS™/Roche) 和 PEG-G-CSF(Neulasta™/Amgen) 以及处于临床试验中的许多其他聚乙二醇化蛋白。

[0653] 所谓“聚乙二醇化肽”或“聚乙二醇化蛋白”是指具有聚乙二醇 (PEG) 部分的肽，该聚乙二醇部分共价结合到肽自身的氨基酸残基，或者共价结合到直接地或经由另一接头部分间接地共价结合到肽残基的肽基或非肽基接头。非限制性实例为肽与 3-(1-(1- 溴 -2- 氧代 -6,9,12,15,18,21,24,27,30,33,36- 十一氧杂 -3- 氮杂三十八烷 -38- 基)-1H-1,2,3- 三唑 -4- 基）丙酰基的 N 端偶联（本文中以缩写“{ 溴乙酰胺 -PEG11- 三唑 }-”来表示）。

[0654] 所谓“聚乙二醇”或“PEG”是指聚亚烷基二醇化合物或其衍生物，具有或不具有偶合剂或用或不用偶合或活化部分（例如用醛、羟基琥珀酰亚胺基、酰肼、硫醇、三氟甲磺酸、三氟乙磺酸、氮丙啶、环氧乙烷、邻吡啶基二硫化物、乙烯基砜、碘乙酰胺或马来酰亚胺部分）衍生化。根据本发明，可用的 PEG 包括基本上线性的直链 PEG、支链 PEG(brPEG)

或树枝状 PEG。(参见例如 Merrill,美国专利号 5,171,264 ;Harris 等人,Multiarmed, monofunctional,polymer for coupling to molecules and surfaces,美国专利号 5,932,462 ;Shen,N-maleimidyl polymer derivatives,美国专利号 6,602,498)。

[0655] 简而言之,PEG 基团通常经由 PEG 部分上的反应性基团(例如醛、氨基、硫醇或酯基团)与本发明化合物上的反应性基团(例如醛、氨基或酯基团)发生酰化或还原性烷基化(或还原性胺化)而连接到本发明组合物的肽部分。可用于合成类肽的聚乙二醇化的策略由通过在溶液中形成共轭键来组合肽与 PEG 部分而构成,肽与 PEG 部分各自具有彼此相互反应的特殊官能团。肽可用常规的固相合成容易地制备(参见例如图 5 和图 6 以及本文所附的文本)。在特定位点处用合适的官能基将肽“预活化”。在与 PEG 部分反应前纯化并充分表征前体。肽与 PEG 的连接通常在水相中发生并可通过反相分析型 HPLC 容易地监测。聚乙二醇化肽可容易地通过制备型 HPLC 加以纯化并通过分析型 HPLC、氨基酸分析和激光解吸质谱来表征。

[0656] PEG 是可以商购获得的或可根据本领域熟知的方法通过乙二醇开环聚合而制备的熟知水溶性聚合物 (Sandler 和 Karo,Polymer Synthesis,Academic Press,New York, Vol.3,第 138-161 页)。在本申请中,术语“PEG”广泛用于涵盖呈单官能、双官能或多官能形式的任何聚乙二醇分子而不考虑 PEG 的大小或末端修饰,并且可由下式表示 :

[0657] $X-O(CH_2CH_2O)_{n-1}CH_2CH_2OH$, (I)

[0658] 其中 n 为 20 至 2300,并且 X 为 H 或末端修饰,例如 C_{1-4} 烷基。

[0659] 在一些可用的实施方案中,本发明所用的 PEG 在 - 端以羟基或甲氧基终止,即 X 为 H 或 CH_3 “甲氧基 PEG”)。应当注意,式 (I) 中示为以 OH 终止的 PEG 的另一端经由醚氧键、胺键合或酰胺键合共价连接到活化部分。当用于化学结构中时,术语“PEG”包括不具有所示羟基的氢从而留下可用于与接头游离碳原子反应形成醚键的氧的上式 (I)。更具体地讲,为了使 PEG 偶联到肽,肽必须与“活化”形式的 PEG 反应。活化的 PEG 可由下式表示 :

[0660] (PEG)-(A) (II)

[0661] 其中 PEG(定义同上) 共价连接到活化部分 (A) 的碳原子以形成醚键、胺键合或酰胺键合,并且 (A) 含有可与肽的氨基酸残基或共价连接到肽的接头部分 (例如毒素肽类似物) 上的氨基、叠氮基、炔烃、亚氨基、马来酰亚胺基、N- 琥珀酰亚胺基、羧基、氨基氧基、硒基或硫醇基团反应的反应性基团。

[0662] 制备活化的 PEG 及其与生物活性肽的偶联技术在本领域中是熟知的。(参见例如美国专利号 5,643,575、5,919,455、5,932,462 和 5,990,237 ;Kinstler 等人, N-terminally chemically modified protein compositions and methods,美国专利号 5,985,265 和 5,824,784 ;Thompson 等人,PEGylation of polypeptides,EP0575545B1 ; Petit,Site specific protein modification,美国专利号 6,451,986 和 6,548,644 ; S.Herman 等人,Poly(ethylene glycol)with reactive endgroups :I.Modification of proteins,J.Bioactive Compatible Polymers,10 :145-187(1995) ;Y.Lu 等人,PEGylated peptides III :Solid-phase synthesis with PEGylating reagents of varying molecular weight :synthesis of multiply PEGylated peptides,Reactive Polymers, 22 :221-229(1994) ;A.M.Felix 等 人,PEGylated Peptides IV :Enhanced biological activity of site-directed PEGylated GRF analogs,Int.J.Peptide Protein Res.,

46:253-264(1995);A.M.Felix,Site-specific poly(ethylene glycol)ylation of peptides,ACS Symposium Series680(poly(ethylene glycol)):218-238(1997);Y.Ikeda 等 人,Polyethylene glycol derivatives,their modified peptides,methods for producing them and use of the modified peptides,EP0473084B1;G.E.Means 等人,Selected techniques for the modification of protein side chains,in:Chemical modification of proteins,Holden Day,Inc.,219(1971))。

[0663] 活化的 PEG 诸如 PEG- 醛或 PEG- 醛水合物可通过已知的手段化学合成或得自商业来源,例如 Shearwater Polymers(Huntsville,A1) 或 Enzon,Inc.(Piscataway,N.J.)。

[0664] 出于本发明的目的,可用的活化 PEG 的实例为 PEG- 醛化合物(例如甲氧基 PEG- 醛),诸如 PEG- 丙醛,其可从 Shearwater Polymers(Huntsville,A1) 商购获得。PEG- 丙醛由式 PEG-CH_2CH_2CHO 表示。(参见例如美国专利号 5,252,714)。"PEG 醛化合物"的含义还包括 PEG 醛水合物,例如 PEG 乙醛水合物和 PEG 双醛水合物,后者产生双官能活化的结构。(参见例如 Bentley 等人,Poly(ethylene glycol)aldehyde hydrates and related polymers and applications in modifying amines,美国专利号 5,990,237)(参见例如 Bentley 等人,Poly(ethylene glycol)aldehyde hydrates and related polymers and applications in modifying amines,美国专利号 5,990,237)。可使用活化的多分支 PEG- 醛化合物(包含多条臂以获得二价、三价、四价、八价构建体的 PEG 衍生物)。使用 4 臂 PEG 衍生物时,将四 (4) 个毒素肽类似物连接到各 PEG 分子。例如,根据本发明,毒素肽类似物可在 PEG 的 1、2、3 或 4 个氨基官能化位点偶联到聚乙二醇 (PEG)。

[0665] 在根据本发明的方法进行偶联时,如本文所述的聚乙二醇 (PEG) 通过还原胺化直接共价结合到毒素肽类似物自身氨基酸残基的至少一个溶剂暴露的游离胺部分。在本发明方法的一些实施方案中,毒素肽类似物在毒素肽类似物上的一个或多个伯胺或仲胺处偶联到 PEG,或在毒素肽类似物上的单个伯胺位点处偶联到两个 PEG 基团(例如此情况可在还原胺化反应涉及存在过量的 PEG- 醛化合物时发生)。我们已观察到,当在肽上的伯胺处通过还原胺化进行聚乙二醇化时,常见的是获得一定量 (1 至 100% 范围) 的每分子具有两个或更多个 PEG 的反应产物,并且如果所需的聚乙二醇化产物是每分子仅具有一个 PEG 的产物,则此"过度聚乙二醇化"可能不合需要。当需要每个聚乙二醇化产物分子具有单个 PEG 的聚乙二醇化产物时,可采用涉及使用药理学活性肽的仲胺进行聚乙二醇化的本发明方法的实施方案,因为每个分子中仅一个 PEG 基团将在还原胺化反应中转移。

[0666] 可提供伯胺部分的氨基酸残基包括赖氨酸、高赖氨酸、鸟氨酸、α,β- 二氨基丙酸 (Dap)、α,β- 二氨基丙酸 (Dpr) 和 α,γ- 二氨基丁酸 (Dab)、氨基丁酸 (Abu) 和 α- 氨基 - 异丁酸 (Aib)。多肽 N 端也提供可用于聚乙二醇化的 α- 氨基。可提供二级胺部分的氨基酸残基包括 ε-N- 烷基赖氨酸、α-N- 烷基赖氨酸、δ-N- 烷基鸟氨酸、α-N- 烷基鸟氨酸或 N- 端脯氨酸,其中烷基为 C_1 至 C_6。

[0667] 另一可用于产生本发明的聚乙二醇化毒素肽类似物的活化 PEG 为 PEG- 马来酰亚胺化合物,诸如但不限于甲氧基 PEG- 马来酰亚胺,诸如马来酰亚胺基单甲氧基 PEG,尤其可用于产生本发明的 PEG 偶联肽。(例如 Shen,N-maleimidyl polymer derivatives,美国专利号 6,602,498;C.Delgado 等人,The uses and properties of PEG-linked proteins.,Crit.Rev.Therap.Drug Carrier Systems,9:249-304(1992);S.Zalipsky

等 人，Use of functionalized poly(ethylene glycol)s for modification of polypeptides，in：Poly(ethylene glycol)chemistry：Biotechnical and biomedical applications(J.M.Harris，Editor，Plenum Press：New York，347-370(1992)；S.Herman 等人，Poly(ethylene glycol)with reactive endgroups：I.Modification of proteins，J.Bioactive Compatible Polymers，10：145-187(1995)；P.J.Shadle 等人，Conjugation of polymer to colony stimulating factor-1，美国专利号 4,847,325；G.Shaw 等人，Cysteine added variants IL-3and chemical modifications thereof，美国专利号 5,166,322 和 EP0469074B1；G.Shaw 等人，Cysteine added variants of EPO and chemical modifications thereof，EP0668353A1；G.Shaw 等人，Cysteine added variants G-CSF and chemical modifications thereof，EP0668354A1；N.V.Katre 等人，Interleukin-2muteins and polymer conjugation thereof，美国专利号 5,206,344；R.J.Goodson and N.V.Katre，Site-directed pegylation of recombinant interleukin-2at its glyCoSylation site，Biotechnology，8：343-346(1990))。

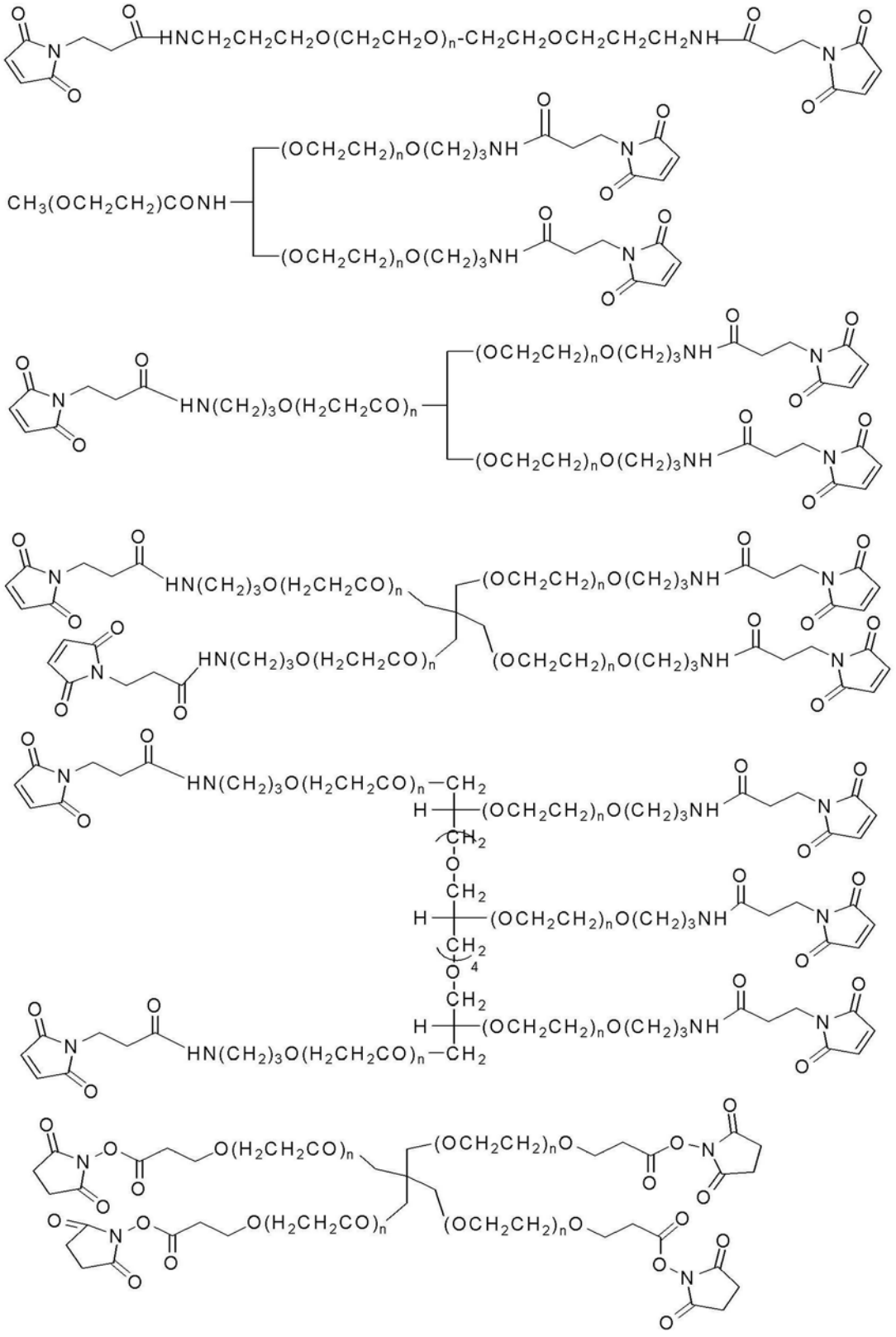
[0668] 聚（二醇）乙烯基砜是另一可用于通过在硫醇化氨基酸残基处（例如在 C 残基处）偶联而产生本发明的 PEG 偶联毒素肽类似物的活化 PEG。（例如 M.Morpurgo 等人，Preparation and characterization of poly(ethylene glycol)vinyl sulfone，Bioconj.Chem.，7：363-368(1996)；另见 Harris，Functionalization of polyethylene glycol for formation of active sulfone-terminated PEG derivatives for binding to proteins and biologically compatible materials，美国专利号 5,446,090、5,739,208、5,900,461、6,610,281 和 6,894,025；以及 Harris，Water soluble active sulfones of poly(ethylene glycol)，WO95/13312A1)。可根据本发明使用的另一 PEG 活化形式是 PEG-N- 羟基琥珀酰亚胺酯化合物，例如甲氧基 PEG-N- 羟基琥珀酰亚胺基 (NHS) 酯。

[0669] PEG 的杂双官能活化形式也可使用。（参见例如 Thompson 等人，PEGylation reagents and biologically active compounds formed therewith，美国专利号 6,552,170)。

[0670] 在产生物质组合物的本发明方法的另外其他实施方案中，毒素肽类似物通过已知的化学技术与活化的 PEG 化合物诸如但不限于硫醇活化的 PEG 化合物、二醇活化的 PEG 化合物、PEG- 酰肼化合物、PEG- 羟基胺化合物或 PEG- 溴乙酰基化合物反应。（参见例如 S.Herman，Poly(ethylene glycol)with Reactive Endgroups：I.Modification of Proteins，J.Bioactive and Compatible Polymers，10：145-187(1995)；S.Zalipsky，Chemistry of Polyethylene Glycol Conjugates with Biologically Active Molecules，Advanced Drug Delivery Reviews，16：157-182(1995)；R.Greenwald 等人，Poly(ethylene glycol)conjugated drugs and prodrugs：a comprehensive review，Critical Reviews in Therapeutic Drug Carrier Systems，17：101-161(2000))。

[0671] 用于产生本发明的 PEG 偶联毒素肽类似物的甚至更优选的活化 PEG 是具有不止一个活化残基的多价 PEG。优选的多价 PEG 部分包括但不限于以下所示的那些：

[0672]



[0673] 在制备物质组合物的另外其他实施方案中，本发明的毒素肽类似物通过已知的化学技术与活化的多分支PEG化合物（包含多条臂以获得二价、三价、四价、八价构建体的PEG衍物，诸如但不限于季戊四醇四聚乙二醇醚）反应。官能化和活化衍生物诸如但不限于

N- 琥珀酰亚胺基氧基羰基）丙基、对硝基苯基氧基羰基、(-CO_2-p-$C_6H_4NO_2$)、3-(N- 马来酰亚胺基）丙酰胺基、2- 巯乙基和 3- 氨基丙基。使用 4 臂 PEG 衍生物时，将四个毒素肽类似物连接到各 PEG 分子。例如，根据本发明，毒素肽类似物可在以下位点偶联到聚乙二醇 (PEG)：

[0674] (a)PEG 的 1、2、3 或 4 个氨基官能化位点；

[0675] (b)PEG 的 1、2、3 或 4 个硫醇官能化位点；

[0676] (c)PEG 的 1、2、3 或 4 个马来酰亚胺基官能化位点；

[0677] (d)PEG 的 1、2、3 或 4 个 N- 琥珀酰亚胺基官能化位点；

[0678] (e)PEG 的 1、2、3 或 4 个羧基官能化位点；

[0679] (f)PEG 的 1、2、3 或 4 个对硝基苯基氧基羰基官能化位点。

[0680] PEG 的最小适用大小为约 500 道尔顿 (Da)，低于该值 PEG 将变得具有毒性。高于约 500Da 时，可根据实际需要使用任何 PEG 分子质量，例如约 1,000 道尔顿 (Da) 至 100,000Da(n 为 20 至 2300)。PEG 单体数目 (n) 是根据平均分子质量针对各单体使用 MW = 44Da 获得的近似值。优选的是，活化接头上的 PEG 的组合分子质量适合药学用途。因此，PEG 分子的组合分子质量不应超过约 100,000Da。在一些实施方案中，用于本发明的 PEG- 偶联毒素肽类似物的 PEG 的组合或总平均分子质量为约 3,000Da 至 60,000Da(总 n 为 70 至 1,400)，更优选地为约 10,000Da 至 40,000Da(总 n 为约 230 至约 910)。PEG 的最优选组合质量为约 20,000Da 至 30,000Da(总 n 为约 450 至约 680)。

[0681] 应当理解，可制备物质组合物的“多聚体”，因为用于偶联到毒素肽类似物（具有或不具有居间接头部分）的半衰期延长部分可关于可偶联半衰期延长部分的氨基酸残基数为多价的（例如二价、三价、四价或更高价）。在一些实施方案中，本发明的物质组合物的肽部分可以为多价的（例如二价、三价、四价或更高价），并因此本发明物质组合物的一些“多聚体”可具有不止一个半衰期延长部分。因此，可通过产生物质组合物的本发明方法来产生多种偶联的半衰期延长部分肽结构。例如，单价半衰期延长部分和单价肽将产生 1 :1 偶联物；二价肽和单价半衰期延长部分可形成其中肽偶联物具有两个半衰期延长部分的偶联物，而二价半衰期延长部分和单价肽可产生其中两个肽实体连接到单个半衰期延长部分的物质；使用更高价态的半衰期延长部分可导致形成结合到单个半衰期延长部分的肽实体簇，而更高价态的肽可通过多个半衰期延长部分包裹。又如，若个多价半衰期延长部分与毒素肽类似物的偶联位点为半胱氨酸或其他氨基硫醇，则可采用 D′ Amico 等人公开的方法 (D’Amico 等人，Method of conjugating aminothiol containing molecules to vehicles，作为 US2006/0199812 而公开，该申请以引用方式整体并入本文）。

[0682] 肽部分可具有不止一个将与活化的半衰期延长部分反应的反应性基团，并且必须始终考虑形成复杂结构的可能性；当需要形成简单结构诸如半衰期延长部分和肽的 1 :1 加合物或需要使用二价半衰期延长部分形成肽 :半衰期延长部分 :肽加合物时，将会有益的是 :使用预定比率的活化半衰期延长部分与肽物质、其预定的浓度以及在预定条件下（诸如持续时间、温度、pH 等）进行反应以便形成一定比例的所述产物然后将所述产物与其他反应产物分离。反应条件、试剂比例和浓度可通过在普通技术人能力范围内的相对简单的试错实验并视需要进行适当的放大而获得。类似地，通过本领域技术人员熟知的常规技术实现产物的纯化和分离。

[0683] 另外，融合到或偶联到本发明毒素肽类似物的半衰期延长部分的生理上可接受的

盐也涵盖在本发明的物质组合物的范围内。

[0684] 上述半衰期延长部分和本文所述的其他半衰期延长部分可单独地或组合地使用，并且如本领域进一步描述，例如在 Sullivan 等人，Toxin Peptide Therapeutic Agents，US2007/0071764 和 Sullivan 等人，Toxin Peptide Therapeutic Agents，PCT/US2007/022831（作为 WO2008/088422 公开）中，两者均以引用方式整体并入本文。本发明涵盖任何单一种类的药学上可接受的半衰期延长部分（诸如但不限于本文所述的那些）与毒素肽类似物结合使用，或使用两种或更多种类似或不同的半衰期延长部分的组合。

[0685] 接头。如本文所使用的“接头部分”是指共价结合到本发明组合物中所含的毒素肽类似物或其他多肽链（例如免疫球蛋白 HC 或 LC 或免疫球蛋白 Fc 结构域）的氨基酸残基的生物学上可接受的肽基或非肽基有机基团，该接头部分将毒素肽类似物或其他多肽链共价接合或偶联到组合物中的另一肽或多肽链，或半衰期延长部分。在组合物的一些实施方案中，如本文所述的半衰期延长部分偶联（即直接共价结合）到毒素肽类似物自身的氨基酸残基，或任选地结合到肽基或非肽基接头部分（包括但不限于芳族或芳基接头），该接头部分共价结合到毒素肽类似物的氨基酸残基。任选地存在任何接头部分。当存在时，其化学结构并不重要，因为其主要充当定位、接合、连接或优化本发明组合物分子的一个官能部分相对于一个或多个其他官能部分的呈现或位置的间隔物。存在接头部分可用于优化本发明组合物的一些实施方案的药理学活性。接头优选地由通过肽键连接在一起的氨基酸构成。接头部分在存在时可独立地与本发明组合物中可存在的任何一个或多个其他接头相同或不同。如上所述，接头部分在存在时（无论是在毒素肽类似物的一级氨基酸序列内还是作为将半衰期延长部分连接到毒素肽类似物的接头）本质上可以为“肽基”（即，由通过肽键连接在一起的氨基酸组成）并在长度方面优选地由 1 至约 40 个氨基酸残基构成，更优选地由 1 至约 20 个氨基酸残基构成，并且最优选地由 1 至约 10 个氨基酸残基构成。优选但不必须地，接头中的氨基酸残基来自 20 种规范氨基酸，更优选地来自半胱氨酸、甘氨酸、丙氨酸、脯氨酸、天冬酰胺、谷氨酰胺和 / 或丝氨酸。甚至更优选地，肽基接头主要由无空间位阻的氨基酸构成，诸如通过肽键连接的甘氨酸、丝氨酸和丙氨酸。也可取的是若存在肽基接头，则选择避免在体内循环中发生快速蛋白水解转换的肽基接头。这些氨基酸的其中一些可经糖基化，如本领域的技术人员充分了解。例如，构成唾液酸化位点的可用接头序列为 $X_1X_2NX_4X_5G$(SEQ ID NO:479)，其中 X_1、X_2、X_4 和 X_5 各自独立地为任何氨基酸残基。

[0686] 在其他实施方案中，肽基接头部分的 1 至 40 个氨基酸选自甘氨酸、丙氨酸、脯氨酸、天冬酰胺、谷氨酰胺和赖氨酸。优选地，接头主要由无空间位阻的氨基酸（诸如甘氨酸和丙氨酸）构成。因此，优选的接头包括聚甘氨酸、聚丝氨酸和聚丙氨酸，或任何这些聚氨基酸的组合。一些示例性肽基接头为 poly$(Gly)_{1-8}$，尤其是 $(Gly)_3$、$(Gly)_4$(SEQ ID NO:480)、$(Gly)_5$(SEQ ID NO:481) 和 $(Gly)_7$(SEQ ID NO:482)，以及 GlySer 和 poly$(Gly)_4$Ser，诸如“L15”(GGGGSGGGGSGGGGS;SEQ ID NO:483)、poly$(Gly\text{-}Ala)_{2-4}$ 和 poly$(Ala)_{1-8}$。肽基接头的其他具体实例包括 $(Gly)_5$Lys(SEQ ID NO:484) 和 $(Gly)_5$LysArg(SEQ ID NO:485)。可用的肽基接头的其他实例为：

[0687] $(Gly)_3$Lys$(Gly)_4$(SEQ ID NO:486)；

[0688] $(Gly)_3$AsnGlySer$(Gly)_2$(SEQ ID NO:487)；

[0689] $(Gly)_3$Cys$(Gly)_4$(SEQ ID NO:488)；和

[0690] GlyProAsnGlyGly(SEQ ID NO:489).

[0691] 为了阐述以上命名法,例如 $(Gly)_3Lys(Gly)_4$ 意指 Gly-Gly-Gly-Lys-Gly-Gly-Gly-Gly(SEQ ID NO:490)。Gly 和 Ala 的其他组合也可使用。

[0692] 其他优选的接头是在本文中鉴定为“L5”(GGGGS;或“G_4S”;SEQ ID NO:491)、“L10”(GGGGSGGGGS;SEQ ID NO:492)、“L20”(GGGGSGGGGSGGGGSGGGGS;SEQ ID NO:477)、“L25”(GGGGSGGGGSGGGGSGGGGSGGGGS;SEQ ID NO:493)的那些接头以及用于下文工作实施例中的任何接头。

[0693] 在包含肽接头部分的本发明组合物的一些实施方案中,将酸性残基(例如谷氨酸或天冬氨酸残基)置于接头部分的氨基酸序列中。实例包括以下肽接头序列:

[0694] GGEGGG(SEQ ID NO:494);

[0695] GGEEEGGG(SEQ ID NO:495);

[0696] GEEEG(SEQ ID NO:496);

[0697] GEEE(SEQ ID NO:497);

[0698] GGDGGG(SEQ ID NO:498);

[0699] GGDDDGG(SEQ ID NO:499);

[0700] GDDDG(SEQ ID NO:500);

[0701] GDDD(SEQ ID NO:501);

[0702] GGGGSDDSDEGSDGEDGGGGS(SEQ ID NO:502);

[0703] WEWEW(SEQ ID NO:503);

[0704] FEFEF(SEQ ID NO:504);

[0705] EEEWWW(SEQ ID NO:505);

[0706] EEEFFF(SEQ ID NO:506);

[0707] WWEEEWW(SEQ ID NO:507);或

[0708] FFEEEFF(SEQ ID NO:508).

[0709] 在其他实施方案中,接头构成磷酸化位点,例如 $X_1X_2YX_4X_5G$(SEQ ID NO:509),其中 X_1、X_2、X_4 和 X_5 各自独立地为任何氨基酸残基;$X_1X_2SX_4X_5G$(SEQ ID NO:510),其中 X_1、X_2、X_4 和 X_5 各自独立地为任何氨基酸残基;或 $X_1X_2TX_4X_5G$(SEQ ID NO:511),其中 X_1、X_2、X_4 和 X_5 各自独立地为任何氨基酸残基。

[0710] 此处所示的接头为示例性的;本发明范围内的肽基接头可长得多并且可包含其他残基。肽基接头可包含例如半胱氨酸、另一硫醇或亲核物质以供与半衰期延长部分偶联。在另一实施方案中,接头包含半胱氨酸或高半胱氨酸残基或者其他 2- 氨基 - 乙硫醇或 3- 氨基 - 丙硫醇部分以供与马来酰亚胺、碘乙酰胺或硫酯官能化半衰期延长部分偶联。

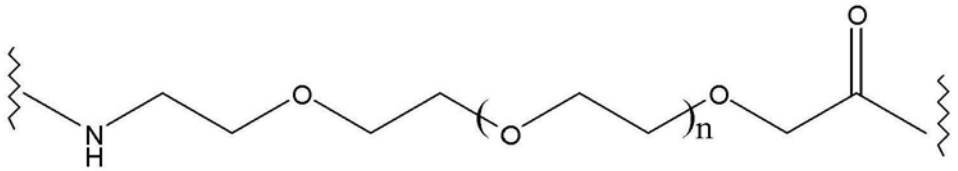
[0711] 另一可用的肽基接头为柔性大接头,其包含随机 Gly/Ser/Thr 序列,例如:GSGSATGGSGSTASSGSGSATH(SEQ ID NO:512)或HGSGSATGGSGSTASSGSGSAT(SEQ ID NO:513),据估计大约具有 1kDa PEG 分子的大小。可选地,可用的肽基接头可由本领域已知的氨基酸序列构成以形成刚性螺旋结构(例如刚性接头:-AEAAAKEAAAKEAAAKAGG-//SEQ ID NO:514)。另外,肽基接头也可包含非肽基片段,诸如式 $-CH_2-CH_2-CH_2-CH_2-CH_2-CH_2-$ 的 6 碳脂族分子。肽基接头可发生改变以形成如本文所述的衍生物。

[0712] 任选地,非肽基接头部分也可用于将半衰期延长部分偶联到半衰期延长部分偶

联的毒素肽类似物的肽部分。例如，可以使用烷基接头，诸如 -NH-$(CH_2)_s$-C(O)-，其中 s = 2-20。这些烷基接头可进一步被任何无空间位阻的基团诸如低级烷基（例如 C_1-C_6）、低级酰基、卤素（例如 Cl、Br）、CN、NH_2、苯基等取代。示例性非肽基接头为 PEG 接头（例如，如下所示）：

[0713]

(III)



[0714] 其中 n 使得接头具有约 100 至约 5000 道尔顿 (Da)，优选地约 100 至约 500Da 的分子量。

[0715] 在一个实施方案中，非肽基接头为芳基。接头可发生改变以按如本文所述的相同方式形成衍生物。此外，PEG 部分可通过使用 PEG 醛的还原性烷基化或使用羟基琥珀酰亚胺基或 PEG 碳酸酯的酰化或通过硫醇偶联而连接到 N 端胺或所选的侧链胺。

[0716] “芳基”为苯基或与饱和、部分饱和或不饱和的 3、4 或 5 元碳桥邻位稠合的苯基，该苯基或桥被 0、1、2 或 3 个选自 C_{1-8} 烷基、C_{1-4} 卤代烷基或卤素的取代基取代。“杂芳基”是不饱和的 5、6 或 7 元单环或部分饱和或不饱和的 6、7、8、9、10 或 11 元双环，其中至少一个环为不饱和的，单环和双环含有 1、2、3 或 4 个选自 N、O 和 S 的原子，其中环被 0、1、2 或 3 个选自 C_{1-8} 烷基、C_{1-4} 卤代烷基和卤素的取代基取代。

[0717] 本发明的物质组合物的非肽部分诸如非肽基接头或非肽半衰期延长部分可通过常规的有机化学反应来合成。

[0718] 上文仅为说明性的，而非对可根据本发明任选地采用的接头种类的详尽探讨。

[0719] 结合了电压门控钠通道 $Na_v1.3$ 和 / 或 $Na_v1.7$ 的经分离的多肽拮抗剂的本发明组合物，尤其是本发明的 GpTx-1 和 GpTx-1 毒素肽类似物（无论是否偶联到半衰期延长部分），均可用作例如人类中的疼痛治疗的治疗剂。临床遗传学信息（由若干小组独立地重复得到）清楚地表明 Nav1.7(SCN9A) 基因的产物是感知疼痛的关键控制点。在人类中，基因的功能丧失性截短突变导致对所测量的所有疼痛形式完全不敏感，而人类慢性疼痛综合征原发性红斑性肢痛和阵发性剧痛症由 $Na_v1.7$ 中的功能获得性突变引起，这些突变使 Nav1.7 通道更容易或更长时间开放。值得注意的是，在 $Na_v1.7$ 中携带截短突变或功能获得性突变的患者中不存在其他主要的神经学异常 (Goldberg 等人，Clin Genet71 :311-319(2007)；Cox 等人，Nature444 :894-898(2006) ;Ahmad 等人，Hum Mol Genet16 :2114-2121(2007)；Fertleman 等人，Neurology69 :586-595(2007))。因此，可预期阻断 $Na_v1.7$ 的治疗剂在人类疼痛治疗方面具有较大的实用性。

[0720] 具体的临床慢性疼痛综合征包括但不限于与以下有关或由以下所致的疼痛 :癌症、化疗、骨关节炎、纤维肌痛、原发性红斑性肢痛、疱疹后神经痛、疼痛性糖尿病神经病变、特发性疼痛性神经病变、神经瘤、阵发性剧痛症、偏头痛、三叉神经痛、颌面痛、丛集性头痛

或其他头痛、复杂性局部疼痛综合征 (CRPS)、腰椎手术失败综合征、坐骨神经痛（包括下背痛）、间质性膀胱炎和骨盆痛、炎症引起的疼痛（包括蜂窝组织炎）以及风湿性疼痛或关节疼痛。$Na_v1.7$ 抑制剂也可在治疗急性或持续性疼痛（包括但不限于创伤、烧伤或手术后的疼痛）方面具有较大的实用性。要注意的是，预期抑制 $Na_v1.7$ 不会对认知和胃肠系统产生限制使用阿片类药物的不良作用。另外，不同于阿片类，$Na_v1.7$ 抑制剂不应产生呼吸抑制、患者耐受性或成瘾性。此外，人类和非人灵长类动物中的 $Na_v1.7$ 表达绝大部分处于外周神经系统中，而脑或脊髓中几乎不存在信使或蛋白 (Ahmad 等人，Hum Mol Genet16 :2114-2121，2007)。与这些研究一致，我们的数据显示在用原位杂交检查的死后人类 CNS 区域中，仅在下丘脑核中以及脊髓和脊髓室管膜的腹侧运动区中发现了少量 $Na_v1.7$ 的信使 RNA，已知这些区域不牵涉疼痛反应。相比之下，在大脑皮层、小脑、肾上腺髓质、垂体或腰脊髓背侧区域或较深区域中未发现 $Na_v1.7$。在包括背根神经节、三叉神经节以及胃肠的肠肌丛的外周神经中发现了强 $Na_v1.7$ 表达。（参见图 13A-E)。此结果表明，$Na_v1.7$ 抑制剂将经由外周神经系统发挥镇痛功效而无需渗透CNS。由于肽一般不跨过血脑屏障，因此肽抑制剂与具有一定 CNS 渗透性的小分子相比优势在于肽不会产生由脑介导的常见脱靶副作用，诸如头晕、混乱或镇静。

[0721] $Na_v1.7$ 的临床遗传学数据未阐明 $Na_v1.7$ 是否在神经系统损伤并随后重塑的患者中维持其在疼痛感知方面的关键作用。这种重塑可能是许多慢性疼痛综合征的特征 (Woolf and Ma，Neuron55 :353-364(2007))。对于此类情况，可证明 $Na_v1.3$ 钠通道的拮抗作用具有较大的治疗有益效果。已公开的结果显示，在进行脊神经结扎手术的大鼠的感觉神经元（人类神经性疼痛的标准模型）中，编码 $Na_v1.3$ 的 mRNA 上调 (Hains 等人，J Neurosci24 :4832-4839，2004)。此结果暗示，对于一些慢性疼痛综合征，尤其是神经性疼痛，除了 $Na_v1.7$ 外还抑制 $Na_v1.3$ 可产生最佳的镇痛功效。大鼠感觉神经元细胞体的电生理学研究显示，脊神经结扎引起钠通道表达急剧偏向最可能由 SCN9A($Na_v1.7$) 和 SCN3A($Na_v1.3$) 编码的快速、河豚毒素敏感性亚型（参见图 14A-E)。另外，此结果暗示，对于一些疼痛综合征，Nav1.7 和 Nav1.3 的同时双重抑制可产生最有效的疼痛抑制。

[0722] 因此，本发明还涉及本发明物质组合物中的一种或多种在制造用于治疗或预防疾病、障碍或本文所述的其他医疗病症（例如但不限于慢性疼痛、急性疼痛或持续性疼痛，或本文所述的疼痛综合征的任一者）的药物中的用途。

[0723] 此类药物组合物可被构造成通过多种递送途径施用给患者，例如血管内递送途径，诸如通过注射或输注 ；皮下（“s.c.”)、静脉内（“i.v.”)、肌内、腹膜内（“i.p.”)、硬膜外或鞘内递送途径 ；或经口、经肠、经肺（例如吸入剂）、鼻内、经粘膜（例如舌下施用）、经皮或本领域已知的其他递送途径和 / 或施用形式。递送含有 GpTx-1 或本发明的其他物质组合物的药物或药物组合物可经由标准可注射状态进行，无论是自行施用还是在医院环境中施用 ；或者也可经由可植入的递送泵来实现最精确的给药和最稳定的血浆暴露水平。本发明的药物组合物可制备成液体形式，或可呈干燥粉末形式（诸如冻干形式）或结晶形式。对于经口或经肠使用而言，这些药物组合物可被构造成例如片剂、糖锭、锭剂、水性或油性悬浮液、分散性粉末或颗粒、乳液、硬胶囊或软胶囊、糖浆、酏剂或经肠调配物。

[0724] 药物组合物

[0725] 概要。本发明还提供包含本发明的物质组合物以及药学上可接受的载体的药物组

合物。此类药物组合物可被构造成通过多种递送途径施用给患者，例如血管内递送途径，诸如通过注射或输注；皮下、肌内、腹膜内、硬膜外或鞘内递送途径；或经口、经肠、经肺（例如吸入剂）、鼻内、经粘膜（例如舌下施用）、经皮或本领域已知的其他递送途径和/或施用形式。本发明的药物组合物可制备成液体形式，或可呈干燥粉末形式，诸如冻干形式。对于经口或经肠使用而言，这些药物组合物可被构造成例如片剂、糖锭、锭剂、水性或油性悬浮液、分散性粉末或颗粒、乳液、硬胶囊或软胶囊、糖浆、酏剂或经肠调配物。

[0726] 在本发明的实践中，“药学上可接受的载体”是本领域普通技术人员已知的可用于配制药物组合物的任何生理上耐受的物质，包括单一的或组合的任何药学上可接受的稀释剂、赋形剂、分散剂、粘合剂、填充剂、助流剂、抗摩擦剂、压缩助剂、片剂崩解剂（崩解剂）、助悬剂、润滑剂、矫味剂、除臭剂、甜味剂、穿透或渗透增强剂、防腐剂、表面活性剂、增溶剂、乳化剂、增稠剂、佐剂、染料、包衣料、包封材料和/或其他添加剂。此类药物组合物可包含多种缓冲液内含物（例如 Tris-HCl、乙酸盐、磷酸盐）、pH 值和离子强度的稀释剂；诸如洗涤剂和增溶剂的添加剂（例如 Tween® 80，聚山梨醇酯 80）、抗氧化剂（例如抗坏血酸、焦亚硫酸钠）、防腐剂（例如 Thimersol®，苯甲醇）和增量物质（例如乳糖、甘露糖醇）；将材料掺入聚合化合物（诸如聚乳酸、聚乙醇酸等）的颗粒制剂中或掺入脂质体中。也可使用透明质酸，并且此酸可具有促进循环的持续时间延长的作用。此类组合物可影响本发明蛋白和衍生物的物理状态、稳定性、体内释放速率和体内清除速率。参见例如以引用方式整体并入本文的 Remington′ s Pharmaceutical Sciences，第 18 版 (1990，Mack Publishing Co.，Easton，PA18042) 第 1435-1712 页。此类组合物可制备成液体形式，或者可以为干燥粉末，诸如冻干形式。可植入持续释放制剂也可使用，如经皮或经粘膜制剂。除此之外（或可选地），本发明提供用于技术人员已知的各种缓慢释放或持续释放制剂或微粒制剂任一者中的组合物，例如持续释放微粒制剂，其可经由肺、鼻内或皮下递送途径施用。（参见例如 Murthy 等人，Injectable compositions for the controlled delivery of pharmacologically active compound，美国专利号 6,887,487；Manning 等人，Solubilization of pharmaceutical substances in an organic solvent and preparation of pharmaceutical powders using the same，美国专利号 5,770,559 和 5,981,474；Lieberman 等人，Lipophilic complexes of pharmacologically active inorganic mineral acid esters of organic compounds，美国专利号 5,002,936；Gen，Formative agent of protein complex，US2002/0119946A1；Goldenberg 等人，Sustained release formulations，WO2005/105057A1）。

[0727] 可用惰性材料稀释本发明的组合物或增加本发明药物组合物的体积。此类稀释剂可包括碳水化合物，尤其是甘露糖醇、α- 乳糖、无水乳糖、纤维素、蔗糖、改性葡聚糖和淀粉。某些无机盐也可用作填充剂，包括三磷酸钙、碳酸镁和氯化钠。一些市售稀释剂为 Fast-Flo、Emdex、STA-Rx1500、Emcompress 和 Avicell。

[0728] 多种常规的增稠剂可用于药物组合物的乳膏、软膏、栓剂和凝胶剂型，诸如但不限于海藻酸盐、黄原胶或凡士林，也可用于本发明的药物组合物的此类剂型。也可采用穿透或渗透增强剂，诸如聚乙二醇单月桂酸酯、二甲基亚砜、N- 乙烯基 -2- 吡咯烷酮、N-(2- 羟乙基)- 吡咯烷酮或 3- 羟基 -N- 甲基 -2- 吡咯烷酮。可用于产生水凝胶基质的技术是已

知的。(例如 Feijen,Biodegradable hydrogel matrices for the controlled release of pharmacologically active agents,美国专利号 4,925,677 ;Shah 等人,Biodegradable pH/thermosensitive hydrogels for sustained delivery of biologically active agents,WO00/38651A1)。可例如通过使蛋白组分与多糖或粘多糖组分交联,接着加载待递送的本发明的物质组合物来形成此类可生物降解的凝胶基质。

[0729] 作为无菌溶液或悬浮液的本发明的液体药物组合物可通过例如肌内、鞘内、硬膜外、血管内(例如静脉内或动脉内)、腹膜内或皮下注射而施用给患者。(参见例如 Goldenberg 等人,Suspensions for the sustained release of proteins,美国专利号 6,245,740 和 WO00/38652A1)。无菌溶液也可通过静脉内输注而施用。本发明的组合物可包含在无菌固体药物组合物中,诸如冻干粉,其可在施用给患者之前在方便时使用无菌水、盐水、缓冲盐水或其他合适的无菌注射用介质溶解或悬浮。

[0730] 可植入持续释放制剂也是本发明药物组合物的可用实施方案。例如,作为可生物降解的基质植入人类或非人类脊椎动物体内或皮肤下的药学上可接受的载体可以是与如上所述的那些相似的水凝胶。可选地,其可以由聚-α-氨基酸组分形成。(Sidman, Biodegradable, implantable drug delivery device, and process for preparing and using same,美国专利号 4,351,337)。用于制备供药物递送的植入物的其他技术是已知的并可根据本发明使用。

[0731] 在粉末形式中,药学上可接受的载体为细分的固体,其与包括本发明组合物在内的细分活性成分配混。例如,在一些实施方案中,当将药物组合物构造成吸入剂时,可以使用粉末形式。(参见例如 Zeng 等人, Method of preparing dry powder inhalation compositions,WO2004/017918 ;Trunk 等人,Salts of the CGRP antagonist BIBN4096and inhalable powdered medicaments containing them,美国专利号 6,900,317)。

[0732] 可用惰性材料稀释或增加本发明化合物的体积。这些稀释剂可包括碳水化合物,尤其是甘露糖醇、α-乳糖、无水乳糖、纤维素、蔗糖、改性葡聚糖和淀粉。某些无机盐也可用作填充剂,包括三磷酸钙、碳酸镁和氯化钠。一些市售稀释剂为 Fast-Flo™、Emdex™、STA-Rx™1500、Emcompress™ 和 Avicell™。

[0733] 崩解剂可以药物组合物制剂形式包含在固体剂型中。用作崩解剂的材料包括但不限于淀粉,包括基于淀粉的市售崩解剂 Explotab™。羧甲淀粉钠、Amberlite™、羧甲基纤维素钠、超支链淀粉 (ultramylopectin)、海藻酸钠、明胶、橘皮、酸性羧甲基纤维素、天然海绵和膨润土均可使用。不溶性阳离子交换树脂是崩解剂的另一种形式。粉状胶可用作崩解剂并可用作粘合剂并且这些物质可包括诸如琼脂、Karaya 或黄蓍胶的粉状胶。海藻酸及其钠盐也可用作崩解剂。

[0734] 粘合剂可用于将治疗剂保持在一起以形成硬片剂并且包括来自天然产物的材料,诸如阿拉伯树胶、黄蓍胶、淀粉和明胶。其他物质包括甲基纤维素 (MC)、乙基纤维素 (EC) 和羧甲基纤维素 (CMC)。聚乙烯吡咯啶酮 (PVP) 和羟丙基甲基纤维素 (HPMC) 均可用于醇性溶液中以使治疗剂粒化。抗摩擦剂可包含在治疗剂制剂中以防止在配方过程中发生粘附。润滑剂可用作治疗剂与模具壁之间的层,并且这些润滑剂可包括但不限于硬脂酸(包括其镁盐和钙盐)、聚四氟乙烯 (PTFE)、液体石蜡、植物油和蜡。也可使用可溶性润滑剂,诸如月桂基硫酸钠、月桂基硫酸镁、各种分子量的聚乙二醇、Carbowax4000 和 6000。

[0735] 可添加可在配方期间改善药物流动性并在压缩期间有助于重排的助流剂。助流剂可包括淀粉、滑石、火成二氧化硅和水合硅铝酸盐。

[0736] 为了有助于将本发明的化合物溶于水性环境中，可添加表面活性剂作为湿润剂。表面活性剂可包括阴离子洗涤剂，诸如月桂基硫酸钠、二辛基磺基琥珀酸钠和二辛基磺酸钠。可使用阳离子洗涤剂并且其可以包括苯扎氯铵或苄索氯铵。可包含在制剂中作为表面活性剂的潜在非离子型洗涤剂的列表为聚桂醇 400、聚烃氧 40 硬脂酸酯、聚氧乙稀氢化蓖麻油 10、50 及 60、单硬脂酸甘油酯、聚山梨醇酯 40、60、65 及 80、蔗糖脂肪酸酯、甲基纤维素和羧甲基纤维素。这些表面活性剂可单独地或以不同比率的混合物形式存在于蛋白或衍生物的制剂中。

[0737] 经口剂型。本发明组合物的经口剂型也是可用的。需要时，可对组合物进行化学修饰以使得经口递送是有效的。一般来讲，设想的化学修饰是将至少一个部分连接到分子本身，其中所述部分允许 (a) 抑制蛋白水解；以及 (b) 从胃或肠吸收到血流中。还希望增加化合物的整体稳定性并延长体内循环时间。可在本发明中用作共价连接的半衰期延长部分的部分也可用于此目的。此类部分的实例包括：PEG、乙二醇与丙二醇的共聚物、羧甲基纤维素、葡聚糖、聚乙烯醇、聚乙烯吡咯烷酮以及聚脯氨酸。参见例如 Abuchowski 和 Davis(1981)，Soluble Polymer-Enzyme Adducts，Enzymes as Drugs(Hocenberg and Roberts 编辑)，Wiley-Interscience，New York，NY，pp367-83；Newmark，等人 (1982)，J.Appl.Biochem.4：185-9。其他可以使用的聚合物为聚 -1,3- 二氧戊环和聚 -1,3,6- 三氧八环 (poly-1,3,6-tioxocane)。如上所指出，对于药学用途，PEG 部分是优选的。

[0738] 对于经口递送剂型，也可使用经改性的脂族氨基酸的盐（诸如 N-(8-[2- 羟基苯甲酰基］氨基）辛酸钠 (SNAC)）作为增强本发明治疗性化合物的吸收的载体。已在由 Emisphere Technologies 开展的 II 期试验中证实了使用 SNAC 的肝素制剂的临床功效。参见美国专利号 5,792,451，“Oral drug delivery composition and methods”。

[0739] 在一个实施方案中，药学上可接受的载体可为液体并且药学组合物以溶液、悬浮液、乳液、糖浆、酏剂或加压组合物的形式制备。一种或多种活性成分（例如本发明的物质组合物）可溶解、稀释或悬浮在药学上可接受的液体载体诸如水、有机溶剂、两者的混合物或药学上可接受的油或脂肪中。液体载体可含有其他合适的药学添加剂，诸如洗涤剂和 / 或增溶剂（例如 Tween80、聚山梨醇酯 80）、乳化剂、适当 pH 值的缓冲剂（例如 Tris-HCl、乙酸盐、磷酸盐）、佐剂、抗氧化剂（例如抗坏血酸、焦亚硫酸钠）、防腐剂（例如 Thimersol、苯甲醇）、甜味剂、矫味剂、助悬剂、增稠剂、增量物质（例如乳糖、甘露糖醇）、着色剂、粘度调节剂、稳定剂、电解质、渗透溶质或渗透调节剂。增强本发明组合物吸收的添加剂也可包含在制剂中。可能具有此性质的添加剂例如为脂肪酸油酸、亚油酸和亚麻酸。

[0740] 经口固体剂型是可用的，其通常描述于同上的 Remington′ sPharmaceutical Sciences(1990) 第 89 章中，该文献据此以引用方式整体并入。固体剂型包括片剂、胶囊剂、丸剂、糖锭剂或锭剂、扁囊剂或颗粒剂。此外，脂质体或类蛋白包封也可用于配制本发明的组合物（例如美国专利号 4,925,673 中报道的类蛋白微球）。可使用脂质体包封并且可将脂质体用多种聚合物衍生化（例如美国专利号 5,013,556）。对用于治疗剂的可能固体剂型的描述在 Marshall，K.，Modern Pharmaceutics(1979)，G.S.Banker 和 C.T.Rhodes 编辑，第 10 章中有所提供，该文献据此以引用方式整体并入。一般而言，制剂将包含本发明的化

合物以及保护免受胃环境及肠内生物活性物质释放影响的惰性成分。

[0741] 本发明的组合物可以粒度为约 1mm 的颗粒或球粒的形式作为细小多粒子包含在制剂中。用于经胶囊施用的材料的制剂也可以作为粉末、略微压缩的栓或甚至作为片剂。治疗剂可通过压缩而制备。

[0742] 着色剂和调味剂均可包含在内。例如，可配制蛋白（或衍生物）（诸如通过脂质体或微球包封），接着进一步使其包含在可食用产品内，诸如含有着色剂和调味剂的冷藏饮料。

[0743] 在片剂形式中，以合适的比例将活性成分与具有必要压缩性质的药学上可接受的载体混合并压制成所需的形状和尺寸。

[0744] 粉末和片剂优选地包含高达 99％的活性成分。合适的固体载体包括例如磷酸钙、硬脂酸镁、滑石、糖、乳糖、糊精、淀粉、明胶、纤维素、聚乙烯吡咯烷酮、低熔点蜡和离子交换树脂。

[0745] 可能需要控释制剂。可将本发明的组合物掺入允许通过扩散或浸出机理释放的惰性基质（例如树胶）中。也可将缓慢变性基质掺入制剂中，例如海藻酸盐、多糖。本发明组合物的另一控释形式是利用基于 Oros™ 治疗系统 (Alza Corp.) 的方法，即将药物封闭在半透膜中，该半透膜因渗透效应允许水进入而通过单一小孔将药物推出。一些肠溶衣也具有延迟释放的作用。

[0746] 其他包衣料也可用于制剂。这些包衣料包括可施加到包衣锅中的多种糖。治疗剂也可以薄膜衣片的形式提供并且将此情况中的所用材料分成 2 组。第一组为非肠溶性材料并包括甲基纤维素、乙基纤维素、羟乙基纤维素、甲基羟基 - 乙基纤维素、羟丙基纤维素、羟丙基甲基纤维素、羧甲基纤维素钠、聚维酮以及聚乙二醇。第二组由通常为邻苯二甲酸酯的肠溶性材料组成。

[0747] 材料混合物可用于提供最佳的薄膜衣。包薄膜衣可在包衣锅中或流化床中或通过压制包衣而进行。

[0748] 经肺递送形式。经肺递送本发明的组合物也是可用的。蛋白（或衍生物）在吸入时被递送到哺乳动物肺中，并横向穿过肺上皮衬里进入血流。此形式的其他报道包括 Adjei 等人，Pharma.Res.(1990)7 :565-9 ;Adjei 等人 (1990)，Internatl.J.Pharmaceutics63 : 135-44（醋酸亮丙瑞林）;Braquet 等人 (1989)，J.Cardiovasc.Pharmacol.13(supp1.5) : s.143-146（内皮素 -1) ;Hubbard 等人 (1989)，Annals Int.Med.3 :206-12（α1- 抗胰蛋白酶）;Smith 等人 (1989)，J.Clin.Invest.84 :1145-6（α1- 蛋白酶）;Oswein 等人 (March1990)，" Aerosolization of Proteins，" Proc.Symp.Resp.Drug Delivery II，Keystone，Colorado（重组人生长激素）;Debs 等人 (1988)，J.Immunol.140 :3482-8（干扰素 -γ 和肿瘤坏死因子 α）以及 Platz 等人，美国专利号 5,284,656（粒细胞集落刺激因子）。

[0749] 可用于实践本发明的是多种设计用于经肺递送治疗产品的机械装置，包括但不限于喷雾器、定剂量吸入器和粉末吸入器，所有这些装置都是本领域技术人员熟悉的。适用于实践本发明的市售装置的一些具体实例是由 Mallinckrodt，Inc.，St.Louis，Missouri 制造的 Ultravent 喷雾器 ;由 Marquest Medical Products，Englewood，Colorado 制造的 Acorn II 喷雾器 ;由 Glaxo Inc.，Research Triangle Park，North Carolina 制造的定

剂量吸入器；以及由 Fisons Corp.，Bedford，Massachusetts 制造的 Spinhaler 粉末吸入器。（参见例如 Helgesson 等人，Inhalation device，美国专利号 6,892,728；McDerment 等人，Dry powder inhaler，WO02/11801A1；Ohki 等人，Inhalant medicator，美国专利号 6,273,086）。所有此类装置均需要使用适合分配本发明化合物的制剂。通常，各制剂特定针对于所用装置的类型并且可涉及除了可用于治疗的稀释剂、佐剂和 / 或载体外还使用合适的推进剂材料。

[0750] 本发明的化合物最有利地应当以平均粒径小于 10μm（或微米），最优选地 0.5 至 5μm 的颗粒形式制备，以便最有效地递送到远侧肺。

[0751] 药学上可接受的赋形剂包括碳水化合物，诸如海藻糖、甘露糖醇、木糖醇、蔗糖、乳糖和山梨糖醇。用于制剂的其他成分可包括 DPPC、DOPE、DSPC 和 DOPC。可使用天然的或合成的表面活性剂。可使用 PEG（甚至与其在蛋白或类似物衍生化方面的用途无关）。可使用葡聚糖，诸如环糊精。可使用胆汁盐和其他相关的增强剂。可使用纤维素和纤维素衍生物。可使用氨基酸，诸如用于缓冲制剂。

[0752] 此外，设想了使用脂质体、微囊或微球、包合复合物或其他类型的载体。

[0753] 适于与喷雾器（喷射或超声）一起使用的制剂通常将包含以每毫升溶液约 0.1 至 25mg 生物活性蛋白的浓度溶于水中的本发明化合物。制剂也可包含缓冲剂和简单糖（例如，用于蛋白稳定化以及调节渗透压）。喷雾器制剂也可含有表面活性剂以降低或防止在形成气溶胶时因溶液雾化所致的表面诱发的蛋白聚集。

[0754] 与定剂量吸入器装置一起使用的制剂一般将包含细分的粉末，其含有借助表面活性剂而悬浮在推进剂中的本发明化合物。推进剂可以为用于此目的的任何常规材料，诸如氯氟烃、氢氯氟烃、氢氟烃或烃，包括三氯氟甲烷、二氯二氟甲烷、二氯四氟乙醇以及 1,1,1,2- 四氟乙烷或它们的组合。合适的表面活性剂包括脱水山梨糖醇三油酸酯和大豆卵磷脂。油酸也可适用作表面活性剂。（参见例如 Bäckström 等人，Aerosol drug formulations containing hydrofluoroalkanes and alkyl saccharides，美国专利号 6,932,962）。

[0755] 由粉末吸入器装置分配的制剂将包含含有本发明化合物的细分干粉，并且还可以包含有助于从该装置分散粉末的量（例如制剂的 50 重量％至 90 重量％）的增量剂，诸如乳糖、山梨糖醇、蔗糖、甘露糖醇、海藻糖或木糖醇。

[0756] 经鼻递送形式。根据本发明，本发明物质组合物和 / 或药物组合物的鼻内递送也是可用的，由此使其在鼻内施用后直接通向血流，而不必在肺中沉积药品。适于鼻内施用的制剂包括具有葡聚糖或环糊精的那些制剂，并且鼻内递送装置是已知的。（参见例如 Freezer，Inhaler，美国专利号 4,083,368）。

[0757] 经皮及经粘膜（例如经颊）递送形式。在一些实施方案中，将本发明的组合物构造成药学上可接受的经皮或经粘膜贴片或糖锭的一部分。经皮贴片药物递送系统（例如基质型经皮贴片）是已知的并可用于实践本发明药物组合物的一些实施方案。（例如，Chien 等人，Transdermal estrogen/progestin dosage unit，system and process，美国专利号 4,906,169 和 5,023,084；Cleary 等人，Diffusion matrix for transdermal drug administration and transdermal drug delivery devices including same，美国专利号 4,911,916；Teillaud 等人，EVA-based transdermal matrix system for the administration of an estrogen and/or a progestogen，美国专利号 5.605,702；

Venkateshwaran 等 人，Transdermal drug delivery matrix for coadministering estradiol and another steroid，美国专利号 5,783,208；Ebert 等人，Methods for providing testosterone and optionally estrogen replacement therapy to women，美国专利号 5,460,820)。用于经粘膜递送治疗剂的多种药学上可接受的系统在本领域中也是已知的并且可与本发明的实践相容。(例如 Heiber 等人，Transmucosal delivery of macromolecular drugs，美国专利号 5,346,701 和 5,516,523；Longenecker 等人，Transmembrane formulations for drug administration，美国专利号 4,994,439)。

[0758] 经颊递送本发明的组合物也是可用的。与肽一起使用的经颊递送制剂是本领域已知的。例如，被构造成用于通过口腔粘膜(例如舌下粘膜)进行药物递送的已知片剂或贴片系统包括一些包含内层的实施方案，该内层含有药物、渗透增强剂(诸如胆汁盐或夫西地酸盐)和亲水性聚合物(诸如羟丙基纤维素、羟丙基甲基纤维素、羟乙基纤维素、葡聚糖、果胶、聚乙烯吡咯啶酮、淀粉、明胶)或已知可用于此目的的许多其他聚合物。此内层可具有一个适于接触并粘附到口腔湿润粘膜组织的表面并且可具有粘附到上覆非粘性惰性层的相对表面。任选地，这样的经粘膜递送系统可以为双层片剂的形式，其中内层还含有另外的粘合剂、调味剂或填充剂。一些可用的系统采用与渗透增强剂一起的非离子型洗涤剂。经粘膜递送装置可呈自由形式，诸如乳膏、凝胶或软膏，或可包含诸如片剂、贴片或糖锭的确定形式。例如，可经由经粘膜递送系统递送本发明的组合物，该递送系统包含例如粘合层、背衬层、界定容纳本发明组合物的贮存器的渗透膜、膜下面的剥离密封圆片、一或多个热密封以及可移除的防粘衬里的层压复合物。(例如，Ebert 等人，Transdermal delivery system with adhesive overlay and peel seal disc，美国专利号 5,662,925；Chang 等人，Device for administering an active agent to the skin or mucosa，美国专利号 4,849,224 和 4,983,395)。这些实例仅为可用的经粘膜递送技术的示例性实例，不是对本发明的限制。

[0759] 剂量。在治疗上述病症的方法中所涉及的给药方案将由主治医师考虑到改变药物作用的多种因素来决定，这些因素例如为患者年龄、病症、体重、性别和饮食，任何感染的严重程度，施用时间以及其他临床因素。一般而言，每日方案应在每公斤体重 0.1 至 1000 微克本发明化合物的范围内，优选地每公斤 0.1 至 150 微克。

[0760] 作为进一步说明，本发明涵盖以下带编号的实施方案：

[0761] 1. 一种物质组合物，该物质组合物包含具有下式的氨基酸序列的分离多肽：

[0762] $X_{aa}^{1}X_{aa}^{2}X_{aa}^{3}X_{aa}^{4}X_{aa}^{5}X_{aa}^{6}X_{aa}^{7}X_{aa}^{8}X_{aa}^{9}X_{aa}^{10}X_{aa}^{11}X_{aa}^{12}X_{aa}^{13}X_{aa}^{14}Asp^{15}X_{aa}^{16}X_{aa}^{17}X_{aa}^{18}X_{aa}^{19}X_{aa}^{20}X_{aa}^{21}X_{aa}^{22}X_{aa}^{23}X_{aa}^{24}X_{aa}^{25}X_{aa}^{26}X_{aa}^{27}X_{aa}^{28}X_{aa}^{29}X_{aa}^{30}X_{aa}^{31}Lys^{32}X_{aa}^{33}X_{aa}^{34}X_{aa}^{35}X_{aa}^{36}X_{aa}^{37}X_{aa}^{38}$//SEQ ID NO：475

[0763] 或其药学上可接受的盐，

[0764] 其中：

[0765] $X_{aa}^{1}X_{aa}^{2}$ 不存在；或者 X_{aa}^{1} 为任何氨基酸残基并且 X_{aa}^{2} 为任何氨基酸残基；或者 X_{aa}^{1} 不存在并且 X_{aa}^{2} 为任何氨基酸残基；

[0766] X_{aa}^{3} 在 X_{aa}^{18} 为 Cys 时为 Cys；或者 X_{aa}^{3} 在 X_{aa}^{18} 为 SeCys 时为 SeCys；或者 X_{aa}^{3} 在 X_{aa}^{18} 为烷基氨基酸残基时为烷基氨基酸残基；

[0767] X_{aa}^{4} 为酸性、疏水性、碱性或中性亲水性氨基酸残基；

[0768] X_{aa}^{5} 为 Gly、Ala、疏水性或碱性氨基酸残基；

[0769] X_{aa}^{6} 为 Gly、Ala、2-Abu、Nle、Nva 或疏水性氨基酸残基；

[0770] X_{aa}^{7} 为 Gly、Ala、芳族或疏水性氨基酸残基；

[0771] X_{aa}^{8} 为碱性、酸性或中性亲水性氨基酸残基，或 Ala 残基；

[0772] X_{aa}^{9} 为碱性或中性亲水性氨基酸残基；

[0773] X_{aa}^{10} 在 X_{aa}^{24} 为 Cys 时为 Cys；或者 X_{aa}^{10} 在 X_{aa}^{24} 为 SeCys 时为 SeCys；

[0774] X_{aa}^{11} 为任何氨基酸残基；

[0775] X_{aa}^{12} 为 Pro、酸性、中性或疏水性氨基酸残基；

[0776] X_{aa}^{13} 为任何氨基酸残基；

[0777] X_{aa}^{14} 为任何氨基酸残基；

[0778] X_{aa}^{16} 为碱性、中性亲水性或酸性氨基酸残基，或 Ala 残基；

[0779] X_{aa}^{17} 在 X_{aa}^{31} 为 Cys 时为 Cys；或者 X_{aa}^{17} 在 X_{aa}^{31} 为 SeCys 时为 SeCys；

[0780] X_{aa}^{18} 为 Cys、SeCys 或烷基氨基酸残基；

[0781] X_{aa}^{19} 为任何氨基酸残基；

[0782] X_{aa}^{20} 为 Pro、Gly、碱性或中性亲水性残基；

[0783] X_{aa}^{21} 为碱性、疏水性或中性亲水性氨基酸残基；

[0784] X_{aa}^{22} 为疏水性或碱性氨基酸残基；

[0785] X_{aa}^{23} 为疏水性、碱性或中性亲水性氨基酸残基；

[0786] X_{aa}^{24} 为 Cys 或 SeCys 残基；

[0787] X_{aa}^{25} 为 Ser、Ala 或中性亲水性氨基酸残基；

[0788] X_{aa}^{26} 为 Ala、酸性、碱性或中性亲水性氨基酸残基；

[0789] X_{aa}^{27} 为酸性、碱性、中性亲水性或疏水性残基；

[0790] X_{aa}^{28} 为芳族或碱性氨基酸残基；

[0791] X_{aa}^{29} 为酸性、碱性或中性亲水性氨基酸残基；

[0792] X_{aa}^{30} 为 Trp、5- 溴代 Trp、6- 溴代 Trp、5- 氯代 Trp、6- 氯代 Trp、1-Nal、2-Nal 或硫代 Trp 残基；

[0793] X_{aa}^{31} 为 Cys 或 SeCys；

[0794] X_{aa}^{33} 为疏水性或芳族氨基酸残基；

[0795] X_{aa}^{34} 为任何氨基酸残基；

[0796] X_{aa}^{35} 为疏水性氨基酸残基；

[0797] X_{aa}^{36}、X_{aa}^{37} 和 X_{aa}^{38} 的每一者独立地不存在或独立地为中性、碱性或疏水性氨基酸残基；

[0798] 并且其中：

[0799] 如果 X_{aa}^{3} 和 X_{aa}^{18} 均为 Cys 残基，则在残基 X_{aa}^{3} 与残基 X_{aa}^{18} 之间存在二硫键；或者如果 X_{aa}^{3} 和 X_{aa}^{18} 均为 SeCys 残基，则在残基 X_{aa}^{3} 与残基 X_{aa}^{18} 之间存在二硒键；

[0800] 如果 X_{aa}^{10} 和 X_{aa}^{24} 均为 Cys 残基，则在残基 X_{aa}^{10} 与残基 X_{aa}^{24} 之间存在二硫键；或者如果 X_{aa}^{10} 和 X_{aa}^{24} 均为 SeCys 残基，则在残基 X_{aa}^{10} 与残基 X_{aa}^{24} 之间存在二硒键；

[0801] 如果 X_{aa}^{17} 和 X_{aa}^{31} 均为 Cys 残基，则在残基 X_{aa}^{17} 与残基 X_{aa}^{31} 之间存在二硫键；或者如果 X_{aa}^{17} 和 X_{aa}^{31} 均为 SeCys 残基，则在残基 X_{aa}^{17} 与残基 X_{aa}^{31} 之间存在二硒键；

[0802] 氨基末端残基任选地被乙酰化、生物素酰化或 4- 戊炔酰化或聚乙二醇化；并且

[0803] 羧基末端残基任选地被酰胺化。

[0804] 2. 实施方案 1 的物质组合物，其中 X_{aa}^4 选自 Ala、Glu、Asp、Phe、Pro、Ile、Leu、Met、Val、Trp、Tyr、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、4- 苯基 - 苯丙氨酸 (Bip)、Gln、Asn、Ser、Thr、磷酸丝氨酸、磷酸酪氨酸、γ- 羧基谷氨酸和 Cit 残基。

[0805] 3. 实施方案 1-2 的物质组合物，其中 X_{aa}^5 选自 Ala、Phe、Ile、Leu、Met、Val、Trp、Tyr、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1' NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

[0806] 4. 实施方案 1-3 的物质组合物，其中 X_{aa}^6 选自 Ala、Gly、2-Abu、Phe、Ile、Leu、Met、Val、Trp、Tyr、脯氨酸、硫杂脯氨酸、蛋氨酸、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1' NMe-Trp、环戊基甘氨酸 (Cpg)、苯基甘氨酸、N- 甲基亮氨酸、N- 甲基苯丙氨酸、N- 甲基缬氨酸、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、2- 氯苯丙氨酸、4- 氯苯丙氨酸、3,4- 二氯苯丙氨酸、4- 三氟甲基 - 苯丙氨酸和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

[0807] 5. 实施方案 1-4 的物质组合物，其中 X_{aa}^7 选自 Gly、Ala、Phe、Ile、Leu、Met、Val、Trp、Tyr、正亮氨酸、正缬氨酸、Pro、2- 吡啶基丙氨酸、1-Nal、2-Nal、1'NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、2- 氯苯丙氨酸、4- 氯苯丙氨酸、3,4- 二氯苯丙氨酸、4- 三氟甲基 - 苯丙氨酸和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

[0808] 6. 实施方案 1-5 的物质组合物，其中 X_{aa}^8 选自 Ala、Arg、Lys、His、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、Ser、Thr、Asn、Gln、Cit、Asp、磷酸丝氨酸、磷酸酪氨酸、γ- 羧基谷氨酸和 Glu 残基。

[0809] 7. 实施方案 1-6 的物质组合物，其中 X_{aa}^9 选自 Al、Pro、Met、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、Gln、Asn、Ser、Thr 和 Cit 残基。

[0810] 8. 实施方案 1-7 的物质组合物，其中 X_{aa}^{11} 选自 Ala、Asp、Glu、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、Pra、Atz、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

[0811] 9. 实施方案 1-8 的物质组合物，其中 X_{aa}^{12} 选自丙氨酸、缬氨酸、亮氨酸、异亮氨酸、脯氨酸、丝氨酸、苏氨酸、天冬氨酸、谷氨酸、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1' NMe-Trp、Cha 和 4- 苯基 - 苯丙氨酸 (Bip)、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、天冬酰胺、谷氨酰胺、蛋氨酸、羟基脯氨酸、苯丙氨酸、色氨酸和酪氨酸。

[0812] 10. 实施方案 1-9 的物质组合物，其中 X_{aa}^{13} 选自 Ala、Asp、Glu、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、Pra、Atz、高赖氨酸、鸟氨酸、N- 甲

基－精氨酸、ω－氨基精氨酸、ω－甲基－精氨酸、1-甲基－组氨酸、3-甲基－组氨酸、高精氨酸、N-甲基－赖氨酸、N-ε－甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸(Chg)、环己基丙氨酸(Cha)和4-苯基－苯丙氨酸(Bip)残基。

[0813] 11.实施方案1-10的物质组合物，其中X_{aa}^{14}选自Ala、Asp、Glu、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、Pra、Atz、高赖氨酸、鸟氨酸、N-甲基－精氨酸、ω－氨基精氨酸、ω－甲基－精氨酸、1-甲基－组氨酸、3-甲基－组氨酸、高精氨酸、N-甲基－赖氨酸、N-ε－甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸(Chg)、环己基丙氨酸(Cha)和4-苯基－苯丙氨酸(Bip)残基。

[0814] 12.实施方案1-11的物质组合物，其中X_{aa}^{16}选自Ala、Pro、Met、Arg、Lys、His、Pra、Atz、高赖氨酸、鸟氨酸、精氨酸、N-甲基－精氨酸、ω－氨基精氨酸、ω－甲基－精氨酸、1-甲基－组氨酸、3-甲基－组氨酸、高精氨酸、N-甲基－赖氨酸、N-ε－甲基赖氨酸、Dab、Gln、Asn、Ser、Thr、Cit、Asp、磷酸丝氨酸、磷酸酪氨酸、γ－羧基谷氨酸和Glu残基。

[0815] 13.实施方案1-12的物质组合物，其中X_{aa}^{19}选自Ala、Asp、Glu、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、高赖氨酸、鸟氨酸、N-甲基－精氨酸、ω－氨基精氨酸、ω－甲基－精氨酸、1-甲基－组氨酸、3-甲基－组氨酸、高精氨酸、N-甲基－赖氨酸、N-ε－甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸(Chg)、环己基丙氨酸(Cha)和4-苯基－苯丙氨酸(Bip)残基。

[0816] 14.实施方案1-13的物质组合物，其中X_{aa}^{20}选自Ala、Gly、Pro、Met、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N-甲基－精氨酸、ω－氨基精氨酸、ω－甲基－精氨酸、1-甲基－组氨酸、3-甲基－组氨酸、高精氨酸、N-甲基－赖氨酸、N-ε－甲基赖氨酸、Dab、Gln、Asn、Ser、Thr和Cit残基。

[0817] 15.实施方案1-14的物质组合物，其中X_{aa}^{21}选自Ala、Phe、Pro、Ile、Leu、Met、Val、Trp、Tyr、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N-甲基－精氨酸、ω－氨基精氨酸、ω－甲基－精氨酸、1-甲基－组氨酸、3-甲基－组氨酸、高精氨酸、N-甲基－赖氨酸、N-ε－甲基赖氨酸、Dab、环己基甘氨酸(Chg)、环己基丙氨酸(Cha)、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、4-苯基－苯丙氨酸(Bip)、Gln、Asn、Ser、Thr和Cit残基。

[0818] 16.实施方案1-15的物质组合物，其中X_{aa}^{22}选自Ala、Phe、Ile、Leu、Met、Val、Trp、Tyr、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N-甲基－精氨酸、ω－氨基精氨酸、ω－甲基－精氨酸、1-甲基－组氨酸、3-甲基－组氨酸、高精氨酸、N-甲基－赖氨酸、N-ε－甲基赖氨酸、Dab、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1’NMe-Trp、环己基甘氨酸(Chg)、环己基丙氨酸(Cha)和4-苯基－苯丙氨酸(Bip)残基。

[0819] 17.实施方案1-16的物质组合物，其中X_{aa}^{23}选自Ala、Phe、Pro、Ile、Leu、Met、Val、Trp、Tyr、Arg、Lys、His、Pra、Atz、高赖氨酸、鸟氨酸、N-甲基－精氨酸、ω－氨基精氨酸、ω－甲基－精氨酸、1-甲基－组氨酸、3-甲基－组氨酸、高精氨酸、N-甲基－赖氨酸、N-ε－甲基赖氨酸、Dab、环己基甘氨酸(Chg)、环己基丙氨酸(Cha)、甘氨酸、正亮氨酸、正缬氨酸、1-Nal、2-Nal、4-苯基－苯丙氨酸(Bip)、Gln、Asn、Ser、Thr和Cit残基。

[0820] 18.实施方案1-17的物质组合物，其中X_{aa}^{25}选自Ala、Gly Pro、Met、Gln、Asn、Ser、Thr和Cit残基。

[0821] 19.实施方案1-18的物质组合物，其中X_{aa}^{26}选自Ala、Pro、Met、Arg、Lys、His、高

赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、甘氨酸、Glu、Asp、磷酸丝氨酸、磷酸酪氨酸、γ - 羧基谷氨酸、Gln、Asn、Ser、Thr 和 Cit 残基。

[0822] 20. 实施方案 1-19 的物质组合物，其中 X_{aa}^{27} 选自 Thr、Leu、Ile、Val、Ser、Met、Gln、Asn、Phe、Tyr、Trp、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、4- 苯基 - 苯丙氨酸 (Bip)、Arg、Lys、His、高赖氨酸、鸟氨酸、精氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、Asp、Glu、磷酸丝氨酸、磷酸酪氨酸、γ - 羧基谷氨酸和 Gly 残基。

[0823] 21. 实施方案 1-20 的物质组合物，其中 X_{aa}^{28} 选自 Phe、Trp、Tyr、Arg、Lys、His、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、1-Nal、2-Nal、2- 吡啶基 - 丙氨酸、3- 吡啶基 - 丙氨酸、4- 吡啶基 - 丙氨酸、4- 哌啶基 - 丙氨酸和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

[0824] 22. 实施方案 1-21 的物质组合物，其中 X_{aa}^{29} 选自 Ala、Asp、Glu、磷酸丝氨酸、磷酸酪氨酸、γ - 羧基谷氨酸、Phe、Gly、His、Lys、Asn、Pro、Gln、Arg、Ser、Thr、Tyr、Pra、Atz、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸和 Dab 残基。

[0825] 23. 实施方案 1-22 的物质组合物，其中 X_{aa}^{33} 选自 Phe、Ile、Leu、Met、Val、Trp、Tyr、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1' NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、2- 氯苯丙氨酸、4- 氯苯丙氨酸、3,4- 二氯苯丙氨酸、4- 三氟甲基 - 苯丙氨酸、2- 吡啶基 - 丙氨酸、3- 吡啶基 - 丙氨酸、4- 吡啶基 - 丙氨酸、4- 哌啶基 - 丙氨酸和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

[0826] 24. 实施方案 1-23 的物质组合物，其中 X_{aa}^{34} 选自 Ala、Asp、Glu、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、Pra、Atz、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1' NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、2- 氯苯丙氨酸、4- 氯苯丙氨酸、3,4- 二氯苯丙氨酸、4- 三氟甲基 - 苯丙氨酸、2- 吡啶基 - 丙氨酸、3- 吡啶基 - 丙氨酸、4- 羧基 - 苯丙氨酸和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

[0827] 25. 实施方案 1-24 的物质组合物，其中 X_{aa}^{35} 选自 Phe、Ile、Leu、Met、Val、Trp、Tyr、正亮氨酸、正缬氨酸、1-Nal、2-Nal、1' NMe-Trp、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha)、2- 氯苯丙氨酸、4- 氯苯丙氨酸、3,4- 二氯苯丙氨酸、4- 三氟甲基 - 苯丙氨酸和 4- 苯基 - 苯丙氨酸 (Bip) 残基。

[0828] 26. 实施方案 1-25 的物质组合物，其中 X_{aa}^{36}、X_{aa}^{37} 和 X_{aa}^{38} 的每一者独立地不存在或独立地选自 Ala、Phe、Gly、His、Ile、Lys、Leu、Met、Asn、Pro、Gln、Arg、Ser、Thr、Val、Trp、Tyr、高赖氨酸、鸟氨酸、N- 甲基 - 精氨酸、ω- 氨基精氨酸、ω- 甲基 - 精氨酸、1- 甲基 - 组氨酸、3- 甲基 - 组氨酸、高精氨酸、N- 甲基 - 赖氨酸、N- ε - 甲基赖氨酸、Dab、正亮氨酸、正缬氨酸、1-Nal、2-Nal、环己基甘氨酸 (Chg)、环己基丙氨酸 (Cha) 和 4- 苯基 - 苯丙氨酸 (Bip)

残基。

[0829] 27. 实施方案 1-26 的物质组合物，其中 X_{aa}^{3} 和 X_{aa}^{18} 为烷基残基。

[0830] 28. 实施方案 27 的物质组合物，其中 X_{aa}^{3} 和 X_{aa}^{18} 独立地为 Ala 或 2-Abu 残基。

[0831] 29. 实施方案 1-28 的物质组合物，其中羧基末端残基被酰胺化。

[0832] 30. 实施方案 1-29 的物质组合物，其中分离的多肽包含下式的氨基酸序列：

[0833] $X_{aa}^{1}X_{aa}^{2}Cys^{3}X_{aa}^{4}X_{aa}^{5}Ala^{6}X_{aa}^{7}X_{aa}^{8}X_{aa}^{9}Cys^{10}X_{aa}^{11}X_{aa}^{12}X_{aa}^{13}X_{aa}^{14}Asp^{15}X_{aa}^{16}Cys^{17}Cys^{18}X_{aa}^{19}X_{aa}^{20}X_{aa}^{21}X_{aa}^{22}X_{aa}^{23}Cys^{24}X_{aa}^{25}X_{aa}^{26}X_{aa}^{27}X_{aa}^{28}X_{aa}^{29}X_{aa}^{30}Cys^{31}Lys^{32}X_{aa}^{33}X_{aa}^{34}X_{aa}^{35}X_{aa}^{36}X_{aa}^{37}X_{aa}^{38}$//SEQ ID NO:476。

[0834] 31. 实施方案 1-29 的物质组合物，其中 X_{aa}^{6} 为 Ala。

[0835] 32. 实施方案 31 的物质组合物，其中 X_{aa}^{27} 为 Glu。

[0836] 33. 实施方案 31-32 的物质组合物，其中 X_{aa}^{29} 为 Asp、Glu 或 Gln。

[0837] 34. 实施方案 31 的物质组合物，包含选自以下的氨基酸序列：SEQ ID NO:22、252-263、419-439、518-521、524、525、562-580、602、691、692、696-703、715、721-735、737-749、756、757、761、762、764-771、787-796、798、800、802、803、809-812、1028、1030-1040、1043-1047、1062-1065 和 1068-1070。

[0838] 35. 实施方案 31 的物质组合物，包含选自以下的氨基酸序列：SEQ ID NO:1082、1096、1110、1124、1135、1146、1157、1165、1173、1181、1192、1203、1214、1222、1230、1238、1249、1260、1271、1279、1287、1295、1306、1317、1328、1336、1344、1352、1360、1368、1376、1384、1392、1400、1408、1416、1424、1432、1440、1448、1456、1464、1472、1480、1488、1496、1504、1512、1520、1528、1536、1544、1552、1560、1568、1576、1584、1592、1600、1608、1616、1624、1632、1640、1658、1672、1686、1700、1711、1722、1733、1741、1749、1757、1768、1779、1790、1798、1806、1814、1825、1836、1847、1855、1863、1871、1882、1893、1904、1912、1920、1928、1936、1944、1952、1960、1968、1976、1984、1992、2000、2008、2016、2024、2032、2040、2048、2056、2064、2072、2080、2088、2096、2104、2112、2120、2128、2136、2144、2152、2160、2168、2176、2184、2192、2200、2208、2216、2234、2248、2262、2276、2287、2298、2309、2317、2325、2333、2344、2355、2366、2374、2382、2390、2401、2412、2423、2431、2439、2447、2458、2469、2480、2488、2496、2504、2512、2520、2528、2536、2544、2552、2560、2568、2576、2584、2592、2600、2608、2616、2624、2632、2640、2648、2656、2664、2672、2680、2688、2696、2704、2712、2720、2728、2736、2744、2752、2760、2768、2776、2784、2792、2808、2822、2833、2844、2855、2863、2871、2879、2890、2901、2912、2920、2928、2936、2944、2952、2960、2968、2976、2984、2992、3000、3008、3016、3024、3032、3040、3048、3056、3064、3072 和 3080。

[0839] 36. 实施方案 31 的物质组合物，包含选自以下的氨基酸序列：SEQ ID NO:597-601 和 813-1027。

[0840] 37. 实施方案 1-29 的物质组合物，其中 X_{aa}^{6} 为 Gly。

[0841] 38. 实施方案 37 的物质组合物，其中 X_{aa}^{27} 为 Glu。

[0842] 39. 实施方 37-38 的物质组合物，其中 X_{aa}^{29} 为 Asp、Glu 或 Gln。

[0843] 40. 实施方案 37 的物质组合物，包含选自以下的氨基酸序列：SEQ ID NO:265、751、752、754、755、1081、1095、1109、1123、1134、1145、1156、1164、1172、1180、1191、1202、1213、1221、1229、1237、1248、1259、1270、1278、1286、1294、1305、1316、1327、1335、1343、1351、1359、1367、1375、1383、1391、1399、1407、1415、1423、1431、1439、1447、1455、1463、

1471、1479、1487、1495、1503、1511、1519、1527、1535、1543、1551、1559、1567、1575、1583、1591、1599、1607、1615、1623、1631、1639、1657、1671、1685、1699、1710、1721、1732、1740、1748、1756、1767、1778、1789、1797、1805、1813、1824、1835、1846、1854、1862、1870、1881、1892、1903、1911、1919、1927、1935、1943、1951、1959、1967、1975、1983、1991、1999、2007、2015、2023、2031、2039、2047、2055、2063、2071、2079、2087、2095、2103、2111、2119、2127、2135、2143、2151、2159、2167、2175、2183、2191、2199、2207、2215、2233、2247、2261、2275、2286、2297、2308、2316、2324、2332、2343、2354、2365、2373、2381、2389、2400、2411、2422、2430、2438、2446、2457、2468、2479、2487、2495、2503、2511、2519、2527、2535、2543、2551、2559、2567、2575、2583、2591、2599、2607、2615、2623、2631、2639、2647、2655、2663、2671、2679、2687、2695、2703、2711、2719、2727、2735、2743、2751、2759、2767、2775、2783、2791、2807、2821、2832、2843、2854、2862、2870、2878、2889、2900、2911、2919、2927、2935、2943、2951、2959、2967、2975、2983、2991、2999、3007、3015、3023、3031、3039、3047、3055、3063、3071 和 3079。

[0844] 41. 实施方案 1-29 的物质组合物，其中 X_{aa}^{6} 为 2-Abu。

[0845] 42. 实施方案 41 的物质组合物，其中 X_{aa}^{27} 为 Glu。

[0846] 43. 实施方案 41-42 的物质组合物，其中 X_{aa}^{29} 为 Asp、Glu 或 Gln。

[0847] 44. 实施方案 41 的物质组合物，包含选自以下的氨基酸序列 :SEQ ID NO :605、636、649、706、707、718、753、758、797、799、801、804、807、808、1029、1041、1042、1048、1066、1067、1083、1097、1111、1125、1136、1147、1158、1166、1174、1182、1193、1204、1215、1223、1231、1239、1250、1261、1272、1280、1288、1296、1307、1318、1329、1337、1345、1353、1361、1369、1377、1385、1393、1401、1409、1417、1425、1433、1441、1449、1457、1465、1473、1481、1489、1497、1505、1513、1521、1529、1537、1545、1553、1561、1569、1577、1585、1593、1601、1609、1617、1625、1633、1641、1659、1673、1687、1701、1712、1723、1734、1742、1750、1758、1769、1780、1791、1799、1807、1815、1826、1837、1848、1856、1864、1872、1883、1894、1905、1913、1921、1929、1937、1945、1953、1961、1969、1977、1985、1993、2001、2009、2017、2025、2033、2041、2049、2057、2065、2073、2081、2089、2097、2105、2113、2121、2129、2137、2145、2153、2161、2169、2177、2185、2193、2201、2209、2217、2235、2249、2263、2277、2288、2299、2310、2318、2326、2334、2345、2356、2367、2375、2383、2391、2402、2413、2424、2432、2440、2448、2459、2470、2481、2489、2497、2505、2513、2521、2529、2537、2545、2553、2561、2569、2577、2585、2593、2601、2609、2617、2625、2633、2641、2649、2657、2665、2673、2681、2689、2697、2705、2713、2721、2729、2737、2745、2753、2761、2769、2777、2785、2793、2809、2823、2834、2845、2856、2864、2872、2880、2891、2902、2913、2921、2929、2937、2945、2953、2961、2969、2977、2985、2993、3001、3009、3017、3025、3033、3041、3049、3057、3065、3073 和 3081。

[0848] 45. 实施方案 1-29 的物质组合物，其中 X_{aa}^{6} 为 Nle。

[0849] 46. 实施方案 45 的物质组合物，其中 X_{aa}^{27} 为 Glu。

[0850] 47. 实施方案 45-46 的物质组合物，其中 X_{aa}^{29} 为 Asp、Glu 或 Gln。

[0851] 48. 实施方案 45 的物质组合物，包含选自以下的氨基酸序列 :SEQ ID NO :607、638、651、1085、1099、1113、1127、1138、1149、1160、1168、1176、1184、1195、1206、1217、1225、1233、1241、1252、1263、1274、1282、1290、1298、1309、1320、1331、1339、1347、1355、

1363、1371、1379、1387、1395、1403、1411、1419、1427、1435、1443、1451、1459、1467、1475、1483、1491、1499、1507、1515、1523、1531、1539、1547、1555、1563、1571、1579、1587、1595、1603、1611、1619、1627、1635、1643、1661、1675、1689、1703、1714、1725、1736、1744、1752、1760、1771、1782、1793、1801、1809、1817、1828、1839、1850、1858、1866、1874、1885、1896、1907、1915、1923、1931、1939、1947、1955、1963、1971、1979、1987、1995、2003、2011、2019、2027、2035、2043、2051、2059、2067、2075、2083、2091、2099、2107、2115、2123、2131、2139、2147、2155、2163、2171、2179、2187、2195、2203、2211、2219、2237、2251、2265、2279、2290、2301、2312、2320、2328、2336、2347、2358、2369、2377、2385、2393、2404、2415、2426、2434、2442、2450、2461、2472、2483、2491、2499、2507、2515、2523、2531、2539、2547、2555、2563、2571、2579、2587、2595、2603、2611、2619、2627、2635、2643、2651、2659、2667、2675、2683、2691、2699、2707、2715、2723、2731、2739、2747、2755、2763、2771、2779、2787、2795、2811、2825、2836、2847、2858、2866、2874、2882、2893、2904、2915、2923、2931、2939、2947、2955、2963、2971、2979、2987、2995、3003、3011、3019、3027、3035、3043、3051、3059、3067、3075 和 3083。

[0852] 49. 实施方案 1-29 的物质组合物，其中 X_{aa}^{6} 为 Nva。

[0853] 50. 实施方案 49 的物质组合物，其中 X_{aa}^{27} 为 Glu。

[0854] 51. 实施方案 49-50 的物质组合物，其中 X_{aa}^{29} 为 Asp、Glu 或 Gln。

[0855] 52. 实施方案 49 的物质组合物，包含选自以下的氨基酸序列：SEQ ID NO：606、637、650、705、708、717、759、760、805、806、1084、1098、1112、1126、1137、1148、1159、1167、1175、1183、1194、1205、1216、1224、1232、1240、1251、1262、1273、1281、1289、1297、1308、1319、1330、1338、1346、1354、1362、1370、1378、1386、1394、1402、1410、1418、1426、1434、1442、1450、1458、1466、1474、1482、1490、1498、1506、1514、1522、1530、1538、1546、1554、1562、1570、1578、1586、1594、1602、1610、1618、1626、1634、1642、1660、1674、1688、1702、1713、1724、1735、1743、1751、1759、1770、1781、1792、1800、1808、1816、1827、1838、1849、1857、1865、1873、1884、1895、1906、1914、1922、1930、1938、1946、1954、1962、1970、1978、1986、1994、2002、2010、2018、2026、2034、2042、2050、2058、2066、2074、2082、2090、2098、2106、2114、2122、2130、2138、2146、2154、2162、2170、2178、2186、2194、2202、2210、2218、2236、2250、2264、2278、2289、2300、2311、2319、2327、2335、2346、2357、2368、2376、2384、2392、2403、2414、2425、2433、2441、2449、2460、2471、2482、2490、2498、2506、2514、2522、2530、2538、2546、2554、2562、2570、2578、2586、2594、2602、2610、2618、2626、2634、2642、2650、2658、2666、2674、2682、2690、2698、2706、2714、2722、2730、2739、2746、2754、2762、2770、2778、2786、2794、2810、2824、2835、2846、2857、2865、2873、2881、2892、2903、2914、2922、2930、2938、2946、2954、2962、2970、2978、2986、2994、3002、3010、3018、3026、3034、3042、3050、3058、3066、3074 和 3082。

[0856] 53. 实施方案 1 的物质组合物，包含选自以下的氨基酸序列：SEQ ID NO：3-30、32-72、74-134、136-178、180-211、218-239、241-305、307-363、366-386、388-432、434-474、515-527、532-588、590、591、593-775、777、778、780-788、790-1049 和 1062-3086。

[0857] 54. 一种物质组合物，包含选自以下的氨基酸序列：SEQ ID NO：3-134、136-305、307-386、388-474、515-527、532-588、590、591、593-1049 和 1062-3086。

[0858] 55. 一种分离的核酸，编码不含非规范氨基酸的 SEQ ID NO：3-134、136-305、307-386、388-474、515-527、532-588、590、591、593-1049 或 1062-3086 的任一者。

[0859] 56. 一种表达载体，包含实施方案 55 的核酸。

[0860] 57. 一种重组宿主细胞，包含实施方案 56 的表达载体。

[0861] 58. 实施方案 1-54 任一项的物质组合物，还包含任选的接头部分和药学上可接受的、共价连接的半衰期延长部分。

[0862] 59. 实施方案 58 的物质组合物，其中半衰期延长部分为分子量为约 1000Da 至约 100000Da 的聚乙二醇、IgG Fc 结构域、转甲状腺素蛋白或人血清白蛋白。

[0863] 60. 实施方案 58 的物质组合物，其中半衰期延长部分包含人免疫球蛋白或人免疫球蛋白 Fc 结构域或两者。

[0864] 61. 实施方案 60 的物质组合物，具有如图 12A-N 或图 88-91 任一者中所示的构型。

[0865] 62. 实施方案 60 的物质组合物，其中组合物包含单价免疫球蛋白 - 肽或 Fc- 肽偶联物。

[0866] 63. 实施方案 60 的物质组合物，其中组合物包含二价免疫球蛋白 - 肽或 Fc- 肽偶联物。

[0867] 64. 一种药物组合物，包含实施方案 1-54 或 58-63 任一项的物质组合物和药学上可接受的载体。

[0868] 65. 一种预防疼痛的方法，包括施用预防有效量的实施方案 1-54 或 58-63 任一项的物质组合物。

[0869] 66. 一种治疗疼痛的方法，包括施用治疗有效量的实施方案 1-54 或 58-63 任一项的物质组合物。

[0870] 67. 实施方案 66 的方法，其中疼痛为慢性疼痛、急性疼痛或持续性疼痛。

[0871] 68. 实施方案 67 的方法，其中慢性疼痛与癌症、化疗、骨关节炎、纤维肌痛、原发性红斑性肢痛、疱疹后神经痛、疼痛性糖尿病神经病变、特发性疼痛性神经病变、神经瘤、阵发性剧痛症、偏头痛、三叉神经痛、颌面痛、丛集性头痛、复杂性局部疼痛综合征 (CRPS)、腰椎手术失败综合征、坐骨神经痛、间质性膀胱炎、骨盆痛、下背痛、炎症引起的疼痛或关节痛相关。

[0872] 69. 实施方案 67 的方法，其中急性或持续性疼痛与创伤、烧伤或手术相关。

[0873] 70. 实施方案 1-30 的物质组合物，其中 X_{aa}^{29} 为酸性或中性亲水性残基。

[0874] 71. 实施方案 70 的物质组合物，其中 X_{aa}^{29} 选自 Ala、Asp、Glu、Gly、Asn、Gln、Ser、Thr、磷酸丝氨酸、磷酸酪氨酸和 γ - 羧基谷氨酸残基。

[0875] 72. 实施方案 70 的物质组合物，包含选自 SEQ ID NO：1071-2798 的氨基酸序列 .

[0876] 以下工作实施例为示例性的，不应以任何方式视为限制本发明的范围。

[0877] 实施例

[0878] 实施例 1：从毒液中分离和纯化 GpTx-1

[0879] 毒液样品制备 . 通过对麻醉的蜘蛛进行电刺激提取了狼蛛智利红玫瑰的毒液。收集毒液样品、冻干、溶于 0.1％的三氟乙酸 (TFA) 水溶液，达到约 1mg 毒液 /mL。将粗制毒液溶液通过固相萃取 (SPE) 脱盐，其中使用在 0.1％ TFA 中平衡的 Sep-Pak C18 柱 (Waters，Milford，MA，USA)，用 60％乙腈水溶液洗脱，然后蒸发。将干燥的材料溶于 0.1％ TFA 中达

到 1mg 毒液 /mL 的浓度，通过 10kDa 分子量截留 Ultrafree-CL(Millipore) 移除高分子组分。然后将＜ 10kDa 的毒液提取物真空干燥，并保存在 -80℃下。

[0880] 分级分离。将粗毒液通过反相 (RP)HPLC 分级分离，收集了时间片中的 84 个样品。将低于 10kDa 的毒液提取物溶于 0.1％ TFA 中达到约 1mg 毒液 /mL，然后通过 C18RP HPLC 色谱分离并收集到大约 1 分钟宽的级分中。HPLC 方法 :1mL/min 的缓冲液 A(0.1％的 TFA 水溶液) 和缓冲液 B(90％乙腈 /10％含 0.1％ TFA 的水)，以 1％ /min 的梯度从 0 到 100％缓冲液 B。接着将级分转移到板上，真空干燥，然后保存在 -80℃下。

[0881] 在 $Na_v1.7$ 和 $Na_v1.3$ IonWorks® Quatrro(IWQ) 测定法中筛选毒液级分的活性。(参见实施例 3 和图 1)。鉴定了多种具有明显 (＞对照的 80％)Nav1.7 抑制活性的级分，其中第一种为级分 31。对级分 31 的第二等分试样在 $Na_v1.7$、$Na_v1.3$ 和 $Na_v1.5$IWQ 测定法中进行了测试，以确认“命中”活性并评估选择性。然后将样品通过高分辨率电喷雾电离 (ESI) 和基质辅助激光解吸电离飞行时间 (MALDI-TOF) 质谱 (MS) 分析，其表明级分为至少四种不同的肽物质的混合物。(参见图 2 和图 3)。然后将级分 31 通过 RP-HPLC 分离，在 $Na_v1.7$ 和 $Na_v1.5$ 测定法中筛选相应子级分的活性。子级分 11 为 RP-HPLC 色谱图中的主峰，并显示出＞ 90％的 $Na_v1.7$ 活性抑制。(参见图 4)。子级分 11 的解卷积揭露出 GpTx-1 的一级肽序列。与所有蛋白一样，预计 GpTx-1 基本上不会进入中枢神经系统。

[0882] 使用表达的序列标签方法，通过智利红玫瑰毒腺的转录组分析，鉴定了 GpTx-2 至 GpTx-7(SEQ ID NO :467-474 ;参见表 5A)。(参见 Siang AS, Doley R, Vonk FJ, Kini RM., “Transcriptomic analysis of the venom gland of the red-headed krait(Bungarus flaviceps)using expressed sequence tags”, BMC Molecular Biology2010, 11 :24 ; Jiang Y, Li Y, Lee W, Xu X, Zhang Y, Zhao R, Zhang Y, Wang W., “Venom gland transcriptomes of two elapid snakes(Bungarus multicinctus and Naja atra)and evolution of toxin genes”, BMC Genomics2011, 12 :1 ; Wagstaff SC, Sanz L, Juárez P, Harrison RA, Calvete JJ., “Combined snake venomics and venom gland transcriptomic analysis of the ocellated carpet viper, Echis ocellatus.”, J Proteomics.200971(6) :609-23 ; Magalhães GS, Junqueira-de-Azevedo IL, Lopes-Ferreira M, Lorenzini DM, Ho PL, Moura-da-Silva AM. “Transcriptome analysis of expressed sequence tags from the venom glands of the fish Thalassophryne nattereri”, Biochimie200688(6) :693-9 ; Wagstaff SC, Harrison RA., “Venom gland EST analysis of the saw-scaled viper, Echis ocellatus, reveals novel alpha9betal integrin-binding motifs in venom metalloproteinases and a new group of putative toxins, renin-like aspartic proteases.” Gene2006377 :21-32)。

[0883] 肽测序 :埃德曼降解和从头 MS/MS. 通过埃德曼降解对肽进行了 N 端测序 (参考文献 :(1)Edman, P.(1950), " Method for determination of the amino acid sequence in peptides" , Acta Chem.Scand.4 :283-293 ;(2)Niall, H.D.(1973)." Automated Edman degradation :the protein sequenator" .Meth.Enzymol.27 :942-1010)。通过 Applied Biosystems 自动化 473A 测序仪分析了苯基硫代乙内酰脲 (PTH)- 氨基酸衍生物。

[0884] 肽从头测序通过串联质谱完成 (参考文献 :Vlado Dančík, Theresa A.Addona,

Karl R.Clauser,James E.Vath,Pavel A.Pevzner.,J.Comp.Biol.,Volume6,3/4,(1999);(2)Favreau,P.,Menin,L.,Michalet,S.,Perret,F.,Cheneval,Stöcklin,M.,Bulet,A.和Stöcklin,R.,Toxicon,47(6),676-687,(2006);(3)Favreau,P.,Cheneval,O.,Menin,L.,Michalet,S.,Gaertner,H.,Principaud,F.,Thai,R.,Ménez,A.,Bulet,P.和Stöcklin,R.(2007),The venom of the snake genus Atheris contains a new class of peptides with clusters of histidine and glycine residues.Rapid Communications in Mass Spectrometry,21:406-412)。

[0885] 实施例2:GpTx-1肽类似物的合成

[0886] 小规模肽合成。使用N^{α}-Fmoc固相合成肽方法通过合适的正交保护和树脂接头策略组装了肽。使用Rink Amide MBHA树脂(100-200目,1%DVB,RFR-1063-PI,0.52meq/g初始上样量,408291,Peptides International,Louisville,KY)以0.012mmol的规模合成了肽。使用树脂装载器(Radley)将干树脂(17mg/孔)加到Phenomenex深孔蛋白沉淀板(CEO-7565,38710-1)中。在自动肽合成仪(Intavis Multipep)上使用标准固相方法将氨基酸逐步添加到正在生长的肽链上。将氨基酸(5摩尔当量,120μL,0.5M的DMF溶液)通过(1-氰基-2-乙氧基-2-氧乙烯基氨基氧基)二甲氨基-吗啉代-碳鎓六氟磷酸盐(COMU®;5摩尔当量,170μL,0.35M的二甲基甲酰胺(DMF)溶液)和N,N-二异丙基乙胺(DIEA;7.5摩尔当量,70μL,1.25M的二氯甲烷(DCM)溶液)预活化(1min)。将预活化的氨基酸转移的合适的孔中。将树脂孵育30分钟,沥干,重复以上循环。在第2次氨基酸孵育后,将板沥干,用DMF洗涤8次(每列的8个孔3mL)。然后通过在500μL20%哌啶的DMF溶液中连续孵育2次将Fmoc基团移除。第1次孵育为5分钟,沥干树脂,第2次孵育持续20分钟。将树脂沥干,用DMF洗涤10次(每列的8个孔3mL)。移除最终的Fmoc保护基团后,将树脂用DCM洗涤5次(每列的8个孔3mL),然后让其风干。

[0887] 裂解。向滤板的底部装上排放孔密封垫(Arctic White,AWSM-1003DP)。使用多道移液器向每个孔中的树脂加入三异丙基硅烷(100μL)、DODT(100μL)和水(100μL)。使用Dispensette Organic分配器向每个孔中的树脂加入TFA(1mL)。向树脂中加入三角形微型搅拌棒,将混合物搅拌3小时。移除密封垫,将裂解溶液洗脱到固底96孔深孔板中。将每个孔中的树脂用另外1mL TFA洗涤。使用旋转蒸发(Genevac)对溶液进行浓缩。使用Dispensette Organic分配器向连接有底部密封垫的新96孔滤板中的每个孔加入1mL冷乙醚。使用具有宽孔吸头的多道移液器向乙醚中加入浓缩的肽溶液。将溶液用移液器搅拌以确保完全混合和沉淀。滤出白色固体,用第二个1mL冷乙醚洗涤,过滤,真空干燥。

[0888] 折叠。向每个孔中的粗肽通过多道移液器加入0.9mL50:50水/乙腈以及加入微型搅拌棒。将混合物搅拌1h。将溶液过滤到固底96孔深孔板中。向每个孔中的粗肽通过多道移液器加入另外0.9mL50:50水/乙腈。将溶液过滤到相同的固底96孔深孔板中。在4L瓶中制备了4.0L折叠缓冲液(3.3L水,300mL乙腈,2.0g氧化的谷胱甘肽,1.0g还原的谷胱甘肽,400mL1M Tris-HCl pH7.5)。使用Dispensette分配器向96根50mL离心管中加入40mL肽折叠缓冲液。使用Tecan自动液体处理器向折叠缓冲液中加入1.8mL溶解的肽。折叠溶液的pH经测量为约7.7。将折叠反应物静置过夜。向每根管中加入1mL冰醋酸。通过多道移液器向96孔滤板中加入作为浆液的SP Sepharose High Performance(1mL/

孔)。使用 Tecan 自动液体处理器,将凝胶用折叠缓冲液 (3×0.9mL) 调节,用折叠的肽溶液 (50×0.9mL, pH = 4.0,在 Tecan 自动液体处理器上) 上样,洗涤 (4×0.9mL,20mM NaOAc, pH = 4.0),然后在真空歧管上用 2×1mL(1M NaCl,20mM NaOAc,pH = 4.0) 人工洗脱到固底 96 孔深孔板中。

[0889] 肽与 PEG 的偶联。将一些 GpTx-1 肽类似物偶联到叠氮基 -NPEG10(例如参见下文的表 30、表 31 和表 32)。向 1mL 溶于 IEX 洗脱缓冲液中的折叠肽按顺序加入 :32- 叠氮基 -3,6,9,12,15,18,21,24,27,30- 十氧杂三十二烷 -1- 胺 (70μL,50mM 水溶液)、三 (2- 苯基 -1-(1H-1,2,3- 三唑 -4- 基) 乙基) 胺 (TBTA ;88μL,10mM 的 DMSO 溶液)、L- 抗坏血酸钠盐 (438μL,75mM 水溶液) 和无水硫酸铜 (ii) 粉末 (188μL,35mM 水溶液)。反应混合物在添加 TBTA 后变得略微浑浊。过夜孵育后,将板在 1600rpm 下离心 1h 以沉降任何沉淀。将上清液通过多道移液器转移到 96 孔滤板中,然后过滤到固底 96 孔板中。

[0890] 分子的纯化和表征。将折叠的 (偶联的) 肽 (2mL) 通过质量触发式半制备型 HPLC(Agilent/LEAP ′ Ariel ′ , Jupiter5u C18300A,100×10mm5μm) 在 8mL/min 下以 15-35% B 的梯度经 45min 纯化,其中 5min 冲洗和 5min 平衡。将收集的级分合并,在 Tecan 上重新装到小瓶中。进行了最终 QC(Phenomenex Jupiter20×2mm, 100 Å, 5μm 柱,以 0.750mL/min 的流速通过 10 至 60% 的梯度经 10min 洗脱,在 220nm 处监测吸光度) 和 CLND 定量。筛选了具有 > 95% 的纯度和正确的 (m/z) 比的肽。(有关合成的 GpTx-1 的 LC-MS 表征,参见图 5 和 6)。

[0891] 大规模肽合成。称取 Rink Amide Chem Matrix 树脂 (0.2mmol,0.45mmol/g 的上样量,0.444g,Matrix Innovation) 加到 CS BIO 反应容器中。将反应容器连接到 CS BIO336X 自动肽合成仪的通道,将树脂用 2×DMF 洗涤,然后让其在 DMF 中溶胀 15min。将 Fmoc- 氨基酸 (1.0mmol,Midwest Biotech 或 Novabiochem) 溶于 2.5mL0.4M6- 氯 -1- 羟基苯并三唑 (6-Cl-HOBt,Matrix Innovation) 的 DMF 溶液中。向溶液中加入 1.0mL1.0M1,3- 二异丙基碳二亚胺 (DIC,Sigma-Aldrich) 的 DMF 溶液。将溶液通过氮气鼓泡搅拌 15min 以实现预活化,然后加入树脂中。将混合物振摇 2h。将树脂过滤,用 3×DMF、2×DCM 和 3×DMF 洗涤。通过用 20% 的哌啶的 DMF 溶液 (5mL,2×15min, Fluka) 处理而移除 Fmoc。将树脂过滤,用 3×DMF 洗涤。通过重复上述 Fmoc- 氨基酸偶合和 Fmoc 移除步骤将所有残基单个偶合。

[0892] 裂解和线性肽纯化。在最终从 N 端残基移除 Fmoc 后,将树脂结合的线性肽 (0.2mmol 规模) 转移到 25mL 固相萃取 (SPE) 滤管,用 3×DMF 和 3×DCM 洗涤,再进行真空干燥。向树脂中加入三异丙基硅烷 (1.0mL)、3,6- 二氧杂 -1,8- 辛烷 - 二硫醇 (DODT,1.0mL)、水 (1.0mL)、三氟乙酸 (TFA,15mL) 和搅拌棒,然后将混合物搅拌 3h。将混合物过滤到 50mL 离心管中。将树脂用 TFA(约 5mL) 洗涤,将合并的滤液通过在 Genevac HT-12(30℃的腔室温度,压力斜坡经 40min 从 500 至 50mbar,最终压力为 8mbar 持续 2h) 中旋转蒸发而浓缩。向残余物 (约 5mL) 中加入 40mL 冷乙醚。白色沉淀形成。将固体在醚中搅拌。将混合物离心 (4min,4,400rpm),滗析醚。向管中加入另外 40mL 冷醚,对沉淀进行搅拌。将混合物离心,滗析醚。将固体在真空下干燥过夜。将粗的线性肽通过制备型 LC-MS 纯化。将过滤后的样品 (500mg 溶于 10mL DMSO) 进样到制备型 HPLC 柱 (Jupiter10u C18300A,250×50mm10μm)。将肽通过 10-40% B 的梯度经 60min 在 50mL/min 下洗脱,然后为 10min 冲洗和 10min 平衡。将级分通过 LC-MS 分析,合并,冻干得到纯的线性肽前体。

[0893] 折叠。在 2L FEP 瓶中通过水 (944mL)、乙腈 (55.5mL)、Tris-HCl pH7.5(111mL)、氧化的 (-)- 谷胱甘肽 (680mg,1.110mmol) 和还原的 1- 谷胱甘肽 (340mg,1.110mmol) 配制了折叠缓冲液。向纯的线性肽 (111mg,0.028mmol) 中加入 2.5mL 乙腈和 2.5mL 水。将混合物涡旋,以完全溶解肽。将肽溶液加到折叠缓冲液 (0.1mg/mL 肽浓度、1mM 氧化的谷胱甘肽、1mM 还原的谷胱甘肽、10% v/v 乙腈、0.1M Tris pH7.5) 中。pH 值经测得为 7.7。将折叠混合物在室温下以 80rpm 搅拌过夜。取出小等分试样,将样品通过 LC-MS 分析以确保折叠完成。将溶液通过添加 4mL AcOH 和 4mL TFA(pH = 2.5) 而猝灭。将水溶液过滤 (0.45uM 纤维素膜)。

[0894] 纯化。使用 Agilen 制备型上样泵以 30mL/min 将过滤后的溶液 (1110mL,111mg 肽) 上样到制备型 HPLC 柱 (Phenomenex Synergi4u MAX-RP80A AXIA,250×30mm)。将柱子用 10% B 以 30mL/min 冲洗 10min,将 AcOH/TFA 洗脱。将柱子连接到制备型 HPLC :Agilent/LEAP 制备型 LC-MS,将肽通过 10-40% B 的梯度经 60min 洗脱,然后是 10min 冲洗和 10min 平衡。将级分通过 LC-MS 分析,合并,冻干得到纯的折叠肽。

[0895] 肽体内研究的反离子交换。将 4mL 装有 VariPure IPE(Varian,PL-HCO3MP- 树脂,聚合物负载碳酸氢盐,1.8mmol/g,100A,150-300μm) 的 SPE 管用 2mL MeOH 然后用 2mL 水预调节,在重力下沥干。将 2.0mL ≤ 5.0mM 的纯化折叠肽水溶液施加到树脂床上。将装置用 4×2.0mL 水洗涤,以洗脱出所有肽。向洗脱液中加入 50μL 乙酸。将溶液通过旋转蒸发 (Genevac) 浓缩得到纯化折叠肽的乙酸盐。通过以下方式现配了 100mM 的三氟乙醇 (TFE) 的氧化氘 (D2O) 储备液 :称取 50mg TFE 加到 5mL 容量瓶中,然后将 D2O 加入达到 5mL 的最终体积。然后通过稀释配制了 5mM 的 TFE 的 D2O 溶液,以用于溶解所有样品进行 19F-NMR。将溶液用于溶解肽达到 1mM 的浓度,使用氟长延迟 (d1 = 5s) 方法将样品通过 19F-NMR 进行分析。将 TFE 积分 (-76.75ppm 的三重峰) 归一化到 5,记录 TFA 的积分 (-75.6 的单重峰)。切割 NMR 管,通过旋转蒸发 (Genevac) 回收样品。

[0896] 实施例 3 :电生理

[0897] 表达 Nay 通道的细胞系。将组成型表达 (h) 电压门控钠 (Nav) 通道的稳定细胞系 (HEK293-hNav1.2、CHO-hNav1.3、HEK293-hNav1.4、HEK293-hNav1.5 和 HEK293-hNav1.7) 或在诱导型启动子下表达 hNav1.8 的 CHO 细胞用于实验。

[0898] Ion-Works® Quatro 细胞群膜片钳电生理。将贴壁细胞使用 0.25% 胰蛋白酶 -EDTA 处理 10 分钟而从组织培养瓶分离,然后重悬在由 140mM NaCl、5.0mM KCl、10mM HEPES、2mM $CaCl_2$、1mM $MgCl_2$、10mM 葡萄糖组成的外部溶液 (pH7.4) 中。内部溶液由 70mM KCl、70mM KF、10HEPES、5mM EDTA 组成 (pH7.3)。在室温 (约 22℃) 下使用穿孔膜片钳配置将细胞电压钳制到 -110mV,并在添加测试化合物之前以及添加测试化合物之后 5 分钟去极化至 -10mV。化合物稀释样含有 0.1% 的牛血清白蛋白以将非特异性结合减至最少。测量了不同细胞在各化合物浓度下的峰值内向电流并用 Excel 软件计算了 IC_{50} 值。所有化合物均一式两份地进行测试 (n = 2)。

[0899] PatchXpress® 7000A 电生理。使用 1 :10 稀释的 0.25% 胰蛋白酶 -EDTA 处理 2 至 3 分钟从组织培养瓶中分离了贴壁细胞,接着在含有 10% 胎牛血清的完全培养基中孵育至少 15 分钟,然后重悬在由 70mM NaCl、140mM D- 甘露糖醇、10mM HEPES、2mM $CaCl_2$、1mM $MgCl_2$

组成的外部溶液（用 NaOH 调至 pH7.4）中。内部溶液由 62.5mM CsCl、75mM CsF、10HEPES、5mM EGTA、2.5mM $MgCl_2$ 组成（用 CsOH 调至 pH7.25）。使用全细胞膜片钳配置在室温（约 22℃）下电压钳制细胞，保持电位为 -125mV，测试电位为 -10mV(hNav1.2、hNav1.3、hNav1.4 和 hNav1.7) 或 -20mV(hNav1.5)。为了从部分失活的通道进行记录，将细胞转换至产生约 20％通道失活的电压。添加测试化合物并在 0.1Hz 在合适的测试电位下监测 Nav 电流。所有化合物稀释样均含有 0.1％的牛血清白蛋白以将非特异性结合减至最少。如果在洗出化合物后电流恢复到＞起始值的 80％，则将细胞用于另外的化合物测试。通过汇集不同化合物浓度下的单点测定值并在 DataXpress2.0 软件中通过 Hill（四参数逻辑）拟合法拟合所得的数据集而计算 IC_{50} 值。

[0900] 全细胞膜片钳电生理。在室温（约 22℃）下使用全细胞膜片钳配置来电压钳制细胞。电极电阻在 1.5 与 2.0MΩ 之间。全细胞电容和串联电阻无补偿。将电流在 50kHz 下数字化，并使用 pClamp10.2 在 10kHz 下过滤 (4 极 Bessel)。将细胞从培养皿提离，并直接置于连接到用于化合物灌流的溶液交换歧管的微电极前。为了从非失活的通道进行记录，将细胞保持在 -140mV 下并去极化至 -10mV（对于 hNav1.8 为 0mV)。为了从部分失活的通道进行记录，最初将细胞保持在 -140mV 下，然后转换至产生约 20％通道失活的电压。每 10 秒递送 10ms 脉冲并在添加化合物之前和之后记录了峰值内向电流。化合物稀释样含有 0.1％的牛血清白蛋白以将非特异性结合减至最少。对于 hNav1.8 通道记录，添加了河豚毒素 (TTX，0.5μM) 以抑制内源性 TTX 敏感性电压门控钠通道并且仅记录 Nav1.8 介导的 TTX 耐性电流。外部溶液由 140mM NaCl、5.0mM KCl、2.0mM $CaCl_2$、1.0mM $MgCl_2$、10mM HEPES 和 11mM 葡萄糖组成（用 NaOH 调至 pH7.4)。内部溶液由 62.5mM CsCl、75mM CsF、2.5mM $MgCl_2$、5mM EGTA 和 10mM HEPES 组成（用 CsOH 调至 pH7.25)。在同一细胞上分析了递增化合物浓度，并通过 Clampfit10.2 软件且在 Origin Pro8 软件中通过 Hill（四参数逻辑）拟合法拟合所得的数据集而计算了 IC_{50} 值。

[0901] DRG 神经元分离。用戊巴比妥钠 (Nembutal，80mg/kg，腹膜内，Western Med Supply，Arcadia，CA) 对成年雄性和雌性 C57BL/6 小鼠 (Harlan Laboratories，Indianapolis，IN) 实施安乐死，接着断头。从颈段、胸段及腰段取出 DRG，置于不含 Ca^{2+} 和 Mg^{2+} 的 Hanks'平衡盐溶液 (Invitrogen，Carlsbad，CA) 中，然后在解剖显微镜下修剪附接的纤维。将 DRG 在 37℃下依次用不含 Ca^{2+} 和 Mg^{2+} 的 Hanks'溶液 (pH7.4) 中的木瓜蛋白酶 (20U/ml，Worthington Biochemical Corporation，Lakewood，NJ) 和 L- 半胱氨酸 (25μM) 消化 20 至 30 分钟，然后用胶原酶 2 型 (0.9％ w/v，Worthington Biochemical Corporation) 消化 20 至 30 分钟。用 DMEM 与补充了 10％小牛血清 (Invitrogen) 的 Ham′ s F-12 营养混合物 (Invitrogen) 的 1 :1 混合物猝灭消化，用经火焰抛光的 Pasteur 吸管研磨细胞，接着铺到聚 -D- 赖氨酸包被的盖玻片 (Cole-Parmer，Vernon Hills，IL) 上。在存在 1％ NSF-1(Lonza，Basel，Switzerland) 下将细胞维持在 28℃、含 5％ CO_2 的潮湿培养箱中 3 至 7 天以增加河豚毒素敏感性钠通道电流的表达。

[0902] DRG 神经元的人工膜片钳电生理。在室温 (21℃至 24℃) 下，使用 Axopatch200B 或 MultiClamp700B 放大器以及具有 pCLAMP 软件的 DIGIDATA1322A(Molecular Devices，Sunnyvale，CA) 以全细胞膜片钳配置电压钳制 DRG 神经元。由硼硅酸盐玻璃毛细管拉制的电极 (World Precision Instruments，Sarasota，FL) 具有 1.0 与 3.0MΩ 之间的电阻。使

用＞80％的串联电阻补偿将电压误差减至最小。P/4 方案用于漏减。将电流在 50kHz 下数字化，并在 10kHz 下过滤 (4 极 Bessel)。将细胞从培养皿提离，并直接置于连接到用于化合物灌流的溶液交换歧管的微电极前。将细胞保持在 -140mV 或产生约 20％失活的电压下，并且每 10 秒去极化至 -10mV，维持 40 毫秒。在添加肽后使用河豚毒素 (TTX，Sigma) 阻断任何残余的 TTX 敏感性钠电流。电极溶液包含（以 mM 计）：62.5CsCl、75CsF、2.5$MgCl_2$、5EGTA 和 10HEPES（用 CsOH 调至 pH7.25)。浴溶液包含（以 mM 计）：70NaCl、5.0KCl、2.0$CaCl_2$、1.0$MgCl_2$、10HEPES 和 11 葡萄糖、140 甘露糖醇（用 NaOH 调至 pH7.4)。通过 Clampfit 和 Origin Pro8(OriginLab Corp，Northampton，MA) 对数据进行了分析。

[0903] 电生理研究的结果和构效关系。电生理研究的结果在下文的表 6 至表 32 中示出。广泛的系统类比对 GpTx-1(SEQ ID NO：1) 内的各个位置如何有助于其整体 VGSC 活性特征提供了深入的认识。关于整个分子骨架，Cys9（或 SeCys9）与 Cys23（或 SeCys23)(C2-C5) 之间以及 Cys16（或 SeCys16) 与 Cys30（或 SeCys30)(C3-C6) 之间的二硫键（或二硒键）对功能必不可少。然而，移除 (C1-C4) 二硫键的 Cys2 和 Cys17 的同时取代（如在 [2-Abu2，17]GpTx-1(SEQ ID NO：125) 中）保持了针对 $Na_v1.7$ 和 $Na_v1.3$ 的显著活性，以及针对 Nav1.4 可能改善的选择性。（参见表 29)。

[0904] 包含 N- 端、Asp1、Leu3 和 Gly4 的 GpTx-1 的 N 端部分适于修饰而与 GpTx-1 相比不影响 VGSC 效力或选择性。（参见表 7、表 8、表 9 和表 10)。通过将另外的氨基酸偶合到 N 端而延伸肽链耐受良好。（参见表 7)。在 PatchXpress® (PX) 形式的测定中，对 N- 端天冬氨酸残基乙酰化得到 Ac-GpTx-1(SEQ ID NO：132) 维持了在 $Na_v1.7$ 的效力，并增加了针对 $Na_v1.3$ 和 $Na_v1.4$ 的选择性。（参见表 30)。可将 GpTx-1 的 Asp1 截短或用多种氨基酸取代，而不影响在 $Na_v1.7$ 和 $Na_v1.3$ 的效力或针对 $Na_v1.4$ 和 $Na_v1.5$ 的选择性。（参见表 8)。GpTx-1 中的 Leu3 和 Gly4 可单独地被疏水性或碱性氨基酸替代，并仍保持针对 $Na_v1.7$ 和 $Na_v1.3$ 的效力，但是这些位置不太耐受酸性残基的取代。（参见表 9 和表 10)。然而，在 PX 形式的测定中，用谷氨酸取代 Leu3 增加了针对 Nav1.4 的选择性。（参见表 30)。

[0905] 相对于 SEQ ID NO：1 在第 5 和 6 位的疏水性残基 (GpTx-1 中的 Phe5 和 Met6) 对于 $Na_v1.7$ 和 $Na_v1.3$ 抑制性效力必不可少。（参见表 11 和表 12)。GpTx-1(SEQ ID NO：1) 中第 5 位氨基酸的特性也对肽在 $Na_v1.7$、$Na_v1.3$ 与 $Na_v1.4$ 之间的选择性具有重要影响。用脂族或芳族疏水性残基取代天然苯丙氨酸维持或增加了针对 $Na_v1.7$ 的效力，同时增加了针对 $Na_v1.4$ 的选择性，并且不降低针对 $Na_v1.5$ 的选择性。（参见表 11)。在 PX 形式的测定中，将丙氨酸结合到 [Ala5]GpTx-1(SEQ ID NO：22) 中保持了针对 $Na_v1.7$ 的选择性，同时大大增加了针对 $Na_v1.3$ 和 Nav1.4 的选择性。除了丙氨酸之外，许多其他脂族残基也可结合到第 5 位以改善针对 Nav1.4 的选择性，包括但不限于甘氨酸、2- 氨基丁酸 (Abu)、2- 氨基异丁酸 (Aib)、正缬氨酸、缬氨酸、亮氨酸和异亮氨酸。（参见表 30)。两个对位取代的苯丙氨酸衍生物 -[pI-Phe5]GpTx-1(SEQ ID NO：247) 和 [Bip5]GpTx-1(SEQ ID NO：242) 具有针对 $Na_v1.3$ 增强的效率并对 $Na_v1.7$ 具有选择性。（参见表 30)。在第 6 位结合疏水性残基与其大小成比例地增加了针对所测试的所有四种 Na_v 亚型的效力。（参见表 12)。可与第 5 位的丙氨酸一起在第 6 位结合包括亮氨酸和苯丙氨酸的多种疏水性残基，以在 PX 形式的测定中维持良好的针对 Nav1.7 的效力和针对 Nav1.4 的选择性。（参见表 30)。

[0906] 虽然每个位置都具有可辨认的偏好，但是除了相对于 SEQ ID NO：1 的 Asp14 外，

从 Arg8 至 Thr26 的氨基酸序列都非常耐受单独的取代。不具有在 GpTx-1 第 14 位的天冬氨酸残基而合成的肽未能以对于筛选而言足够纯的形式分离出来，从而表明这个残基可能对于肽的正确折叠至关重要。碱性或中性亲水性氨基酸可相对于 SEQ ID NO :1 被接受作为 Arg7 和 Lys8 的取代，以维持 $Na_v1.7$ 和 $Na_v1.3$ 抑制性效力。（参见表 13）。然而，用谷氨酸取代 Arg7 在 PX 测定形式中增加了针对 Nav1.4 的选择性。（参见表 30）。相对于 SEQ ID NO :1 的 Ile10、Pro11、Asp12、Asn13、Lys15、Arg18 和 Pro19 可用多种氨基酸取代，而对针对 $Na_v1.7$ 和 $Na_v1.3$ 的效力的影响甚微。（参见表 14、表 15、表 16、表 17 和表 18）。用替代性残基取代 Pro11 即 [Glu11]GpTx-1(SEQ ID NO :147) 和 [Trp11]GpTx-1(SEQ ID NO :171) 而不影响 Nav1.7 活性的能力值得注意，因为该残基在 HWTX-IV SEQ ID NO :528) 和 HWTX-I(SEQ ID NO :529) 的肽序列中是保守的。（参见表 15 ;图 15A-B）。第 10 或 11 位的酸性残基取代可改善针对 Nav1.4 的选择性，即 [Asp10]GpTx-1(SEQ ID NO :119)、[Glu10]GpTx-1(SEQ ID NO :146) 和 [Glu11]GpTx-1(SEQ ID NO :147)（参见表 30）。Asn13 的取代改善肽类似物的 Fmoc 固相合成，这可能是通过在后续 Fmoc 移除步骤中减少天冬酰亚胺 (aspartimide) 的形成。第 18 位的取代可改善针对 Nav1.4 的选择性。（参见表 18 和表 30）。相对于 SEQ ID NO :1 的 Asn20、Leu21、Val22、Ser24、Arg25 和 Thr26 可单独地被非酸性氨基酸取代，并保持完全的 Nav1.7 和 Nav1.3 抑制性效力。（参见表 19、表 20、表 21 和表 22）。在 GpTx-1(SEQ ID NO :1) 的第 26 位的苏氨酸不同于 HWTX-IV(SEQ ID NO :528) 和 HWTX-I(SEQ ID NO :529 ; 参见图 15A-B) 中的保守赖氨酸。在该位置的取代增加针对 $Na_v1.4$ 的选择性，如在 [Leu26]GpTx-1(SEQ ID NO :121) 和 [Glu26]GpTx-1(SEQ ID NO :152) 中。（参见表 30）。可通过插入或缺失一个氨基酸残基而延长或缩短 GpTx-1(SEQ ID NO :1) 中的 Cys17 与 Cys23 之间的环长度，而对肽针对所测试的 VGSC 的活性无实质性影响，如 [Ser-Ser19]GpTx-1(SEQ ID NO :93) 和 [Glu18 ;desAsn20]GpTx-1(SEQ ID NO :134) 所示。（参见表 18 和表 29）。

[0907] GpTx-1 序列的 C 端部分对于肽针对 $Na_v1.7$ 和 $Na_v1.3$ 的活性最为重要。取代 GpTx-1(SEQ ID NO :1) 中的 His27 而保持效力和选择性能通过芳族和碱性残基最好地实现。（参见表 23）。相对于 SEQ ID NO :1 的残基 Lys28 和 Val33 最耐受多种不同氨基酸的取代，而不影响 $Na_v1.7$ 和 $Na_v1.3$ 抑制性效力。（参见表 23 和表 26）。[Arg28]GpTx-1(SEQ ID NO :72)、[Glu28]GpTx-1(SEQ ID NO :153)、[Asp28]GpTx-1(SEQ ID NO :750)、[Gln28]GpTx-1(SEQ ID NO :763) 和 [Glu33]GpTx-1(SEQ ID NO :33) 显示出针对 $Na_v1.4$ 增强的选择性。（参见表 30）。GpTx-1(SEQ ID NO :1) 第 29 位的色氨酸（或硫代色氨酸）似乎对于获得高水平的针对 $Na_v1.7$ 和 $Na_v1.3$ 的效力具有重要意义。（参见表 24）。具有大疏水性取代的类似物 [1-Nal29]GpTx-1(SEQ ID NO :79) 和 [2-Nal29]GpTx-1(SEQ ID NO :129) 保持了最大的活性，但是效力仍比 GpTx-1 低 5 倍，然而它们具有针对 Nav1.4 增强的选择性。（参见表 30）。相对于 SEQ ID NO :1 的 Lys31 显然也对 GpTx-1 针对 Nav1.7 和 $Na_v1.3$ 的强效抑制具有重要意义。（参见表 25）。GpTx-1(SEQ ID NO :1) 第 32 位的酪氨酸可被脂族或芳族疏水性氨基酸取代，而保持针对 $Na_v1.7$ 和 $Na_v1.3$ 的效力，但是这些取代通常增加针对 $Na_v1.5$ 和 $Na_v1.4$ 的活性，从而导致降低的选择性。（参见表 25）。GpTx-1(SEQ ID NO :1) 第 34 位的苯丙氨酸只能被其他疏水性氨基酸取代而不丧失针对 $Na_v1.7$ 和 $Na_v1.3$ 的效力，然而大的疏水性氨基酸往往会增强效力并因而降低针对 $Na_v1.4$ 和 $Na_v1.5$ 的选择性。（参见表 27）。GpTx-1(SEQ ID NO :1) 的 C 端适于通过至少一个氨基酸延伸，而保留 Na_v 抑制性活性，但是

GpTx-1 的 C 端截短或天然 C- 端酰胺被游离酸取代会降低针对 $Na_v1.7$ 和 $Na_v1.3$ 的效力。(参见表 28)。结合各个取代的 GpTx-1(SEQ ID NO :1) 的另外类似物已证实了针对 $Na_v1.4$ 和 $Na_v1.5$ 的选择性以及对 Nav1.7 和 Nav1.3 的效力的进一步改善,即 [Ala5,Phe6,Leu26,Arg28]GpTx-1(SEQ ID NO :262) 和 [Ala5,Phe6,Glu10,2-Abu13,Leu26,Arg28]GpTx-1(SEQ ID NO :1035)。(参见表 29 和表 30)。针对部分失活的 hNav1.2 通道的 [Ala5]GpTx-1(1-34)(SEQ ID NO :22) 的 IC_{50} 为 0.265μM。

[0908] 对 GpTx-1(SEQ ID NO :1) 和 [Ala5]GpTx-1(SEQ ID NO :22) 针对 Nav1.7、Nav1.3、Nav1.4 和 Nav1.5 的人克隆体的作用进行了人工全细胞膜片钳电生理分析。用 100nM GpTx-1 进行测试显示出对 Nav1.7 电流的完全抑制。(参见图 20)。GpTx-1 的 Nav1.7 抑制 IC_{50} 值为 7.40nM。(参见图 21)。记录了渐增浓度的 GpTx-1 添加和洗出对 Nav1.7 电流的作用。(参见图 22)。用 300nM GpTx-1 进行测试显示出对 Nav1.3 电流的完全抑制。(参见图 23)。GpTx-1 的 Nav1.3 抑制 IC_{50} 值为 16.8nM。(参见图 24)。记录了渐增浓度的 GpTx-1 添加和洗出对 Nav1.3 电流的作用。(参见图 25)。用 3.0μMGpTx-1 进行测试显示出对 Nav1.4 电流的部分抑制。(参见图 26)。GpTx-1 的 Nav1.4 抑制 IC_{50} 值对于关闭和比分失活状态而言分别为 2.9μM 和 0.26μM。(参见图 27 和图 28)。分别记录了对于关闭和部分失活状态而言渐增浓度的 GpTx-1 添加和洗出对 Nav1.4 电流的作用。(参见图 29 和图 30)。GpTx-1 在通道部分失活时对 hNav1.4 的效力更高。用 3.0μM GpTx-1 进行测试显示出对 Nav1.5 电流的弱抑制。(参见图 31)。GpTx-1 的 Nav1.5 抑制 IC_{50} 值为 8.9μM。(参见图 32)。记录了渐增浓度的 GpTx-1 添加和洗出对 Nav1.5 电流的作用。(参见图 33)。这些结果证明 GpTx-1(SEQ ID NO :1) 是 Nav1.7 和 Nav1.3 的强效双重肽抑制剂,具有针对 Nav1.4 和 Nav1.5 的选择性。用 300nM[Ala5]GpTx-1(SEQ ID NO :22) 进行测试显示出对 Nav1.7 电流的完全抑制。(参见图 34)。[Ala5]GpTx-1 的 Nav1.7 抑制 IC_{50} 值为 13.2nM。(参见图 35)。记录了渐增浓度的 [Ala5]GpTx-1 添加和洗出对 Nav1.7 电流的作用。(参见图 36)。这些结果证明 [Ala5]GpTx-1(SEQ ID NO :22) 也是 Nav1.7 的强效抑制剂。

[0909] 对 GpTx-1(SEQ ID NO :1) 和 [Ala5]GpTx-1(SEQ ID NO :22) 针对分离的小鼠 DRG 神经元的作用进行了人工膜片钳电生理分析。记录了渐增浓度的 GpTx-1 添加和洗出对小鼠 DRG 神经元中钠通道电流的作用。(参见图 37)。GpTx-1 的 TTX 敏感性钠通道电流抑制 IC_{50} 值为 7.1nM。(参见图 38)。用 200nM GpTx-1 进行测试显示出对小鼠 DRG 神经元中 TTX 敏感性钠电流几乎完全的抑制。(参见图 39)。记录了渐增浓度的 GpTx-1 添加和洗出在产生 20％失活的保持电压下对小鼠 DRG 神经元中钠通道电流的作用。(参见图 40)。GpTx-1 在产生 20％失活的保持电压下的 TTX 敏感性钠通道电流抑制 IC_{50} 值为 4.7nM。(参见图 41)。用 200nM GpTx-1 进行测试在产生 20％失活的保持电压下显示出对小鼠 DRG 神经元中 TTX 敏感性钠电流的完全抑制 (参见图 42)。记录了渐增浓度的 [Ala5]GpTx-1(SEQ ID NO :22) 添加和洗出对小鼠 DRG 神经元中钠通道电流的作用。(参见图 43)。[Ala5]GpTx-1(SEQ ID NO :22) 的 TTX 敏感性钠通道电流抑制的 IC_{50} 值为 17.0nM。(参见图 44)。用 300nM GpTx-1 进行测试显示出对小鼠 DRG 神经元中 TTX 敏感性钠电流几乎完全的抑制。(参见图 45)。

[0910] 对同二聚偶联物 1 针对 Nav1.7 和 Nav1.5 的人克隆体的作用进行了人工全细胞膜片钳电生理分析 (参见实施例 5)。记录了渐增浓度的同二聚偶联物 1 添加和洗出对 Nav1.7 电流的作用。(参见图 46)。同二聚偶联物 1 的 Nav1.7 抑制 IC_{50} 值为 1.2nM。(参见图 47)。

用 3nM 同二聚偶联物 1 进行测试显示出化合物在延长洗涤 (10min) 期间非常慢地洗出，而用 300nM 同二聚偶联物 1 进行测试显示出化合物在延长洗涤 (10min) 期间不洗出。(参见图 48)。用 300nM 同二聚偶联物 1 进行测试产生了 Nav1.7 电流的完全抑制。(参见图 49)。记录了渐增浓度的同二聚偶联物 1 添加和洗出在产生约 20％失活的保持电压下对 Nav1.7 电流的作用。(参见图 50)。同二聚偶联物 1 在产生约 20％失活的保持电压下的 Nav1.7 抑制 IC_{50} 值为 0.66nM。(参见图 51)。用 3nM 同二聚偶联物 1 进行测试在产生约 20％失活的保持电压下产生了对 Nav1.7 电流的完全抑制。(参见图 52)。记录了渐增浓度的同二聚偶联物 1 添加和洗出对 Nav1.5 电流的作用。(参见图 53)。同二聚偶联物 1 的 Nav1.5 抑制 IC_{50} 值为 75.5nM。(参见图 54)。用 2μM 同二聚偶联物 1 进行测试产生了 Nav1.5 电流的完全抑制。(参见图 55)。记录了渐增浓度的同二聚偶联物 1 添加和洗出在产生约 20％失活的保持电压下对 Nav1.5 电流的作用。(参见图 56)。同二聚偶联物 1 在产生约 20％失活的保持电压下的 Nav1.5 抑制 IC_{50} 值为 57nM。(参见图 57)。用 2μM 同二聚偶联物 1 进行测试在产生约 20％失活的保持电压下产生了对 Nav1.5 电流的完全抑制。(参见图 58)。

[0911] 钾通道研究。从成年 SD 大鼠 (14 至 15 周龄) 收获了背根神经节，剪掉结缔组织，然后在 37℃下用木瓜蛋白酶 (3mL 不含钙和镁的 Hank's 缓冲液 +1mg L- 半胱氨酸 +4μL 饱和碳酸氢钠 +60μL 木瓜蛋白酶，Worthington biochemical) 进行 30 分钟的酶解离。将制备物在 1000rpm 下离心 2 分钟，将沉淀重悬以进行第二次酶孵育，第二次酶孵育采用胶原酶和分散酶 (4mL 不含钙和镁的 Hank's 缓冲液 +120μL 得自 Roche 的胶原酶 / 分散酶混合物 100mg/mL) 进行 60 分钟，每 10 分钟进行一次温和的研磨。将细胞在 2000rpm 下再次离心 2 分钟，重悬在 F-12 培养基中，铺到聚 -D- 层粘连蛋白包被的盖玻片上，置于含 5％ CO_2 的潮湿 37℃培养箱中，用于在当天进行电生理记录。

[0912] 电生理记录采用膜片钳技术的全细胞配置进行 (Hamill OP 等人，“Improved patch-clamp techniques for high-resolution current recording from cells and cell-free membrane patches，Pfluger's Archiv391 :85-100，1981)，其中内部 (电极) 溶液包含单位为毫摩尔的 70KF、70KCl、10HEPES、5HEDTA，用 KOH 调至 pH7.25。外部溶液包含单位为毫摩尔的 140NaCl、5KCl、$2CaCl_2$、$1MgCl_2$、10HEPES、10 葡萄糖，用 NaOH 调至 pH7.4。在形成膜片钳的全细胞配置后，通过移动膜片电极将细胞从皿底提起，在电子控制 (BioLogique) 下手动置于重力驱动的微灌流阵列前。每 5 秒通过 20ms 测试去极化到由 -90mV 保持电位递送的 0mV 而诱发组合钠电流和钾电流。通过转换灌流管而添加 [Ala5]GpTx-1(SEQ ID NO :22 ;500nM) 肽，虽然快速钠电流 (可能具有河豚毒素敏感性，至少部分地由 Nav1.7 编码) 稳定降低，从而反映肽所致的阻断，但是外向钾电流无变化。图 94 中所示的电流未进行漏减，但是随着测试脉冲变为 0mV，漏电流的污染应当最小。图 94 中所示的结果证明 500nM[Ala5]GpTx-1(SEQ ID NO :22) 未阻断电压门控钾电流。

[0913]

表 6. IonWorks® Quattro 测定的电生理：GpTx-1 (SEQ ID NO:1)与得自智利红玫瑰的其他毒素的比较。

SEQ ID NO.	氨基酸序列	命名	IWQ使用 Nav1.7 (μM)	IWQ使用 Nav1.5 (μM)	IWQ使用 Nav1.4 (μM)	IWQ 使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
467	{H}-DCLGFMRKCSPDNDKCCRPNLVCSRKHKWCKYEI-{酰胺}	GpTx-2(1-34)	4.34	7.21	11.73	1.15	2.7	10.2	3.8
468	{H}-DCLGWFKGCDPDNDKCCEGYKCNRRDKWCKYKL-{酰胺}	GpTx-3(1-33)	8.93	7.80	20.00	9.37	2.2	2.1	1.0
469	{H}-DCLGWFKGCDPDNDKCCENYKCNRREQWCKYKL-{酰胺}	GpTx-4(1-33)	9.25	10.38	11.00	4.92	1.2	2.2	1.9
473	{H}-DCLGWFKGCDPDNDKCCENYKCNRRDKWCKYKLWK-{游离酸}	GpTx-7(1-35)	10.4	7.6	10.0	3.5	1.0	2.8	2.9
474	{H}-DCLGWFKGCDPDNDKCCENYKCNRRDKWCKYKLW-{游离酸}	GpTx-7(1-34)	4.0	7.9	10.5	1.4	2.6	7.7	2.9
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0914]

表 7. IonWorks® Quattro 测定的电生理：相对于 GpTx-1 (SEQ ID NO:1)和 Ac-GpTx-1 (SEQ ID NO:132)的第 0 位添加。

SEQ ID NO.	氨基酸序列	命名	IWQ使用 Nav1.7 (μM)	IWQ使用 Nav1.5 (μM)	IWQ使用 Nav1.4 (μM)	IWQ 使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
100	{H}-ADCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	Ala-GpTx-1(1-34)	0.37	19.58	7.07	0.32	19.2	21.9	1.1
17	{H}-EDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	Glu-GpTx-1(1-34)	0.26	12.77	3.63	0.19	13.9	18.7	1.3
36	{H}-KDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	Lys-GpTx-1(1-34)	0.11	8.35	2.38	0.10	20.8	23.6	1.1
61	{H}-RDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	Arg-GpTx-1(1-34)	0.17	15.08	2.58	0.08	15.6	31.8	2.0
106	{H}-WDCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	Trp-GpTx-1(1-34)	0.22	21.96	3.83	0.25	17.5	15.1	0.9
201	{H}-[1-Nal]DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	1-Nal-GpTx-1(1-34)							
132	{Acetyl}DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	Ac-GpTx-1(1-34)	0.31	12.69	2.86	0.22	9.3	12.9	1.4
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0915]

表 8. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 的第 1 位取代或缺失。

SEQ ID NO.	氨基酸序列	命名	IWQ使用 Nav1.7 (μM)	IWQ使用 Nav1.5 (μM)	IWQ使用 Nav1.4 (μM)	IWQ使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav 1.7/ Nav 1.3
20	{H}-ACLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala1]GpTx-1(1-34)	0.10	9.86	1.68	0.08	16.8	21.1	1.3
18	{H}-ECLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Glu1]GpTx-1(1-34)	0.22	14.16	3.46	0.15	15.7	23.2	1.5
37	{H}-KCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Lys1]GpTx-1(1-34)	0.15	7.29	1.49	0.07	10.2	21.0	2.1
62	{H}-RCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Arg1]GpTx-1(1-34)	0.11	8.78	1.45	0.10	12.9	15.2	1.2
81	{H}-WCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Trp1]GpTx-1(1-34)	0.05	8.79	3.06	0.10	56.1	30.9	0.6
77	{H}-[1-Nal]CLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[1-Nal1]GpTx-1(1-34)	0.11	13.38	6.77	0.14	62.9	48.0	0.8
97	{H}-YCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Tyr1]GpTx-1(1-34)	0.16	10.61	3.89	0.13	24.5	29.0	1.2
108	{H}-CLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(2-34)	0.07	8.22	1.10	0.05	14.8	20.3	1.4
188	{H}-[PE]CLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[PE1]GpTx-1(1-34)	0.17	10.69	2.64	0.11	15.7	24.2	1.5
189	{H}-ICLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ile1]GpTx-1(1-34)	0.10	8.15	1.34	0.07	13.1	20.3	1.5
190	{H}-PCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Pro1]GpTx-1(1-34)	0.09	9.73	1.19	0.04	13.7	29.4	2.2
191	{H}-SCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ser1]GpTx-1(1-34)	0.07	9.40	1.14	0.05	15.7	21.2	1.4
192	{H}-TCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Thr1]GpTx-1(1-34)	0.11	9.21	1.41	0.07	12.5	20.5	1.6
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0916]

表 9. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 的第 3 位取代。

SEQ ID NO.	氨基酸序列	命名	IWQ使用 Nav1.7 (μM)	IWQ使用 Nav1.5 (μM)	IWQ使用 Nav1.4 (μM)	IWQ使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
21	{H}-DCAGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	[Ala3]GpTx-1(1-34)	0.51	19.01	14.46	0.10	28.2	138.2	4.9
19	{H}-DCEGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	[Glu3]GpTx-1(1-34)	0.67	10.47	8.34	0.83	12.5	10.0	0.8
38	{H}-DCKGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	[Lys3]GpTx-1(1-34)	0.08	6.95	1.87	0.06	23.0	33.1	1.4
155	{H}-DCRGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	[Arg3]GpTx-1(1-34)	0.03	8.45	0.85	0.05	26.7	16.0	0.6
98	{H}-DCQGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	[Gln3]GpTx-1(1-34)	0.25	16.40	5.25	0.24	20.7	21.5	1.0
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0917]

表 10. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 的第 4 位取代。

SEQ ID NO.	氨基酸序列	命名	IWQ使用 Nav1.7 (μM)	IWQ使用 Nav1.5 (μM)	IWQ使用 Nav1.4 (μM)	IWQ使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
141	{H}-DCLAFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala4]GpTx-1(1-34)	0.27	11.30	3.24	0.21	12.0	15.4	1.3
24	{H}-DCLEFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Glu4]GpTx-1(1-34)	1.74	17.61	8.50	1.33	4.9	6.4	1.3
39	{H}-DCLKFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Lys4]GpTx-1(1-34)	0.20	9.82	6.49	0.18	32.7	36.2	1.1
63	{H}-DCLRFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Arg4]GpTx-1(1-34)	0.21	20.09	5.82	0.23	27.1	24.8	0.9
169	{H}-DCLWFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Trp4]GpTx-1(1-34)	0.05	10.33	0.52	0.03	10.0	19.3	1.9
160	{H}-DCL[1-Nal]FMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[1-Nal4]GpTx-1(1-34)	0.04	5.09	0.50	0.03	13.7	18.9	1.4
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0918]

表 11. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 的第 5 位取代。

SEQ ID NO.	氨基酸序列	命名	IWQ 使用 Nav1.7 (μM)	IWQ 使用 Nav1.5 (μM)	IWQ 使用 Nav1.4 (μM)	IWQ 使用 Nav1.3 (μM)	Nav1.4/Nav1.7	Nav1.4/Nav1.3	Nav1.7/Nav1.3
22	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala5]GpTx-1(1-34)	0.64	10.34	11.07	1.75	17.4	6.3	0.4
143	{H}-DCLGEMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Glu5]GpTx-1(1-34)	17.67	10.01	22.26	22.29	1.3	1.0	0.8
156	{H}-DCLGRMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Arg5]GpTx-1(1-34)	3.63	12.64	25.69	4.09	7.1	6.3	0.9
82	{H}-DCLGWMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Trp5]GpTx-1(1-34)	0.15	9.32	2.30	0.11	15.6	21.4	1.4
105	{H}-DCLG[1-Nal]MRKCIPDND KCCRPNLVCSRTHKWCKYVF-{酰胺}	[1-Nal5]GpTx-1(1-34)	0.08	13.41	2.13	0.10	26.4	21.7	0.8
88	{H}-DCLGIMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ile5]GpTx-1(1-34)	0.36	6.65	10.78	0.62	30.0	17.3	0.6
128	{H}-DCLG[2-Nal]MRKCIPDND KCCRPNLVCSRTHKWCKYVF-{酰胺}	[2-Nal5]GpTx-1(1-34)	0.11	6.11	0.94	0.05	8.2	17.3	2.1
242	{H}-DCLG[Bip]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Bip5]GpTx-1(1-34)	0.06	3.38	0.14	-	2.3	-	-
243	{H}-DCLG[Cha]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Cha5]GpTx-1(1-34)	0.01	6.99	0.64	0.02	47.6	34.8	0.7
247	{H}-DCLG[pI-Phe]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[pI-Phe5]GpTx-1(1-34)	0.16	6.16	19.68	0.02	121.9	1152.0	9.4
264	{H}-DCLG[1'NMeW]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[1'NMeW5]GpTx-1(1-34)	0.09	8.17	2.81	0.09	32.9	30.5	0.9
265	{H}-DCLGGMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Gly5]GpTx-1(1-34)	0.75	7.47	10.73	1.24	14.3	8.6	0.6
266	{H}-DCLGHMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[His5]GpTx-1(1-34)	4.74	6.62	14.86	8.37	3.1	1.8	0.6
267	{H}-DCLGLMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Leu5]GpTx-1(1-34)	0.17	7.40	12.14	0.30	70.9	40.0	0.6

[0919]

268	{H}-DCLGMMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Met5]GpTx-1(1-34)	0.10	12.81	11.20	0.24	113.6	45.9	0.4
269	{H}-DCLGPMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Pro5]GpTx-1(1-34)	1.17	6.61	11.40	1.73	9.7	6.6	0.7
270	{H}-DCLGTMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Thr5]GpTx-1(1-34)	1.22	15.25	15.54	2.19	12.7	7.1	0.6
271	{H}-DCLGYMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Tyr5]GpTx-1(1-34)	1.43	15.58	6.48	1.64	4.5	3.9	0.9
272	{H}-DCLGVMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Val5]GpTx-1(1-34)	0.71	13.22	13.88	1.03	19.7	13.5	0.7
273	{H}-DCLGfMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[D-Phe5]GpTx-1(1-34)	1.23	>5	>5	3.00	-	-	0.4
274	{H}-DCLG[NMeTrp]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[NMeTrp5]GpTx-1(1-34)	0.19	>5	2.40	0.15	12.8	16.3	1.3
275	{H}-DCLG[Phg]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Phg5]GpTx-1(1-34)	0.09	>5	2.55	0.17	28.4	15.4	0.5
276	{H}-DCLG[4CO2-F]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[4CO2-F5]GpTx-1(1-34)	15.96	8.12	21.45	5.42	1.3	4.0	2.9
277	{H}-DCLG[2PAL]MRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[2PAL5]GpTx-1(1-34)	2.07	9.25	11.86	4.58	5.7	2.6	0.5
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0920]

表 12. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 的第 6 位取代。

SEQ ID NO.	氨基酸序列	命名	IWQ使用 Nav1.7 (μM)	IWQ使用 Nav1.5 (μM)	IWQ使用 Nav1.4 (μM)	IWQ使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
23	{H}-DCLGFARKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala6]GpTx-1(1-34)	0.51	17.38	3.71	0.21	7.3	17.5	2.4
144	{H}-DCLGFERKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Glu6]GpTx-1(1-34)	3.51	9.39	22.42	20.36	6.4	1.1	0.2
154	{H}-DCLGFKRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Lys6]GpTx-1(1-34)	14.52	13.95	24.95	8.49	1.7	2.9	1.7
64	{H}-DCLGFRRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Arg6]GpTx-1(1-34)	6.98	17.59	14.74	5.90	2.1	2.5	1.2
170	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Trp6]GpTx-1(1-34)	0.013	3.58	0.25	0.002	19.1	123.5	6.5
161	{H}-DCLGF[1-Nal]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[1-Nal6]GpTx-1(1-34)	0.007	2.34	0.27	0.006	39.3	43.8	1.1
89	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Phe6]GpTx-1(1-34)	0.05	9.21	1.39	0.03	28.2	40.7	1.4
3	{H}-DCLGF[SeMet]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[SeMet6]GpTx-1(1-34)	0.10	13.89	2.25	0.10	23.5	22.6	1.0
123	{H}-DCLGF[Nle]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Nle6]GpTx-1(1-34)	0.05	4.50	0.43	0.02	8.1	23.3	2.9
124	{H}-DCLGF[2-Abu]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[2-Abu6]GpTx-1(1-34)	0.11	10.59	2.09	0.10	18.6	21.3	1.1
244	{H}-DCLGFLRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Leu6]GpTx-1(1-34)	0.06	6.42	15.94	0.04	270.6	364.7	1.3
245	{H}-DCLGF[Cha]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Cha6]GpTx-1(1-34)	0.02	2.37	0.10	-	6.3	-	-
278	{H}-DCLGFNRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Asn6]GpTx-1(1-34)	6.89	10.27	21.16	6.28	3.1	3.4	1.1
279	{H}-DCLGFQRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Gln6]GpTx-1(1-34)	8.62	7.57	14.08	5.96	1.6	2.4	1.4

[0921]

280	{H}-DCLGFGRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Gly6]GpTx-1(1-34)	0.18	8.20	2.89	0.14	15.7	20.5	1.3
281	{H}-DCLGFHRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[His6]GpTx-1(1-34)	4.72	10.06	17.82	7.77	3.8	2.3	0.6
282	{H}-DCLGFIRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ile6]GpTx-1(1-34)	0.07	8.63	1.19	0.06	16.6	18.9	1.1
283	{H}-DCLGFPRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Pro6]GpTx-1(1-34)	0.79	10.00	11.00	0.76	13.8	14.4	1.0
284	{H}-DCLGFSRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ser6]GpTx-1(1-34)	1.02	16.94	21.30	0.71	20.8	30.1	1.4
285	{H}-DCLGFTRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Thr6]GpTx-1(1-34)	0.59	18.71	4.25	0.28	7.2	15.4	2.1
286	{H}-DCLGFYRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Tyr6]GpTx-1(1-34)	0.97	6.38	11.59	0.52	11.9	22.2	1.9
287	{H}-DCLGFVRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Val6]GpTx-1(1-34)	0.09	9.23	1.77	0.08	18.8	23.4	1.2
288	{H}-DCLGF[Phg]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Phg6]GpTx-1(1-34)	0.15	>5	2.88	0.09	19.5	32.2	1.7
289	{H}-DCLGF[NMeTrp]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[NMeTrp6]GpTx-1(1-34)	0.14	21.45	3.69	0.24	26.5	15.4	0.6
290	{H}-DCLGF[NMePhe]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[NMePhe6]GpTx-1(1-34)	0.24	10.56	2.59	0.14	10.7	18.8	1.8
291	{H}-DCLGF[pI-Phe]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[pI-Phe6]GpTx-1(1-34)	0.02	0.95	0.04	-	2.6	-	-
292	{H}-DCLGF[1'NMeW]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[1'NMeW6]GpTx-1(1-34)	0.04	5.66	0.42	0.03	10.2	16.6	1.6
293	{H}-DCLGF[4CO2-F]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[4CO2-F6]GpTx-1(1-34)	15.79	11.11	21.50	13.78	1.4	1.6	1.1
294	{H}-DCLGF[2PAL]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[2PAL6]GpTx-1(1-34)	0.37	9.11	7.04	0.09	18.8	75.3	4.0
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0922]

表 13. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 在第 7 或 8 位的取代。

SEQ ID NO.	氨基酸序列	命名	IWQ使用 Nav1.7 (μM)	IWQ使用 Nav1.5 (μM)	IWQ使用 Nav1.4 (μM)	IWQ使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
43	{H}-DCLGFMAKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala7]GpTx-1 (1-34)	0.94	21.55	4.72	0.83	5.0	5.7	1.1
145	{H}-DCLGFMEKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Glu7]GpTx-1 (1-34)	0.88	19.11	20.15	1.68	22.9	12.0	0.5
40	{H}-DCLGFMKKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Lys7]GpTx-1 (1-34)	0.53	23.28	6.48	0.47	12.1	13.8	1.1
115	{H}-DCLGFM[Cit]KCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Cit7]GpTx-1(1-34)	0.63	14.37	6.52	0.56	10.3	11.7	1.1
295	{H}-DCLGFM[K(Me2)]KCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[K(Me2)7]GpTx-1(1-34)	0.82	13.27	10.69	0.27	13.0	39.0	3.0
296	{H}-DCLGFM[SDMA]KCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[SDMA7]GpTx-1(1-34)	0.24	10.34	4.89	0.12	20.2	39.2	1.9
44	{H}-DCLGFMRACIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala8]GpTx-1 (1-34)	0.49	16.77	4.73	0.41	9.6	11.4	1.2
25	{H}-DCLGFMRECIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Glu8]GpTx-1 (1-34)	1.70	24.85	13.46	1.36	7.9	9.9	1.2
65	{H}-DCLGFMRRCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Arg8]GpTx-1 (1-34)	0.14	13.76	1.78	0.12	13.1	14.4	1.1
118	{H}-DCLGFMRTCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Thr8]GpTx-1 (1-34)	0.35	9.86	6.13	0.15	17.4	41.3	2.4
297	{H}-DCLGFMR[SDMA]CIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[SDMA8]GpTx-1(1-34)	0.20	9.05	5.47	0.20	28.0	27.1	1.0
298	{H}-DCLGFMR[K(Me2)]CIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[K(Me2)8]GpTx-1(1-34)	0.19	9.46	4.43	0.18	23.1	25.2	1.1
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0923]

表 14. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 在第 10 位的取代。

SEQ ID NO.	氨基酸序列	命名	IWQ使用 Nav1.7 (μM)	IWQ使用 Nav1.5 (μM)	IWQ使用 Nav1.4 (μM)	IWQ使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
45	{H}-DCLGFMRKCAPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala10]GpTx-1(1-34)	0.21	16.48	2.95	0.19	14.1	15.5	1.1
146	{H}-DCLGFMRKCEPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Glu10]GpTx-1(1-34)	0.09	9.55	4.47	0.15	50.9	29.8	0.6
41	{H}-DCLGFMRKCKPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Lys10]GpTx-1(1-34)	0.24	9.00	2.57	0.15	10.9	17.3	1.6
66	{H}-DCLGFMRKCRPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Arg10]GpTx-1(1-34)	0.16	15.24	0.89	0.11	5.4	8.0	1.5
83	{H}-DCLGFMRKCWPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Trp10]GpTx-1(1-34)	0.10	8.02	4.35	0.19	44.1	23.1	0.5
78	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	[1-Nal10]GpTx-1(1-34)	0.15	10.03	9.02	0.21	58.3	42.9	0.7
90	{H}-DCLGFMRKCNPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Asn10]GpTx-1(1-34)	0.49	14.14	9.33	0.19	19.2	49.4	2.6
119	{H}-DCLGFMRKCDPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Asp10]GpTx-1(1-34)	0.22	11.34	8.36	0.16	37.4	52.9	1.4
299	{H}-DCLGFMRKCYPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Tyr10]GpTx-1(1-34)	0.14	5.41	0.96	0.07	6.7	14.5	2.2
300	{H}-DCLGFMRKC[NMeTrp]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[NMeTrp10]GpTx-1(1-34)	0.08	9.89	1.93	0.07	24.4	28.9	1.2
301	{H}-DCLGFMRKCVPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Val10]GpTx-1(1-34)	0.10	7.88	1.41	0.09	13.6	15.3	1.1
302	{H}-DCLGFMRKCFPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Phe10]GpTx-1(1-34)	0.11	5.33	1.08	0.08	9.7	12.8	1.3
303	{H}-DCLGFMRKCLPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Leu10]GpTx-1(1-34)	0.13	8.13	2.54	0.08	19.1	30.9	1.6
304	{H}-DCLGFMRKCHPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[His10]GpTx-1(1-34)	0.05	6.36	0.69	0.03	15.0	20.8	1.4
30	{H}-DCLGFMRKCSPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ser10]GpTx-1(1-3	0.05	4.64	1.95	0.09	36.6	22.2	0.6

[0924]

307	{H}-DCLGFMRKCMPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Met10]GpTx-1(1-34)	0.09	3.38	3.09	0.10	32.9	32.4	1.0
308	{H}-DCLGFMRKCPPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Pro10]GpTx-1(1-34)	0.40	>5	1.19	0.24	3.0	5.0	1.7
309	{H}-DCLGFMRKCTPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Thr10]GpTx-1(1-34)	0.10	>5	1.08	0.06	10.7	17.7	1.7
310	{H}-DCLGFMRKC[4CO2-F]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[4CO2-F10]GpTx-1(1-34)	0.28	6.87	3.94	0.23	14.2	17.3	1.2
311	{H}-DCLGFMRKC[2PAL]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[2PAL10]GpTx-1(1-34)	0.19	8.83	2.91	0.04	15.4	66.3	4.3
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0925]

表 15. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 在第 11 或 12 位的取代。

SEQ ID NO.	氨基酸序列	命名	IWQ 使用 Nav1.7 (μM)	IWQ 使用 Nav1.5 (μM)	IWQ 使用 Nav1.4 (μM)	IWQ 使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
46	{H}-DCLGFMRKCIADNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala11]GpTx-1(1-34)	0.21	16.05	2.97	0.18	14.4	16.6	1.2
147	{H}-DCLGFMRKCIEDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Glu11]GpTx-1(1-34)	0.22	15.61	6.64	0.21	30.7	32.0	1.0
171	{H}-DCLGFMRKCIWDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Trp11]GpTx-1(1-34)	0.07	9.50	1.66	0.04	22.4	36.9	1.6
4	{H}-DCLGFMRKCIPANDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala12]GpTx-1(1-34)	0.12	8.05	0.70	0.13	6.0	5.4	0.9
26	{H}-DCLGFMRKCIPENDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Glu12]GpTx-1(1-34)	0.26	6.45	2.24	0.19	8.5	11.9	1.4
42	{H}-DCLGFMRKCIPKNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Lys12]GpTx-1(1-34)	0.12	6.51	0.53	0.09	4.5	5.8	1.3
67	{H}-DCLGFMRKCIPRNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Arg12]GpTx-1(1-34)	0.11	5.00	0.52	0.14	4.6	3.8	0.8
172	{H}-DCLGFMRKCIPWNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Trp12]GpTx-1(1-34)	0.05	8.04	0.49	0.04	10.4	12.7	1.2
162	{H}-DCLGFMRKCIP[1-Nal]NDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[1-Nal12]GpTx-1(1-34)	0.06	9.88	0.55	0.04	9.4	12.3	1.3
91	{H}-DCLGFMRKCIPSNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ser12]GpTx-1(1-34)	0.08	9.58	1.68	0.19	20.5	8.9	0.4
194	{H}-DCLGFMRKCIPGNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Gly12]GpTx-1(1-34)	0.075	8.764	0.510	0.047	6.8	10.9	1.6
195	{H}-DCLGFMRKCIPINDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ile12]GpTx-1(1-34)	0.662	18.322	5.834	0.607	8.8	9.6	1.1
193	{H}-DCLGFMRKCIPLNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Leu12]GpTx-1(1-34)	0.080	6.832	0.586	0.071	7.4	8.2	1.1
196	{H}-DCLGFMRKCIPTNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Thr12]GpTx-1(1-34)	0.097	7.079	0.649	0.074	6.7	8.8	1.3
197	{H}-DCLGFMRKCIPYNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Tyr12]GpTx-1(1-34)	0.098	6.920	0.475	0.042	4.8	11.2	2.3
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0926]

[0927]

表 16. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 在第 13 位的取代。

SEQ ID NO.	氨基酸序列	命名	IWQ 使用 Nav1.7 (μM)	IWQ 使用 Nav1.5 (μM)	IWQ 使用 Nav1.4 (μM)	IWQ 使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
5	{H}-DCLGFMRKCIPDADKCCRPNLVCSRTHKWCKYVF-{ 酰胺 }	[Ala13]GpTx-1(1-34)	0.17	8.15	2.64	0.16	15.9	16.9	1.1
27	{H}-DCLGFMRKCIPDEDKCCRPNLVCSRTHKWCKYVF-{ 酰胺 }	[Glu13]GpTx-1(1-34)	0.26	9.38	4.41	0.22	17.2	19.8	1.2
48	{H}-DCLGFMRKCIPDKDKCCRPNLVCSRTHKWCKYVF-{ 酰胺 }	[Lys13]GpTx-1(1-34)	0.21	9.72	2.44	0.13	11.5	19.1	1.7
103	{H}-DCLGFMRKCIPDRDKCCRPNLVCSRTHKWCKYVF-{ 酰胺 }	[Arg13]GpTx-1(1-34)	0.16	15.96	4.64	0.22	29.4	21.4	0.7
173	{H}-DCLGFMRKCIPDWDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	[Trp13]GpTx-1(1-34)	0.09	17.29	2.28	0.05	26.2	49.3	1.9
163	{H}-DCLGFMRKCIPD[1-Nal]DKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	[1-Nal13]GpTx-1(1-34)	0.11	8.27	2.84	0.09	24.9	32.4	1.3
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺 }	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0928]

表 17. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 在第 15 位的取代。

SEQ ID NO.	氨基酸序列	命名	IWQ使用 Nav1.7 (μM)	IWQ使用 Nav1.5 (μM)	IWQ使用 Nav1.4 (μM)	IWQ使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
6	{H}-DCLGFMRKCIPDNDACCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala15]GpTx-1(1-34)	0.22	9.64	4.68	0.19	21.5	24.2	1.1
28	{H}-DCLGFMRKCIPDNDECCRPNLVCSRTHKWCKYVF-{酰胺}	[Glu15]GpTx-1(1-34)	0.59	12.09	8.75	0.49	14.8	17.8	1.2
68	{H}-DCLGFMRKCIPDNDRCCRPNLVCSRTHKWCKYVF-{酰胺}	[Arg15]GpTx-1(1-34)	0.20	18.14	2.27	0.14	11.2	16.0	1.4
92	{H}-DCLGFMRKCIPDNDQCCRPNLVCSRTHKWCKYVF-{酰胺}	[Gln15]GpTx-1(1-34)	0.13	7.60	2.42	0.12	19.3	20.9	1.1
312	{H}-DCLGFMRKCIPDND[SDMA]CCRPNLVCSRTHKWCKYVF-{酰胺}	[SDMA15]GpTx-1(1-34)	0.14	9.67	1.96	0.15	14.0	13.0	0.9
313	{H}-DCLGFMRKCIPDND[K(Me2)]CCRPNLVCSRTHKWCKYVF-{酰胺}	[K(Me2)15]GpTx-1(1-34)	0.19	10.13	4.75	0.13	24.4	36.6	1.5
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0929]

表 18. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 在第 18 或 19 位的取代。

SEQ ID NO.	氨基酸序列	命名	IWQ使用 Nav1.7 (μM)	IWQ使用 Nav1.5 (μM)	IWQ使用 Nav1.4 (μM)	IWQ使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.7	Nav1.7/ Nav1.3
148	{H}-DCLGFMRKCIPDNDKCCEPNLVCSRTHKWCKYVF-{酰胺}	[Glu18]GpTx-1 (1-34)	0.22	14.60	4.95	0.21	22.8	23.7	1.0
49	{H}-DCLGFMRKCIPDNDKCCKPNLVCSRTHKWCKYVF-{酰胺}	[Lys18]GpTx-1(1-34)	0.30	17.56	3.78	0.21	12.5	18.1	1.4
174	{H}-DCLGFMRKCIPDNDKCCWPNLVCSRTHKWCKYVF-{酰胺}	[Trp18]GpTx-1(1-34)	0.19	14.73	8.66	0.08	46.6	108.0	2.3
116	{H}-DCLGFMRKCIPDNDKCC[Cit]PNLVCSRTHKWCKYVF-{ 酰胺}	[Cit18]GpTx-1(1-34)	0.17	11.00	5.24	0.23	30.2	23.1	0.8
314	{H}-DCLGFMRKCIPDNDKCC[K(Me2)]PNLVCSRTHKWCKYVF-{酰胺}	[K(Me2)18]Gp Tx-1(1-34)	0.21	6.55	6.70	0.08	31.8	82.8	2.6
315	{H}-DCLGFMRKCIPDNDKCC[SDMA]PNLVCSRTHKWCKYVF-{酰胺}	[SDMA18]GpT x-1(1-34)	0.14	10.48	3.41	0.10	25.1	32.8	1.3
316	{H}-DCLGFMRKCIPDNDKCC[2PAL]PNLVCSRTHKWCKYVF-{酰胺}	[2PAL18]GpTx -1(1-34)	0.19	9.17	9.85	0.06	51.9	167.0	3.2
50	{H}-DCLGFMRKCIPDNDKCCRKNLVCSRTHKWCKYVF-{酰胺}	[Lys19]GpTx-1(1-34)	0.12	10.63	4.29	0.18	36.2	24.2	0.7
157	{H}-DCLGFMRKCIPDNDKCCRRNLVCSRTHKWCKYVF-{酰胺}	[Arg19]GpTx-1 (1-34)	0.07	6.16	1.42	0.06	21.0	23.4	1.1
181	{H}-DCLGFMRKCIPDNDKCCRSNLVCSRTHKWCKYVF-{酰胺}	[Ser19]GpTx-1(1-34)	0.088	11.392	3.107	0.031	35.5	101.2	2.9
93	{H}-DCLGFMRKCIPDNDKCCRSSNLVCSRTHKWCKYVF-{ 酰胺}	[Ser-Ser19]GpT x-1(1-34)	0.27	13.92	6.67	0.32	24.3	20.6	0.8
126	{H}-DCLGFMRKCIPDNDKCCRGNLVCSRTHKWCKYVF-{酰胺}	[Gly19]GpTx-1 (1-34)	0.10	11.92	1.82	0.11	18.6	17.2	0.9
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0930]

表 19. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 在第 20 或 21 位的取代。

SEQ ID NO.	氨基酸序列	命名	IWQ使用 Nav1.7 (μM)	IWQ使用 Nav1.5 (μM)	IWQ使用 Nav1.4 (μM)	IWQ使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
7	{H}-DCLGFMRKCIPDNDKCCRPALVCSRTHKWCKYVF-{ 酰胺}	[Ala20]GpTx-1(1-34)	0.69	19.53	7.13	0.41	10.4	17.5	1.7
149	{H}-DCLGFMRKCIPDNDKCCRPELVCSRTHKWCKYVF-{ 酰胺}	[Glu20]GpTx-1(1-34)	1.42	7.49	20.92	1.02	14.7	20.6	1.4
51	{H}-DCLGFMRKCIPDNDKCCRPKLVCSRTHKWCKYVF-{ 酰胺}	[Lys20]GpTx-1(1-34)	0.61	18.96	3.72	0.33	6.1	11.4	1.9
69	{H}-DCLGFMRKCIPDNDKCCRPRLVCSRTHKWCKYVF-{ 酰胺}	[Arg20]GpTx-1(1-34)	0.17	14.91	1.42	0.08	8.5	17.8	2.1
175	{H}-DCLGFMRKCIPDNDKCCRPWLVCSRTHKWCKYVF-{ 酰胺}	[Trp20]GpTx-1(1-34)	0.05	7.39	0.85	0.02	16.7	37.6	2.3
164	{H}-DCLGFMRKCIPDNDKCCRP[1-Nal]LVCSRTHKWCKYVF-{酰胺}	[1-Nal20]GpTx-1(1-34)	0.07	7.36	0.42	0.06	5.7	6.4	1.1
200	{H}-DCLGFMRKCIPDNDKCCRPYLVCSRTHKWCKYVF-{ 酰胺}	[Tyr20]GpTx-1(1-34)	0.116	9.054	1.145	0.055	9.8	20.8	2.1
198	{H}-DCLGFMRKCIPDNDKCCRPGLVCSRTHKWCKYVF-{ 酰胺}	[Gly20]GpTx-1(1-34)	0.229	9.754	2.629	0.126	11.5	20.9	1.8
199	{H}-DCLGFMRKCIPDNDKCCRPFLVCSRTHKWCKYVF-{ 酰胺}	[Phe20]GpTx-1(1-34)	0.154	10.787	1.837	0.067	12.0	27.4	2.3
176	{H}-DCLGFMRKCIPDNDKCCRPNWVCSRTHKWCKYVF-{酰胺}	[Trp21]GpTx-1(1-34)	0.10	13.75	2.65	0.05	26.8	48.6	1.8
165	{H}-DCLGFMRKCIPDNDKCCRPN[1-Nal]VCSRTHKWCKYVF-{酰胺}	[1-Nal21]GpTx-1(1-34)	0.08	10.63	3.17	0.09	38.9	35.5	0.9
120	{H}-DCLGFMRKCIPDNDKCCRPNMVCSRTHKWCKYVF-{酰胺}	[Met21]GpTx-1(1-34)	0.14	9.54	1.79	0.09	12.9	19.3	1.5
317	{H}-DCLGFMRKCIPDNDKCCRPN[4CO2-F]VCSRTHKWCKYVF-{酰胺}	[4CO2-F21]GpTx-1(1-34)	3.98	8.90	19.74	3.67	5.0	5.4	1.1

[0931]

318	{H}-DCLGFMRKCIPDNDKCCRPN[2PAL]VCSRTHKWCKYV F-{酰胺}	[2PAL21]GpTx-1(1-34)	0.18	7.52	3.48	0.08	19.8	41.6	2.1
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0932]

表 20. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 在第 22 位的取代。

SEQ ID NO.	氨基酸序列	命名	IWQ使用 Nav1.7 (μM)	IWQ使用 Nav1.5 (μM)	IWQ使用 Nav1.4 (μM)	IWQ使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
8	{H}-DCLGFMRKCIPDNDKCCRPNLACSRTHKWCKYVF-{酰胺}	[Ala22]GpTx-1(1-34)	0.38	20.43	13.76	0.32	36.1	43.2	1.2
102	{H}-DCLGFMRKCIPDNDKCCRPNLECSRTHKWCKYVF-{酰胺}	[Glu22]GpTx-1(1-34)	1.40	20.78	8.31	2.14	6.0	3.9	0.7
52	{H}-DCLGFMRKCIPDNDKCCRPNLKCSRTHKWCKYVF-{酰胺}	[Lys22]GpTx-1(1-34)	0.19	15.03	1.96	0.08	10.4	25.7	2.5
158	{H}-DCLGFMRKCIPDNDKCCRPNLRCSRTHKWCKYVF-{酰胺}	[Arg22]GpTx-1(1-34)	0.06	8.20	0.70	0.03	11.7	24.3	2.1
177	{H}-DCLGFMRKCIPDNDKCCRPNLWCSRTHKWCKYVF-{酰胺}	[Trp22]GpTx-1(1-34)	0.03	8.02	4.23	0.06	137.2	75.1	0.5
319	{H}-DCLGFMRKCIPDNDKCCRPNLFCSRTHKWCKYVF-{酰胺}	[Phe22]GpTx-1(1-34)	0.70	>5	>5	1.02	-	-	0.7
320	{H}-DCLGFMRKCIPDNDKCCRPNLPCSRTHKWCKYVF-{酰胺}	[Pro22]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-
321	{H}-DCLGFMRKCIPDNDKCCRPNLICSRTHKWCKYVF-{酰胺}	[Ile22]GpTx-1(1-34)	0.08	11.51	1.54	0.07	19.3	20.6	1.1
322	{H}-DCLGFMRKCIPDNDKCCRPNLLCSRTHKWCKYVF-{酰胺}	[Leu22]GpTx-1(1-34)	0.09	9.58	0.83	0.07	9.3	11.4	1.2
323	{H}-DCLGFMRKCIPDNDKCCRPNLSCSRTHKWCKYVF-{酰胺}	[Ser22]GpTx-1(1-34)	0.10	4.42	1.44	0.09	14.7	16.1	1.1
324	{H}-DCLGFMRKCIPDNDKCCRPNLGCSRTHKWCKYVF-{酰胺}	[Gly22]GpTx-1(1-34)	0.14	10.86	4.66	0.10	33.5	45.2	1.4
325	{H}-DCLGFMRKCIPDNDKCCRPNLNCSRTHKWCKYVF-{酰胺}	[Asn22]GpTx-1(1-34)	0.24	8.07	1.78	0.09	7.5	19.3	2.6
326	{H}-DCLGFMRKCIPDNDKCCRPNLHCSRTHKWCKYVF-{酰胺}	[His22]GpTx-1(1-34)	0.41	15.64	2.51	0.10	6.0	24.1	4.0
327	{H}-DCLGFMRKCIPDNDKCCRPNLDCSRTHKWCKYVF-{酰胺}	[Asp22]GpTx-1(1-34)	1.50	13.26	7.31	0.63	4.9	11.7	2.4
328	{H}-DCLGFMRKCIPDNDKCCRPNL[NMePhe]CSRTHKWCKYVF-{酰胺}	[NMePhe22]GpTx-1(1-34)	20.60	20.39	18.40	7.37	0.9	2.5	2.8
329	{H}-DCLGFMRKCIPDNDKCCRPNLTCSRTHKWCKYVF-{酰胺}	[Thr22]GpTx-1(1-	0.12	4.59	1.38	0.08	11.3	18.2	1.6

[0933]

330	{H}-DCLGFMRKCIPDNDKCCRPNL[Phg]CSRTHKWCKYVF-{酰胺}	[Phg22]GpTx-1(1-34)	0.18	4.69	1.82	0.07	10.0	25.0		2.5
331	{H}-DCLGFMRKCIPDNDKCCRPNLYCSRTHKWCKYVF-{酰胺}	[Tyr22]GpTx-1(1-34)	0.56	4.26	7.91	0.50	14.1	15.9		1.1
332	{H}-DCLGFMRKCIPDNDKCCRPNLMCSRTHKWCKYVF-{酰胺}	[Met22]GpTx-1(1-34)	0.09	4.61	0.43	0.08	4.9	5.5		1.1
333	{H}-DCLGFMRKCIPDNDKCCRPNL[4CO2-F]CSRTHKWCKYVF-{酰胺}	[4CO2-F22]GpTx-1(1-34)	5.77	7.50	22.51	4.47	3.9	5.0		1.3
334	{H}-DCLGFMRKCIPDNDKCCRPNL[2PAL]CSRTHKWCKYVF-{酰胺}	[2PAL22]GpTx-1(1-34)	0.33	10.96	6.80	0.14	20.5	49.4		2.4
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8		0.9

[0934]

表 21. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 在第 24 或 25 位的取代。

SEQ ID NO.	氨基酸序列	命名	IWQ使用 Nav1.7 (μM)	IWQ使用 Nav1.5 (μM)	IWQ使用 Nav1.4 (μM)	IWQ使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
142	{H}-DCLGFMRKCIPDNDKCCRPNLVCARTHKWCKYVF-{酰胺}	[Ala24]GpTx-1(1-34)	0.47	8.20	1.93	0.25	4.1	7.8	1.9
150	{H}-DCLGFMRKCIPDNDKCCRPNLVCERTHKWCKYVF-{酰胺}	[Glu24]GpTx-1(1-34)	6.12	11.48	23.12	6.78	3.8	3.4	0.9
9	{H}-DCLGFMRKCIPDNDKCCRPNLVCSATHKWCKYVF-{酰胺}	[Ala25]GpTx-1(1-34)	0.30	18.78	6.19	0.84	20.8	7.3	0.4
151	{H}-DCLGFMRKCIPDNDKCCRPNLVCSETHKWCKYVF-{酰胺}	[Glu25]GpTx-1(1-34)	0.71	13.99	16.27	1.17	22.8	13.9	0.6
53	{H}-DCLGFMRKCIPDNDKCCRPNLVCSKTHKWCKYVF-{酰胺}	[Lys25]GpTx-1(1-34)	0.38	15.21	3.89	0.24	10.4	16.2	1.6
117	{H}-DCLGFMRKCIPDNDKCCRPNLVCS[Cit]THKWCKYVF-{酰胺}	[Cit25]GpTx-1(1-34)	0.32	8.87	10.49	0.51	32.3	20.6	0.6
335	{H}-DCLGFMRKCIPDNDKCCRPNLVCS[K(Me2)]THKWCKYVF-{酰胺}	[K(Me2)25]GpTx-1(1-34)	0.31	7.93	13.57	0.11	43.2	126.4	2.9
336	{H}-DCLGFMRKCIPDNDKCCRPNLVCS[SDMA]THKWCKYVF-{酰胺}	[SDMA25]GpTx-1(1-34)	0.14	9.22	2.68	0.11	19.8	23.5	1.2
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0935]

表 22. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 在第 26 位的取代。

SEQ ID NO.	氨基酸序列	命名	IWQ 使用 Nav1.7 (μM)	IWQ 使用 Nav1.5 (μM)	IWQ 使用 Nav1.4 (μM)	IWQ 使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
10	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRAHKWCKYVF-{酰胺}	[Ala26]GpTx-1(1-34)	0.25	10.45	3.16	0.17	12.5	18.2	1.5
152	{H}-DCLGFMRKCIPDNDKCCRPNLVCSREHKWCKYVF-{酰胺}	[Glu26]GpTx-1(1-34)	0.68	17.15	23.59	0.71	34.5	33.5	1.0
54	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRKHKWCKYVF-{酰胺}	[Lys26]GpTx-1(1-34)	0.05	7.96	0.75	0.02	14.5	43.0	3.0
70	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRRHKWCKYVF-{酰胺}	[Arg26]GpTx-1(1-34)	0.03	3.06	0.53	0.008	15.5	68.3	4.4
178	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRWHKWCKYVF-{酰胺}	[Trp26]GpTx-1(1-34)	0.03	5.84	0.63	0.02	19.7	27.4	1.4
94	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRKTKWCKYVF-{酰胺}	[Lys26;Thr27]GpTx-1(1-34)	0.10	9.29	3.52	0.05	36.2	65.7	1.8
121	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKWCKYVF-{酰胺}	[Leu26]GpTx-1(1-34)	0.07	10.20	3.45	0.07	51.9	46.8	0.9
337	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRHHKWCKYVF-{酰胺}	[His26]GpTx-1(1-34)	0.10	4.52	10.31	0.08	100.6	124.4	1.2
338	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRSHKWCKYVF-{酰胺}	[Ser26]GpTx-1(1-34)	0.10	12.32	1.12	0.09	11.2	12.9	1.2
339	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRQHKWCKYVF-{酰胺}	[Gln26]GpTx-1(1-34)	0.14	17.95	1.90	0.09	13.2	21.5	1.6
340	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRYHKWCKYVF-{酰胺}	[Tyr26]GpTx-1(1-34)	0.08	5.51	1.24	0.06	16.2	19.7	1.2
341	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRFHKWCKYVF-{酰胺}	[Phe26]GpTx-1(1-34)	0.08	5.88	1.47	0.10	18.8	15.2	0.8
342	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRNHKWCKYVF-{酰胺}	[Asn26]GpTx-1(1-34)	0.09	6.29	1.08	0.10	11.6	10.9	0.9
343	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRGHKWCKYVF-{酰胺}	[Gly26]GpTx-1(1-34)	0.10	4.07	0.99	0.09	10.1	11.1	1.1
344	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRVHKWCKYVF-{酰胺}	[Val26]GpTx-1(1-34)	0.06	8.93	1.57	0.04	24.9	37.9	1.5

[0936]

345	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRPHKWCKYVF-{酰胺}	[Pro26]GpTx-1(1-34)	0.18	6.65	1.78	0.16	9.7	11.5	1.2
346	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRMHKWCKYVF-{酰胺}	[Met26]GpTx-1(1-34)	0.04	4.24	1.28	0.02	31.8	73.1	2.3
347	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRDHKWCKYVF-{酰胺}	[Asp26]GpTx-1(1-34)	0.96	14.12	5.38	0.64	5.6	8.4	1.5
348	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRIHKWCKYVF-{酰胺}	[Ile26]GpTx-1(1-34)	0.05	8.15	2.05	0.03	42.2	58.8	1.4
349	{H}-DCLGFMRKCIPDNDKCCRPNLVCSR[2PAL]HKWCKYVF-{酰胺}	[2PAL26]GpTx-1(1-34)	0.26	10.60	5.14	0.06	19.6	86.3	4.4
350	{H}-DCLGFMRKCIPDNDKCCRPNLVCSR[4CO2-F]HKWCKYVF-{酰胺}	[4CO2-F26]GpTx-1(1-34)	0.40	6.46	18.59	2.62	46.3	7.1	0.2
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0937]

表 23. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 在第 27 或 28 位的取代。

SEQ ID NO.	氨基酸序列	命名	IWQ 使用 Nav1.7 (μM)	IWQ 使用 Nav1.5 (μM)	IWQ 使用 Nav1.4 (μM)	IWQ 使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
11	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTAKWCKYVF-{酰胺}	[Ala27]GpTx-1 (1-34)	0.95	14.71	3.94	1.15	4.1	3.4	0.8
29	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTEKWCKYVF-{酰胺}	[Glu27]GpTx-1 (1-34)	8.54	15.16	21.40	12.26	2.5	1.7	0.7
55	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTKKWCKYVF-{酰胺}	[Lys27]GpTx-1 (1-34)	1.51	11.53	6.16	2.48	4.1	2.5	0.6
71	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTRKWCKYVF-{酰胺}	[Arg27]GpTx-1 (1-34)	0.51	5.22	2.61	0.51	5.2	5.1	1.0
84	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTWKWCKYVF-{酰胺}	[Trp27]GpTx-1 (1-34)	0.32	5.59	2.57	0.59	8.0	4.4	0.5
166	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[1-Nal]KWCKYVF-{酰胺}	[1-Nal27]GpTx-1(1-34)	0.30	0.88	0.62	0.43	2.0	1.5	0.7
109	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTFKWCKYVF-{酰胺}	[Phe27]GpTx-1 (1-34)	0.22	2.06	2.92	0.53	13.2	5.5	0.4
110	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTYKWCKYVF-{酰胺}	[Tyr27]GpTx-1(1-34)	0.19	6.39	5.78	0.31	29.9	18.4	0.6
111	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTLKWCKYVF-{酰胺}	[Leu27]GpTx-1 (1-34)	1.15	6.19	9.04	1.01	7.9	8.9	1.1
351	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[4CO2-F]KWCKYVF-{酰胺}	[4CO2-F27]GpTx-1(1-34)	15.44	6.65	19.35	8.41	1.3	2.3	1.8

[0938]

352	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[2PAL]KWCK YVF-{酰胺}	[2PAL27]GpTx-1(1-34)	0.09	7.82	2.93	0.05	33.5	61.4	1.8
353	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[SDMA]KWC KYVF-{酰胺}	[SDMA27]GpTx-1(1-34)	2.00	8.32	9.84	2.42	4.9	4.1	0.8
354	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRT[K(Me2)]KW CKYVF-{酰胺}	[K(Me2)27]GpTx-1(1-34)	7.00	12.39	11.94	3.82	1.7	3.1	1.8
12	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHAWCKYVF-{酰胺}	[Ala28]GpTx-1(1-34)	0.36	17.34	6.86	0.66	19.2	10.4	0.5
153	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Glu28]GpTx-1(1-34)	0.34	14.07	13.93	0.80	41.4	17.5	0.4
72	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRWCKYVF-{酰胺}	[Arg28]GpTx-1(1-34)	0.08	8.95	7.55	0.13	93.8	58.1	0.6
355	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTH[K(Me2)]W CKYVF-{酰胺}	[K(Me2)28]GpTx-1(1-34)	0.27	8.73	14.42	0.19	54.4	76.5	1.4
356	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTH[SDMA]WC KYVF-{酰胺}	[SDMA28]GpTx-1(1-34)	0.18	9.52	5.01	0.23	28.1	22.1	0.8
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF -{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0939]

表 24. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 在第 29 位的取代。

SEQ ID NO.	氨基酸序列	命名	IWQ 使用 Nav1.7 (μM)	IWQ 使用 Nav1.5 (μM)	IWQ 使用 Nav1.4 (μM)	IWQ 使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
47	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKACKYVF-{酰胺}	[Ala29]GpTx-1(1-34)	11.74	16.17	4.49	27.50	0.4	0.2	0.4
30	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKECKYVF-{酰胺}	[Glu29]GpTx-1(1-34)	18.06	18.91	23.53	16.05	1.3	1.5	1.1
56	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKKCKYVF-{酰胺}	[Lys29]GpTx-1(1-34)	20.10	14.74	27.34	24.53	1.4	1.1	0.8
104	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKRCKYVF-{酰胺}	[Arg29]GpTx-1(1-34)	9.73	18.76	7.35	11.39	0.8	0.6	0.9
79	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[1-Nal]CKYVF-{酰胺}	[1-Nal29]GpTx-1(1-34)	0.46	9.25	16.23	1.55	35.1	10.5	0.3
113	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKYCKYVF-{酰胺}	[Tyr29]GpTx-1(1-34)	1.46	9.49	9.52	4.03	6.5	2.4	0.4
114	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKLCKYVF-{酰胺}	[Leu29]GpTx-1(1-34)	6.99	7.27	23.17	9.80	3.3	2.4	0.7
112	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKFCKYVF-{酰胺}	[Phe29]GpTx-1(1-34)	2.18	6.21	15.19	4.82	7.0	3.1	0.5
129	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[2-Nal]CKYVF-{酰胺}	[2-Nal29]GpTx-1(1-34)	0.58	11.67	9.46	0.73	16.2	12.9	0.8
357	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[NMeTrp]CKYVF-{酰胺}	[NMeTrp29]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-
358	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[pI-Phe]CKYVF-{酰胺}	[pI-Phe29]GpTx-1(1-34)	1.01	14.90	12.98	1.27	12.9	10.2	0.8
359	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[NMePhe]CKYVF-{酰胺}	[NMePhe29]GpTx-1(1-34)	19.15	18.84	15.35	7.39	0.8	2.1	2.6
360	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[Bip]CKYVF-{ 酰胺}	[Bip29]GpTx-1(1-34)	4.79	9.77	19.69	6.95	4.1	2.8	0.7
361	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[1'NMeW]CKYVF-{酰胺}	[1'NMeW29]GpTx-1(1-34)	3.89	12.24	7.04	4.58	1.8	1.5	0.9
362	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[Phg]CKYVF-{ 酰	[Phg29]GpTx	5.52	7.85	16.33	3.18	3.0	5.1	1.7

[0940]

	胺}	-1(1-34)							
363	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHK[4CO2-F]CKYVF-{酰胺}	[4CO2-F29]GpTx-1(1-34)	15.03	18.77	19.34	14.94	1.3	1.3	1.0
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0941]

表 25. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 在第 31 或 32 位的取代。

SEQ ID NO.	氨基酸序列	命名	IWQ 使用 Nav1.7 (μM)	IWQ 使用 Nav1.5 (μM)	IWQ 使用 Nav1.4 (μM)	IWQ 使用 Nav1.3 (μM)	Nav1.4/Nav1.7	Nav1.4/Nav1.3	Nav1.7/Nav1.3
13	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCAYVF-{ 酰胺}	[Ala31]GpTx-1(1-34)	7.94	14.54	5.96	7.39	0.7	0.8	1.1
31	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCEYVF-{ 酰胺}	[Glu31]GpTx-1(1-34)	22.96	21.69	20.41	13.06	0.9	1.6	1.8
73	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCRYVF-{ 酰胺}	[Arg31]GpTx-1(1-34)	1.36	9.17	7.14	4.95	5.2	1.4	0.3
179	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCWYVF-{ 酰胺}	[Trp31]GpTx-1(1-34)	23.61	10.84	21.31	10.17	0.9	2.1	2.3
364	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWC[2PAL]YVF-{酰胺}	[2PAL31]GpTx-1(1-34)	10.95	9.49	21.73	16.93	2.0	1.3	0.6
365	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWC[SDMA]YVF-{酰胺}	[SDMA31]GpTx-1(1-34)	4.15	14.21	10.75	4.55	2.6	2.4	0.9
14	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKAVF-{ 酰胺}	[Ala32]GpTx-1(1-34)	0.80	20.61	5.96	0.77	7.5	7.8	1.0
32	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKEVF-{ 酰胺}	[Glu32]GpTx-1(1-34)	13.95	22.80	22.80	9.14	1.6	2.5	1.5
57	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKKVF-{ 酰胺}	[Lys32]GpTx-1(1-34)	4.96	10.89	15.71	4.19	3.2	3.8	1.2
159	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKRVF-{ 酰胺}	[Arg32]GpTx-1(1-34)	1.02	8.65	18.71	0.87	18.4	21.5	1.2
85	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKWVF-{ 酰胺}	[Trp32]GpTx-1(1-34)	0.09	6.74	4.99	0.16	53.5	31.3	0.6
167	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[1-Nal]VF-{酰胺}	[1-Nal32]GpTx-1(1-34)	0.004	3.96	0.15	0.001	36.0	135.0	3.8
246	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[1'NMeW] VF-{酰胺}	[1'NMeW32]GpTx-1(1-34)	0.06	14.44	21.36	0.03	372.6	806.3	2.2
366	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKQVF-{ 酰胺}	[Gln32]GpTx-1(1-34)	4.87	21.01	12.08	2.39	2.5	5.1	2.0

[0942]

367	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKIVF-{酰胺}	[Ile32]GpTx-1(1-34)	0.07	8.71	1.33	0.06	19.9	23.0	1.2
368	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKMVF-{酰胺}	[Met32]GpTx-1(1-34)	0.35	6.21	5.99	0.14	17.1	42.9	2.5
369	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKTVF-{酰胺}	[Thr32]GpTx-1(1-34)	3.54	11.05	11.19	3.29	3.2	3.4	1.1
370	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[NMePhe]VF-{酰胺}	[NMePhe32]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-
371	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[NMeTrp]VF-{酰胺}	[NMeTrp32]GpTx-1(1-34)	4.88	>5	>5	>5	-	-	-
372	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKVVF-{酰胺}	[Val32]GpTx-1(1-34)	0.15	14.81	1.59	0.08	10.7	19.5	1.8
373	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK1VF-{酰胺}	[Leu32]GpTx-1(1-34)	0.12	8.83	1.19	0.08	10.0	14.1	1.4
374	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[Phg]VF-{酰胺}	[Phg32]GpTx-1(1-34)	0.14	7.06	1.80	0.10	13.2	18.9	1.4
375	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[Cha]VF-{酰胺}	[Cha32]GpTx-1(1-34)	0.05	8.88	0.39	0.02	8.0	16.7	2.1
376	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[Bip]VF-{酰胺}	[Bip32]GpTx-1(1-34)	0.03	2.90	0.19	0.00	7.0	68.6	9.8
377	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKFVF-{酰胺}	[Phe32]GpTx-1(1-34)	0.05	6.84	0.67	0.05	12.3	13.7	1.1
378	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKGVF-{酰胺}	[Gly32]GpTx-1(1-34)	0.71	11.18	7.97	0.62	11.3	12.8	1.1
379	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKNVF-{酰胺}	[Asn32]GpTx-1(1-34)	4.86	10.56	8.40	6.85	1.7	1.2	0.7
380	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKHVF-{酰胺}	[His32]GpTx-1(1-34)	0.60	10.16	7.18	0.75	11.9	9.6	0.8
381	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[pI-Phe]VF-{酰胺}	[pI-Phe32]GpTx-1(1-34)	0.03	4.44	0.30	0.01	11.7	49.6	4.3
382	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKSVF-{酰胺}	[Ser32]GpTx-1(1-34)	3.95	>5	>5	1.47	-	-	2.7
383	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKPVF-{酰胺}	[Pro32]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-

[0943]

384	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[2PAL]VF-{酰胺}	[2PAL32]GpTx-1(1-34)	0.81	7.65	19.08	0.66	23.4	28.8	1.2
385	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK[4CO2-F]VF-{酰胺}	[4CO2-F32]GpTx-1(1-34)	11.42	7.70	19.26	4.05	1.7	4.8	2.8
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0944]

表 26. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 在第 33 位的取代。

SEQ ID NO.	氨基酸序列	命名	IWQ 使用 Nav1.7 (μM)	IWQ 使用 Nav1.5 (μM)	IWQ 使用 Nav1.4 (μM)	IWQ 使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
15	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYAF-{酰胺}	[Ala33]GpTx-1(1-34)	0.33	18.60	4.40	0.35	13.5	12.5	0.9
33	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYEF-{酰胺}	[Glu33]GpTx-1(1-34)	0.56	11.48	10.26	0.39	18.4	26.3	1.4
58	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYKF-{酰胺}	[Lys33]GpTx-1(1-34)	0.07	9.56	1.28	0.07	18.6	19.3	1.0
74	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYRF-{酰胺}	[Arg33]GpTx-1(1-34)	0.08	9.55	2.11	0.05	26.7	40.0	1.5
180	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYWF-{酰胺}	[Trp33]GpTx-1(1-34)	0.05	9.06	0.63	0.009	12.0	70.3	5.9
168	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[1-Nal]F-{酰胺}	[1-Nal33]GpTx-1(1-34)	0.06	15.74	0.57	0.02	9.2	26.7	2.9
95	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYQF-{酰胺}	[Gln33]GpTx-1(1-34)	0.12	10.59	9.56	0.11	81.2	85.7	1.1
248	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYIF-{酰胺}	[Ile33]GpTx-1(1-34)	0.15	6.89	21.63	0.09	142.1	238.9	1.7
249	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[pI-Phe]F-{酰胺}	[pI-Phe33]GpTx-1(1-34)	0.09	7.78	11.54	0.06	127.3	192.9	1.5
250	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[1'NMeW]F-{酰胺}	[1'NMeW33]GpTx-1(1-34)	0.09	5.35	7.87	0.07	88.9	120.1	1.4
386	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[Cha]F-{酰胺}	[Cha33]GpTx-1(1-34)	0.07	12.18	1.12	0.07	15.4	15.5	1.0
388	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[NMePhe]F-{酰胺}	[NMePhe33]GpTx-1(1-34)	1.28	>5	4.91	1.09	3.8	4.5	1.2

[0945]

389	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[NMeTrp]F-{酰胺}	[NMeTrp33]GpTx-1(1-34)	0.35	>5	1.55	0.29	4.5	5.4	1.2
390	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYFF-{酰胺}	[Phe33]GpTx-1(1-34)	0.06	8.66	0.74	0.04	12.7	18.5	1.5
391	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYMF-{酰胺}	[Met33]GpTx-1(1-34)	0.07	15.06	1.54	0.08	20.8	20.3	1.0
392	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYHF-{酰胺}	[His33]GpTx-1(1-34)	0.02	8.16	0.32	0.01	19.6	33.2	1.7
393	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[Phg]F-{酰胺}	[Phg33]GpTx-1(1-34)	0.02	7.63	0.50	0.04	22.9	13.1	0.6
394	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYNF-{酰胺}	[Asn33]GpTx-1(1-34)	0.36	7.94	1.22	0.07	3.4	16.3	4.8
395	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYDF-{酰胺}	[Asp33]GpTx-1(1-34)	0.77	8.79	3.87	0.17	5.0	22.4	4.4
396	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYTF-{酰胺}	[Thr33]GpTx-1(1-34)	0.02	3.78	1.29	0.04	70.8	28.9	0.4
397	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYSF-{酰胺}	[Ser33]GpTx-1(1-34)	0.04	6.28	1.14	0.06	26.0	19.0	0.7
398	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYPF-{酰胺}	[Pro33]GpTx-1(1-34)	5.19	6.93	6.87	3.34	1.3	2.1	1.6
399	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYYF-{酰胺}	[Tyr33]GpTx-1(1-34)	0.07	>5	2.03	0.03	30.3	69.4	2.3
400	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYLF-{酰胺}	[Leu33]GpTx-1(1-34)	0.13	>5	0.82	0.07	6.3	11.3	1.8
401	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYGF-{酰胺}	[Gly33]GpTx-1(1-34)	0.29	>5	1.62	0.04	5.6	40.0	7.1
402	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[2PAL]F-{酰胺}	[2PAL33]GpTx-1(1-34)	0.12	8.36	11.61	0.16	98.2	72.3	0.7
403	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY[4CO2-F]F-{酰胺}	[4CO2-F33]GpTx-1(1-34)	0.16	9.06	9.23	0.31	59.1	29.8	0.5
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0946]

表 27. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 在第 34 位的取代。

SEQ ID NO.	氨基酸序列	命名	IWQ 使用 Nav1.7 (μM)	IWQ 使用 Nav1.5 (μM)	IWQ 使用 Nav1.4 (μM)	IWQ 使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
101	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVA-{ 酰胺}	[Ala34]GpTx-1(1-34)	7.19	9.33	16.41	4.76	2.3	3.5	1.5
34	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVE-{ 酰胺}	[Glu34]GpTx-1(1-34)	16.98	16.76	16.97	11.17	1.0	1.5	1.5
59	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVK-{ 酰胺}	[Lys34]GpTx-1(1-34)	5.68	18.06	20.19	7.74	3.6	2.6	0.7
75	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVR-{ 酰胺}	[Arg34]GpTx-1(1-34)	3.58	8.99	22.67	4.69	6.3	4.8	0.8
86	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVW-{ 酰胺}	[Trp34]GpTx-1(1-34)	0.26	10.02	6.70	0.18	25.7	36.3	1.4
80	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{酰胺}	[1-Nal34]GpTx-1(1-34)	0.02	10.24	0.94	0.03	40.9	31.5	0.8
96	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVI-{ 酰胺}	[Ile34]GpTx-1 (1-34)	0.28	10.79	5.33	0.28	18.8	19.0	1.0
122	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVL-{ 酰胺}	[Leu34]GpTx-1(1-34)	0.24	8.46	3.31	0.13	13.5	25.4	1.9
130	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[2-Nal]-{酰胺}	[2-Nal34]GpTx-1(1-34)	0.04	3.59	0.34	0.02	8.7	14.3	1.6
404	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVf-{ 酰胺}	[D-Phe34]GpTx-1(1-34)	0.98	20.72	6.15	0.52	6.3	11.8	1.9
405	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[Cha]-{酰胺}	[Cha34]GpTx-1(1-34)	0.02	5.53	0.63	0.01	26.3	57.7	2.2
406	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[Phg]-{酰胺}	[Phg34]GpTx-1(1-34)	0.04	5.95	0.27	0.02	6.2	11.9	1.9

[0947]

407	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[NMeTrp]-{酰胺}	[NMeTrp34]GpTx-1(1-34)	6.85	10.16	10.29	4.64	1.5	2.2	1.5
408	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[NMePhe]-{酰胺}	[NMePhe34]GpTx-1(1-34)	10.05	18.85	9.29	4.56	0.9	2.0	2.2
409	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[1'NMeW]-{酰胺}	[1'NMeW34]GpTx-1(1-34)	0.09	5.61	1.22	0.07	14.1	18.3	1.3
410	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[4CO2-F]-{酰胺}	[4CO2-F34]GpTx-1(1-34)	9.19	7.11	21.92	6.31	2.4	3.5	1.5
411	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV[2PAL]-{酰胺}	[2PAL34]GpTx-1(1-34)	5.82	8.16	21.31	4.83	3.7	4.4	1.2
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{ 酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0948]

表 28. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 和游离酸在第 35 位的取代和 C 端缺失

SEQ ID NO.	氨基酸序列	命名	IWQ 使用 Nav1.7 (μM)	IWQ 使用 Nav1.5 (μM)	IWQ 使用 Nav1.4 (μM)	IWQ 使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
16	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFA-{酰胺}	GpTx-1(1-34)-Ala	0.41	14.15	7.13	0.26	17.6	27.2	1.5
35	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFE-{酰胺}	GpTx-1(1-34)-Glu	4.47	19.59	21.73	2.47	4.9	8.8	1.8
60	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFK-{酰胺}	GpTx-1(1-34)-Lys	0.59	12.53	7.00	0.21	11.8	32.7	2.8
76	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFR-{酰胺}	GpTx-1(1-34)-Arg	0.30	9.73	5.53	0.10	18.5	56.3	3.0
131	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[2-Nal]-{酰胺}	GpTx-1(1-34)-2-Nal	0.05	2.55	0.44	0.02	9.2	18.2	2.0
87	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFW-{酰胺}	GpTx-1(1-34)-Trp	0.05	7.87	2.69	0.07	55.0	36.0	0.7
133	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVFW-{游离酸}	GpTx-1(1-34)-Trp-游离酸	0.48	8.28	2.15	0.11	4.5	19.9	4.4
412	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[2-Nal]-{酰胺}	GpTx-1(1-34)-2-Nal	0.05	2.55	0.44	0.02	9.2	18.2	2.0
413	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[4CO2-F]-{酰胺}	GpTx-1(1-34)-4CO2-F	1.15	8.65	12.34	5.35	10.7	2.3	0.2
414	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYVF[2PAL]-{酰胺}	GpTx-1(1-34)-2PAL	0.26	9.29	9.78	0.63	38.1	15.5	0.4

[0949]

415	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV-{酰胺}	GpTx-1(1-33)	2.35	10.84	10.61	1.30	4.5	8.1	1.8
416	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKY-{酰胺}	GpTx-1(1-32)	1.50	8.64	11.48	0.88	7.6	13.1	1.7
417	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCK-{酰胺}	GpTx-1(1-31)	18.32	11.88	6.94	9.09	0.4	0.8	2.0
107	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV F-{游离酸}	GpTx-1(1-34)-游离酸	1.98	9.44	6.75	0.54	3.4	12.5	3.7
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKWCKYV F-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9

[0950]

表 29. IonWorks® Quattro 测定的电生理：相对于 SEQ ID NO:1 在多个位置的取代、添加或缺失。

SEQ ID NO.	氨基酸序列	命名	IWQ 使用 Nav1.7 (μM)	IWQ 使用 Nav1.5 (μM)	IWQ 使用 Nav1.4 (μM)	IWQ 使用 Nav1.3 (μM)	Nav1.4/ Nav1.7	Nav1.4/ Nav1.3	Nav1.7/ Nav1.3
2	{H}-dclgfmrkcipdndkccrpnlvcsrthkwckyvf-{酰胺}	[全右旋异构体]GpTx-1(1-34)	7.51	11.27	18.01	21.05	2.4	0.9	0.4
140	{H}-DALGFMRKCIPDNDKCARPNLVCSRTHKW CKYVF-{酰胺}	[Ala2,17]GpTx-1(1-34)	2.45	18.95	15.39	0.79	6.3	19.4	3.1
125	{H}-D[2-Abu]LGFMRKCIPDNDKC[2-Abu]RPNLV CSRTHKWCKYVF-{酰胺}	[2-Abu2,17]GpTx-1(1-34)	0.30	9.51	11.58	0.24	38.9	48.6	1.2
135	{H}-DCLGFMRK[2-Abu]IPDNDKCCRPNLV[2-Abu]SRTHKWCKYVF-{酰胺}	[2-Abu9,23]GpTx-1(1-34)	8.14	9.21	20.81	12.27	2.6	1.7	0.7
139	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKW CKYV[2-Nal]W-{酰胺}	[2-Nal34]GpTx-1(1-34)-Trp	0.11	2.12	0.30	0.05	2.7	6.5	2.4
99	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKW CKKV[1-Nal]W-{酰胺}	[Lys32;1-Nal34]GpTx-1(1-34)-Trp	0.11	9.14	3.19	0.16	28.0	20.3	0.7
136	{H}-DCLG[2-Nal]MRKCIPDNDKCCRPNLVCSRT HKWCKYV[2-Nal]-{酰胺}	[2-Nal5,34]GpTx-1(1-34)	0.14	5.14	0.29	0.03	2.1	10.7	5.1
137	{H}-DCLG[2-Nal]MRKCIPDNDKCCRPNLVCSRT HKWCKYV[1-Nal]-{酰胺}	[2-Nal5;1-Nal34]GpTx-1(1-34)	0.11	3.15	0.24	0.02	2.2	10.4	4.7
134	{H}-DCLGFMRKCIPDNDKCCEGLVCSRTHKWC KYVF-{酰胺}	[Glu18;desAsn20]GpTx-1(1-34)	0.89	11.54	8.95	0.51	10.0	17.7	1.8
138	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKW CKYV[1-Nal]W-{酰胺}	[1-Nal34]GpTx-1(1-34)-Trp	0.13	2.57	0.55	0.07	4.3	7.8	1.8
127	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKW CKKVFW-{酰胺}	[Lys32]GpTx-1(1-34)-Trp	0.73	18.91	8.41	0.70	11.5	12.0	1.0

[0951]

252	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKW CKYWF-{酰胺}	[Ala5;Trp33]GpTx-1(1-34)	0.23	5.00	3.86	0.40	16.7	9.7	0.6
253	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKW CKWVF-{酰胺}	[Ala5;Trp32]GpTx-1(1-34)	0.27	5.00	5.00	0.53	18.6	9.5	0.5
254	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKW CK[1-Nal]VF-{酰胺}	[Ala5;1-Nal32]GpTx-1(1-34)	0.06	5.00	4.43	0.20	77.9	21.6	0.3
255	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRLHKW CKYVF-{酰胺}	[Ala5;Leu26]GpTx-1(1-34)	0.28	5.00	5.00	0.68	17.7	7.4	0.4
256	{H}-DCLGA[1-Nal]RKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[Ala5;1-Nal6]GpTx-1(1-34)	0.10	5.00	1.15	0.06	11.4	19.5	1.7
257	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Ala5;Phe6]GpTx-1(1-34)	0.07	5.00	2.24	0.05	32.0	48.8	1.5
258	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKW CKY[1-Nal]F-{酰胺}	[Ala5;1-Nal33]GpTx-1(1-34)	0.38	5.00	4.83	0.80	12.6	6.0	0.5
259	{H}-DCLGAMRKC[1-Nal]PDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[Ala5;1-Nal10]GpTx-1(1-34)	1.50	5.00	5.00	3.12	3.3	1.6	0.5
260	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHRW CKYVF-{酰胺}	[Ala5;Arg28]GpTx-1(1-34)	0.33	5.00	5.00	0.24	15.2	20.6	1.4
261	{H}-DCLGAWRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Ala5;Trp6]GpTx-1(1-34)	1.01	5.00	5.00	0.67	5.0	7.5	1.5
262	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRLHRW CKYVF-{酰胺}	[Ala5;Phe6;Leu26;Arg28]GpTx-1(1-34)	0.05	5.00	5.00	0.04	110.5	131.1	1.2
263	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRLHKW CKYVF-{酰胺}	[Ala5;Phe6;Leu26]GpTx-1(1-34)	0.08	5.00	5.00	0.05	63.1	105.1	1.7

[0952]

419	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKW CKYEF-{酰胺}	[Ala5;Glu33]GpTx-1(1-34)	4.00	9.04	11.46	3.58	2.9	3.2		1.1
420	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHRW CKY[1-Nal]F-{酰胺}	[Ala5;Arg28;1-Nal33]GpTx-1(1-34)	0.20	7.50	12.77	0.32	62.9	39.9		0.6
421	{H}-DCLGAMRKCIPDNDKCCRP[1-Nal]LVCSRT HKWCKYVF-{酰胺}	[Ala5;1-Nal20]GpTx-1(1-34)	0.16	4.42	0.25	0.25	1.6	1.0		0.6
422	{H}-DCLGAMRKCIPDNDKCCRPWLVCSRTHKW CKYVF-{酰胺}	[Ala5;Trp20]GpTx-1(1-34)	0.28	>5	>5	0.39	-	-		0.7
423	{H}-DCLGAMRKCIPWNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Ala5;Trp12]GpTx-1(1-34)	0.43	>5	>5	1.09	-	-		0.4
424	{H}-DCLWAMRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Trp4;Ala5]GpTx-1(1-34)	0.49	>5	>5	1.17	-	-		0.4
425	{H}-[1-Nal]CLGAMRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[1-Nal1;Ala5]GpTx-1(1-34)	0.50	>5	>5	0.77	-	-		0.6
426	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKW CKYAF-{酰胺}	[Ala5,33]GpTx-1(1-34)	0.58	>5	>5	1.58	-	-		0.4
427	{H}-DCLGAMRKCIPD[1-Nal]DKCCRPNLVCSRT HKWCKYVF-{酰胺}	[Ala5;1-Nal13]GpTx-1(1-34)	0.65	>5	>5	1.18	-	-		0.6
428	{H}-DCLGAMRKCIPDWDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Ala5;Trp13]GpTx-1(1-34)	0.67	>5	>5	1.10	-	-		0.6
429	{H}-DCLEAMRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Glu4;Ala5]GpTx-1(1-34)	4.64	>5	>5	3.99	-	-		1.2
430	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKW CKYVE-{酰胺}	[Ala5;Glu34]GpTx-1(1-34)	>5	>5	>5	>5	-	-		-
431	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKW CKYVA-{酰胺}	[Ala5,34]GpTx-1(1-34)	>5	>5	>5	>5	-	-		-

[0953]

432	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKW CKAVF-{酰胺}	[Ala5,32]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-
433	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKW CAYVF-{酰胺}	[Ala5,31]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-
434	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKA CKYVF-{酰胺}	[Ala5,29]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-
435	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHEW CKYVF-{酰胺}	[Ala5;Glu28]GpTx-1(1-34)	>5	3.66	0.23	>5	-	-	-
436	{H}-DCLGAMEKCIPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Ala5;Glu7]GpTx-I(1-34)	>5	>5	>5	>5	-	-	-
437	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKE CKYVF-{酰胺}	[Ala5;Glu29]GpTx-1(1-34)	11.93	9.26	22.27	6.09	1.9	3.7	2.0
438	{H}-DCLGAMRKCIPDNDKCCRPNLVCSETHKW CKYVF-{酰胺}	[Ala5;Glu25]GpTx-1(1-34)	5.50	18.21	21.08	5.95	3.8	3.5	0.9
439	{H}-DCLGAMRKCIPDNDECCRPNLVCSRTHKW CKYVF-{酰胺}	[Ala5;Glu15]GpTx-1(1-34)	2.41	10.81	20.47	4.80	8.5	4.3	0.5
251	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRW CK[1-Nal]VF-{酰胺}	[Arg28;1-Nal32]GpTx-1(1-34)	0.005	2.56	0.19	0.002	35.9	112.3	3.1
440	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRT HKWCKWVF-{酰胺}	[1-Nal10;Trp32]GpTx-1(1-34)	0.37	>5	4.58	0.26	12.5	17.9	1.4
441	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRT HRWCKYVF-{酰胺}	[1-Nal10;Arg28]GpTx-1(1-34)	0.02	>5	1.29	0.04	52.7	36.4	0.7
442	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRW CKY[1-Nal]F-{酰胺}	[Arg28;1-Nal33]GpTx-1(1-34)	0.03	>5	0.60	0.04	20.2	13.6	0.7

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443	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRW CKWVF-{酰胺}	[Arg28;Trp32]GpTx-1(1-34)	0.07	4.92	2.49	0.07	38.2	35.0	0.9
444	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHRW CKYWF-{酰胺}	[Arg28;Trp33]GpTx-1(1-34)	0.03	>5	0.68	0.04	19.6	18.2	0.9
445	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHRW CKYVF-{酰胺}	[Leu26;Arg28]GpTx-1(1-34)	0.03	>5	>5	0.06	-	-	0.6
446	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKW CKWVF-{酰胺}	[Leu26;Trp32]GpTx-1(1-34)	0.04	>5	2.92	0.06	75.9	51.8	0.7
447	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKW CKYWF-{酰胺}	[Leu26;Trp33]GpTx-1(1-34)	0.03	>5	0.95	0.02	36.7	43.5	1.2
448	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRTHRW CKYVF-{酰胺}	[Trp6;Arg28]GpTx-1(1-34)	0.01	2.91	0.33	0.01	28.7	37.9	1.3
449	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRTHKW CKWVF-{酰胺}	[Trp6,32]GpTx-1(1-34)	0.03	2.93	0.25	0.01	8.6	29.2	3.4
450	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKW CKWWF-{酰胺}	[Trp32,33]GpTx-1(1-34)	0.05	11.50	0.38	0.03	7.1	11.0	1.6
451	{H}-DCLGF[1-Nal]RKCIPDNDKCCRPNLVCSRTH KWCKWVF-{酰胺}	[1-Nal6;Trp32]GpTx-1(1-34)	0.004	>5	2.53	0.02	572.7	161.3	0.3
452	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRT HKWCK[1-Nal]VF-{酰胺}	[1-Nal10,32]GpTx-1(1-34)	0.005	>5	4.51	0.003	956.6	1322.1	1.4
453	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKW CK[1-Nal]VF-{酰胺}	[Leu26;1-Nal32]GpTx-1(1-34)	0.01	>5	1.69	0.01	289.5	161.2	0.6
454	{H}-DCLGF[1-Nal]RKCIPDNDKCCRPNLVCSRTH RWCKYVF-{酰胺}	[1-Nal6;Arg28]GpTx-1(1-34)	0.01	>5	4.42	0.01	732.2	661.7	0.9

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455	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKW CKW[1-Nal]F-{酰胺}	[Trp32;1-Nal33]GpTx-1(1-34)	0.02	>5	>5	0.04	-	-	0.6
456	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRLHKW CKYVF-{酰胺}	[Trp6;Leu26]GpTx-1(1-34)	0.03	>5	2.91	0.01	91.6	228.8	2.5
457	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRL HKWCKYVF-{酰胺}	[1-Nal10;Leu26]GpTx-1(1-34)	0.06	>5	2.53	0.03	44.2	76.0	1.7
458	{H}-DCLGFWRKC[1-Nal]PDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[Trp6;1-Nal10]GpTx-1(1-34)	0.06	>5	>5	0.05	-	-	1.2
459	{H}-DCLGFMRKC[1-Nal]PWNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[1-Nal10;Trp12]GpTx-1(1-34)	0.08	>5	0.70	0.09	8.5	7.8	0.9
460	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKW CK[1-Nal]WF-{酰胺}	[1-Nal32;Trp33]GpTx-1(1-34)	0.08	>5	1.43	0.03	17.1	47.8	2.8
461	{H}-DCLGFWRKCIPDNDKCCRPNLVCSRTHKW CKY[1-Nal]F-{酰胺}	[Trp6;1-Nal33]GpTx-1(1-34)	0.10	>5	1.38	0.05	13.4	28.5	2.1
462	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRT HKWCKY[1-Nal]F-{酰胺}	[1-Nal10,33]GpTx-1(1-34)	0.11	>5	0.88	0.07	8.2	13.0	1.6
463	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRLHKW CKY[1-Nal]F-{酰胺}	[Leu26;1-Nal33]GpTx-1(1-34)	0.13	>5	>5	0.18	-	-	0.7
464	{H}-WDCLGFMRKC[1-Nal]PDNDKCCRPNLVCS RTHKWCKYVF-{酰胺}	Trp-[1-Nal10]GpTx-1(1-34)	0.20	>5	2.61	0.22	13.1	12.0	0.9
465	{H}-WCLGFMRKC[1-Nal]PDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[Trp1;1-Nal10]GpTx-1(1-34)	0.23	>5	1.98	0.15	8.7	13.0	1.5
466	{H}-[1-Nal]CLGFMRKC[1-Nal]PDNDKCCRPNLV CSRTHKWCKYVF-{酰胺}	[1-Nal1,10]GpTx-1(1-34)	0.61	>5	>5	0.43	-	-	1.4

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467	{H}-DCLGFMRKCSPDNDKCCRPNLVCSRKHKW CKYEI-{酰胺}	GpTx-2	4.34	7.21	11.73	1.15	2.7	10.2	3.8
468	{H}-DCLGWFKGCDPDNDKCCEGYKCNRRDKW CKYKL-{酰胺}	GpTx-3	8.93	7.80	20.00	9.37	2.2	2.1	1.0
469	{H}-DCLGWFKGCDPDNDKCCENYKCNRREQW CKYKL-{酰胺}	GpTx-4	9.25	10.38	11.00	4.92	1.2	2.2	1.9
1	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	GpTx-1(1-34)	0.08	13.09	1.93	0.08	24.9	22.8	0.9
471	{H}-DCLGWFKGCDPDNDKCCEGYKCNRRDKW CKYKLWK-{游离酸}	GpTx-6(1-35)	9.6	14.6	17.4	1.7	1.8	10.0	5.5
472	{H}-DCLGWFKGCDPDNDKCCEGYKCNRRDKW CKYKLW-{游离酸}	GpTx-6(1-34)	1.3	7.3	4.1	0.54	3.2	7.6	2.4
593	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTH[Atz(20kDa PEG)]WCKYVF-{酰胺}	[Phe6,Atz(20kDa Peg)28]GpTx-1(1-34)	3.5	15.6	13.4	4.5	3.8	3.0	0.8
594	{H}-DCLGFFRKCIPDNDKCCRPNL[Atz(20kDa PEG)]CSRTHKWCKYVF-{酰胺}	[Phe6,Atz(20kDa Peg)22]GpTx-1(1-34)	3.2	11.0	12.9	5.7	4.0	2.3	0.6
595	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRT HKECKYVF-{酰胺}	[1-Nal10;Glu29]GpTx-1(1-34)	9.8	18.9	11.2	10.8	1.1	1.0	0.9
596	{H}-DCLG[3Pal]MRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[3Pal5]GpTx-1(1-34)	2.6	>5	>5	>5	1.9	1.0	0.5
597	{H}-DCLGAFRKCIPDYDKCCRPNLVCSRTHRWC KYVF-{游离酸}	[Ala5;Phe6;Tyr13;Arg28]GpTx-1(1-34)-游离酸	>5	7.35	>5	1.1	-	-	-
598	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHGW CKYVF-{游离酸}	[Ala5;Leu6;Gly28]GpTx-1(1-34)-游离酸	>5	12.57	>5	4.0	-	-	-
599	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHHW CKYVF-{游离酸}	[Ala5;Leu6;His28]GpTx-1(1-34)-游离酸	>5	12.65	>5	2.2	-	-	-
600	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{游离酸}	[Ala5;Leu6]GpTx-1(1-34)-游离酸	>5	12.63	>5	3.1	-	-	-
601	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHNW CKYVF-{游离酸}	[Ala5;Leu6;Asn28]GpTx-1(1-34)-游离酸	>5	10.02	>5	2.6	-	-	-
602	{H}-DCLGaFRKCIPDNDKCCRPNLVCSRTHKWC KYVF-{酰胺}	[D-Ala5;Phe6]GpTx-1(1-34)	2.1	13.1	8.1	2.7	3.8	3.0	0.8
603	{H}-DCLG[bAla]FRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[bAla5;Phe6]GpTx-1(1-34)	15.3	9.5	9.1	11.8	0.6	0.8	1.3
604	{H}-DCLG[Aib]FRKCIPDNDKCCRPNLVCSRTHK WCKYVF-{酰胺}	[Aib5;Phe6]GpTx-1(1-34)	0.44	6.4	7.9	0.61	17.9	12.8	0.7

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605	{H}-DCLG[2-Abu]FRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[2-Abu5;Phe6]GpTx-1(1-34)	0.17	9.5	5.6	0.36	33.2	15.5	0.5
606	{H}-DCLG[Nva]FRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[Nva5;Phe6]GpTx-1(1-34)	0.084	7.8	2.7	0.17	32.3	16.1	0.5
607	{H}-DCLG[Nle]FRKCIPDNDKCCRPNLVCSRTHK WCKYVF-{酰胺}	[Nle5;Phe6]GpTx-1(1-34)	0.016	11.3	1.0	0.067	64.4	15.1	0.2
608	{H}-DCLG[Octy]G]FRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[Octy]G5;Phe6]GpTx-1(1-34)	11.3	20.2	15.8	21.8	1.4	0.7	0.5
609	{H}-DCLG[Tle]FRKCIPDNDKCCRPNLVCSRTHK WCKYVF-{酰胺}	[Tle5;Phe6]GpTx-1(1-34)	0.081	6.7	4.6	0.26	56.4	17.6	0.3
610	{H}-DCLG[hLeu]FRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[hLeu5;Phe6]GpTx-1(1-34)	0.011	8.2	0.76	0.041	70.1	18.7	0.3
611	{H}-DCLGMFRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Met5;Phe6]GpTx-1(1-34)	0.043	13.3	2.4	0.11	55.7	20.9	0.4
612	{H}-DCLGLFRKCIPDNDKCCRPNLVCSRTHKWC KYVF-{酰胺}	[Leu5;Phe6]GpTx-1(1-34)	0.057	20.1	3.4	0.22	59.8	15.6	0.3
613	{H}-DCLG[3Pal]FRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[3Pal5;Phe6]GpTx-1(1-34)	0.95	18.7	21.6	3.6	22.7	5.9	0.3
614	{H}-DCLG[Thi]FRKCIPDNDKCCRPNLVCSRTHK WCKYVF-{酰胺}	[Thi5;Phe6]GpTx-1(1-34)	0.012	4.1	1.1	0.077	88.3	14.3	0.2
615	{H}-DCLG[Cpg]FRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[Cpg5;Phe6]GpTx-1(1-34)	0.035	5.6	2.0	0.12	55.9	16.7	0.3
616	{H}-DCLG[Chg]FRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[Chg5;Phe6]GpTx-1(1-34)	0.023	6.9	1.2	0.075	54.0	16.6	0.3
617	{H}-DCLGSFRKCIPDNDKCCRPNLVCSRTHKWC KYVF-{酰胺}	[Ser5;Phe6]GpTx-1(1-34)	0.76	11.9	13.9	1.7	18.2	8.0	0.4
618	{H}-DCLGVFRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Val5;Phe6]GpTx-1(1-34)	0.12	9.4	2.3	0.099	19.1	23.3	1.2
619	{H}-DCLG[4-Bz-F]FRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[4-Bz-F5;Phe6]GpTx-1(1-34)	0.14	7.7	0.57	0.042	4.0	13.8	3.4
620	{H}-DCLG[DiMeO-F]FRKCIPDNDKCCRPNLVCS RTHKWCKYVF-{酰胺}	[DiMeO-F5;Phe6]GpTx-1(1-34)	0.64	10.4	10.1	0.99	15.7	10.2	0.6
621	{H}-DCLG[DiCl-F]FRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[DiCl-F5;Phe6]GpTx-1(1-34)	0.048	4.1	0.16	0.005	3.4	29.7	8.8
622	{H}-DCLG[pI-Phe]FRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[pI-Phe5;Phe6]GpTx-1(1-34)	12.3	12.9	22.9	21.0	1.9	1.1	0.6
623	{H}-DCLG[4CF3-F]FRKCIPDNDKCCRPNLVCSR	[4CF3-F5;Phe6]GpTx-1(	0.096	7.1	0.23	0.013	2.3	17.1	7.3

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	THKWCKYVF-{酰胺}	1-34)								
624	{H}-DCLG[4-F-F]FRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[4-F-F5;Phe6]GpTx-1(1-34)	0.060	11.7	0.27	0.020	4.5	13.7		3.1
625	{H}-DCLG[4-Me-F]FRKCIPDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[4-Me-F5;Phe6]GpTx-1(1-34)	0.063	6.5	0.70	0.051	11.1	13.8		1.2
626	{H}-DCLG[4tBu-F]FRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[4tBu-F5;Phe6]GpTx-1(1-34)	0.052	4.7	0.26	0.021	5.0	12.6		2.5
627	{H}-DCLG[NMeVal]FRKCIPDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[NMeVal5;Phe6]GpTx-1(1-34)	0.19	6.0	4.2	0.25	22.6	16.9		0.7
628	{H}-DCLG[NMeLeu]FRKCIPDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[NMeLeu5;Phe6]GpTx-1(1-34)	0.076	8.4	1.4	0.091	17.9	15.0		0.8
629	{H}-DCLG[NMePhe]FRKCIPDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[NMePhe5;Phe6]GpTx-1(1-34)	0.077	13.6	1.3	0.095	17.3	14.0		0.8
630	{H}-DCLG[2-Cl-F]FRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[2-Cl-F5;Phe6]GpTx-1(1-34)	0.060	5.8	0.35	0.009	5.9	38.9		6.6
631	{H}-DCLG[hPhe]FRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[hPhe5;Phe6]GpTx-1(1-34)	0.019	4.9	0.18	0.005	9.4	38.4		4.1
632	{H}-DCLG[Sar]FRKCIPDNDKCCRPNLVCSRTHK WCKYVF-{酰胺}	[Sar5;Phe6]GpTx-1(1-34)	0.68	10.5	7.6	0.45	11.2	17.0		1.5
633	{H}-DCLGaLRKCIPDNDKCCRPNLVCSRTHKWC KYVF-{酰胺}	[D-Ala5;Leu6]GpTx-1(1-34)	10.7	7.1	10.6	11.5	1.0	0.9		0.9
634	{H}-DCLG[bAla]LRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[bAla5;Leu6]GpTx-1(1-34)	9.3	14.1	22.0	18.1	2.4	1.2		0.5
635	{H}-DCLG[Aib]LRKCIPDNDKCCRPNLVCSRTHK WCKYVF-{酰胺}	[Aib5;Leu6]GpTx-1(1-34)	0.23	14.8	14.8	0.38	64.6	39.1		0.6
636	{H}-DCLG[2-Abu]LRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[2-Abu5;Leu6]GpTx-1(1-34)	0.29	16.7	6.8	1.0	23.8	6.7		0.3
637	{H}-DCLG[Nva]LRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[Nva5;Leu6]GpTx-1(1-34)	0.095	8.0	5.1	0.71	53.7	7.2		0.1
638	{H}-DCLG[Nle]LRKCIPDNDKCCRPNLVCSRTHK WCKYVF-{酰胺}	[Nle5;Leu6]GpTx-1(1-34)	0.025	10.6	1.9	0.099	76.6	19.2		0.3
639	{H}-DCLG[OctylG]LRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[OctylG5;Leu6]GpTx-1(1-34)	0.015	1.7	0.11	0.033	7.8	3.5		0.4
640	{H}-DCLGAFRKCIPD[Pra]DKCCRPNLVCSRLHR WCKYVF-{酰胺}	[Ala5,Phe6,Pra13,Leu26,Arg28]GpTx-1(1-34)	0.103	>5	4.9	0.090	47.3	54.6		1.2
641	{H}-DCLGMLRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Met5;Leu6]GpTx-1(1-34)	0.069	>5	4.4	0.24	64.7	18.5		0.3

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642	{H}-DCLG[3Pal]LRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[3Pal5;Leu6]GpTx-1(1-34)	1.7	>5	>5	3.9	-	-	0.4
643	{H}-DCLGSLRKCIPDNDKCCRPNLVCSRTHKWC KYVF-{酰胺}	[Ser5;Leu6]GpTx-1(1-34)	1.3	>5	>5	3.2	-	-	0.4
644	{H}-DCLGVLRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Val5;Leu6]GpTx-1(1-34)	0.15	>5	>5	0.48	-	-	0.3
645	{H}-DCLG[DiMeO-F]LRKCIPDNDKCCRPNLVCS RTHKWCKYVF-{酰胺}	[DiMeO-F5;Leu6]GpTx-1(1-34)	2.4	>5	>5	2.6	-	-	0.9
646	{H}-DCLG[Sar]LRKCIPDNDKCCRPNLVCSRTHK WCKYVF-{酰胺}	[Sar5;Leu6]GpTx-1(1-34)	0.92	>5	>5	1.7	-	-	0.6
647	{H}-DCLGaMRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[D-Ala5]GpTx-1(1-34)	4.5	>5	>5	>5	-	-	-
648	{H}-DCLG[bAla]MRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[bAla5]GpTx-1(1-34)	4.7	>5	>5	>5	-	-	-
649	{H}-DCLG[2-Abu]MRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[2-Abu5]GpTx-1(1-34)	0.69	>5	>5	1.3	-	-	0.5
650	{H}-DCLG[Nva]MRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[Nva5]GpTx-1(1-34)	0.20	>5	>5	0.57	-	-	0.3
651	{H}-DCLG[Nle]MRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[Nle5]GpTx-1(1-34)	0.077	>5	3.0	0.17	39.6	17.6	0.4
652	{H}-DCLG[DiMeO-F]MRKCIPDNDKCCRPNLVC SRTHKWCKYVF-{酰胺}	[DiMeO-F5]GpTx-1(1-34)	2.9	>5	>5	3.6	-	-	0.8
653	{H}-DCLG[DiCl-F]MRKCIPDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[DiCl-F5]GpTx-1(1-34)	0.14	>5	1.2	0.069	8.8	17.7	2.0
654	{H}-DCLG[4CF3-F]MRKCIPDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[4CF3-F5]GpTx-1(1-34)	0.32	>5	1.3	0.072	4.1	18.4	4.4
655	{H}-DCLG[4-F-F]MRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[4-F-F5]GpTx-1(1-34)	0.26	>5	1.9	0.070	7.1	26.6	3.8
656	{H}-DCLG[NMeVal]MRKCIPDNDKCCRPNLVCS RTHKWCKYVF-{酰胺}	[NMeVal5]GpTx-1(1-34)	1.2	>5	>5	2.5	-	-	0.5
657	{H}-DCLG[NMePhe]MRKCIPDNDKCCRPNLVCS RTHKWCKYVF-{酰胺}	[NMePhe5]GpTx-1(1-34)	0.36	>5	>5	0.28	-	-	1.3
658	{H}-DCLG[Sar]MRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[Sar5]GpTx-1(1-34)	1.5	>5	>5	2.0	-	-	0.7
659	{H}-DCLG[Tle]LRKCIPDNDKCCRPNLVCSRTHK WCKYVF-{酰胺}	[Tle5;Leu6]GpTx-1(1-34)	0.26	>5	>5	0.58	-	-	0.4
660	{H}-DCLG[hLeu]LRKCIPDNDKCCRPNLVCSRTH	[hLeu5;Leu6]GpTx-1(1-	0.031	>5	0.80	0.059	25.6	13.6	0.5

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	KWCKYVF-{酰胺}34)								
661	{H}-DCLGLLRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Leu5,6]GpTx-1(1-34)	0.095	>5	3.4	0.32	36.0	10.6	0.3
662	{H}-DCLG[Thi]LRKCIPDNDKCCRPNLVCSRTHK WCKYVF-{酰胺}	[Thi5;Leu6]GpTx-1(1-34)	0.022	>5	0.93	0.068	42.7	13.6	0.3
663	{H}-DCLG[Cpg]LRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[Cpg5;Leu6]GpTx-1(1-34)	0.059	>5	2.2	0.24	36.6	9.1	0.2
664	{H}-DCLG[Chg]LRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[Chg5;Leu6]GpTx-1(1-34)	0.019	>5	1.3	0.11	65.3	11.4	0.2
665	{H}-DCLG[4-Bz-F]LRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[4-Bz-F5;Leu6]GpTx-1(1-34)	0.23	>5	0.57	0.030	2.5	19.1	7.7
666	{H}-DCLG[DiCl-F]LRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[DiCl-F5;Leu6]GpTx-1(1-34)	0.029	4.5	0.32	0.016	10.9	20.2	1.9
667	{H}-DCLG[pI-Phe]LRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[pI-Phe5;Leu6]GpTx-1(1-34)	0.12	>5	0.39	0.017	3.2	23.3	7.3
668	{H}-DCLG[4CF3-F]LRKCIPDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[4CF3-F5;Leu6]GpTx-1(1-34)	0.18	4.4	0.47	0.011	2.6	42.8	16.3
669	{H}-DCLG[4-F-F]LRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[4-F-F5;Leu6]GpTx-1(1-34)	0.091	>5	0.78	0.037	8.6	20.9	2.4
670	{H}-DCLG[4-Me-F]LRKCIPDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[4-Me-F5;Leu6]GpTx-1(1-34)	0.19	>5	0.99	0.055	5.2	17.9	3.4
671	{H}-DCLG[4tBu-F]LRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[4tBu-F5;Leu6]GpTx-1(1-34)	0.14	>5	0.43	0.050	3.1	8.5	2.8
672	{H}-DCLG[NMeVal]LRKCIPDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[NMeVal5;Leu6]GpTx-1(1-34)	0.47	>5	>5	0.75	-	-	0.6
673	{H}-DCLG[NMeLeu]LRKCIPDNDKCCRPNLVCS RTHKWCKYVF-{酰胺}	[NMeLeu5;Leu6]GpTx-1(1-34)	0.17	>5	>5	0.69	-	-	0.2
674	{H}-DCLG[NMePhe]LRKCIPDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[NMePhe5;Leu6]GpTx-1(1-34)	0.24	>5	3.5	0.31	14.3	11.3	0.8
675	{H}-DCLG[2-Cl-F]LRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[2-Cl-F5;Leu6]GpTx-1(1-34)	0.066	>5	0.92	0.072	14.0	12.9	0.9
676	{H}-DCLG[hPhe]LRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[hPhe5;Leu6]GpTx-1(1-34)	0.016	>5	0.90	0.061	56.2	14.6	0.3
677	{H}-DCLG[Octyl G]MRKCIPDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[Octyl G5]GpTx-1(1-34)	0.17	>5	0.89	0.17	5.2	5.1	1.0
678	{H}-DCLG[Tle]MRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[Tle5]GpTx-1(1-34)	0.70	>5	>5	1.36	-	-	0.5

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679	{H}-DCLG[hLeu]MRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[hLeu5]GpTx-1(1-34)	0.086	>5	2.2	0.24	26.0	9.4	0.4
680	{H}-DCLG[Cha]FRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[Cha5;Phe6]GpTx-1(1-34)	0.019	3.5	0.38	0.032	20.1	11.9	0.6
681	{H}-DCLG[Cha]LRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[Cha5;Leu6]GpTx-1(1-34)	0.023	>5	0.86	0.079	37.9	10.9	0.3
682	{H}-DCLG[Thi]MRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[Thi5]GpTx-1(1-34)	0.11	>5	2.8	0.28	26.6	10.3	0.4
683	{H}-DCLG[Cpg]MRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[Cpg5]GpTx-1(1-34)	0.23	>5	>5	0.63	-	-	0.4
684	{H}-DCLG[Chg]MRKCIPDNDKCCRPNLVCSRTH KWCKYVF-{酰胺}	[Chg5]GpTx-1(1-34)	0.13	>5	4.6	0.36	34.1	12.6	0.4
685	{H}-DCLG[4-Bz-F]MRKCIPDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[4-Bz-F5]GpTx-1(1-34)	0.68	>5	3.3	0.15	4.8	21.2	4.4
686	{H}-DCLG[4-Me-F]MRKCIPDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[4-Me-F5]GpTx-1(1-34)	0.49	>5	2.2	0.18	4.5	12.5	2.8
687	{H}-DCLG[4tBu-F]MRKCIPDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[4tBu-F5]GpTx-1(1-34)	0.27	>5	1.2	0.13	4.5	9.4	2.1
688	{H}-DCLG[NMeLeu]MRKCIPDNDKCCRPNLVCS RTHKWCKYVF-{酰胺}	[NMeLeu5]GpTx-1(1-34)	0.29	>5	>5	0.73	-	-	0.4
689	{H}-DCLG[2-Cl-F]MRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[2-Cl-F5]GpTx-1(1-34)	0.13	>5	1.9	0.11	14.2	18.2	1.3
690	{H}-DCLG[hPhe]MRKCIPDNDKCCRPNLVCSRT HKWCKYVF-{酰胺}	[hPhe5]GpTx-1(1-34)	0.090	>5	2.3	0.18	25.8	13.0	0.5
691	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHEW CKYVF-{酰胺}	[Ala5;Glu28]GpTx-1(1-34)	>5	>5	>5	>5	-	-	-
692	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKW CK[1'NMeW]VF-{酰胺}	[Ala5;1'NMeW32]GpTx-1(1-34)	0.18	>5	>5	0.63	-	-	0.3
693	{H}-DCLGMMRKCIPDNDKCCRPNLVCSRTHKW CK[1'NMeW]VF-{酰胺}	[Met5;1'NMeW32]GpTx-1(1-34)	0.046	>5	4.3	0.10	95.0	43.0	0.5
694	{H}-DCLRMMRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Arg4;Met5]GpTx-1(1-34)	0.080	>5	>5	0.29	-	-	0.3
695	{H}-DCLGFMRKCIPDNDKCCRSNLVCSRTHKW CK[1'NMeW]VF-{酰胺}	[Ser19;1'NMeW32]GpTx-1(1-34)	0.030	>5	0.88	0.030	29.1	28.9	1.0
696	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Ala5;Leu6]GpTx-1(1-34)	0.27	>5	>5	0.75	-	-	0.4
697	{H}-DCLGAGRKCIPDNDKCCRPNLVCSRTHKW	[Ala5;Gly6]GpTx-1(1-34	8.1	>5	>5	4.4	-	-	1.8

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	CKYVF-{酰胺}	)							
698	{H}-DCLGAYRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Ala5;Tyr6]GpTx-1(1-34)	4.4	>5	>5	>5	-	-	-
699	{H}-DCLGA[1'NMeW]RKCIPDNDKCCRPNLVCS RTHKWCKYVF-{酰胺}	[Ala5;1'NMeW6]GpTx-1(1-34)	0.34	>5	>5	0.32	-	-	1.1
700	{H}-DCLGAMRKCDPDNDKCCRPNLVCSRTHK WCKYVF-{酰胺}	[Ala5;Asp10]GpTx-1(1-34)	0.74	35	>50	0.84	-	-	0.9
701	{H}-DCLGAMRKCDPENDKCCRPNLVCSRTHK WCKYVF-{酰胺}	[Ala5;Asp10;Glu12]GpTx-1(1-34)	0.97	43	>50	1.5	-	-	0.6
702	{H}-DCLGAFRKCDPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Ala5;Phe6;Asp10]GpTx-1(1-34)	0.72	43	>50	0.37	-	-	1.9
703	{H}-DCLGAFRKCIPENDKCCRPNLVCSRTHKWC KYVF-{酰胺}	[Ala5;Phe6;Glu12]GpTx-1(1-34)	0.61	45	15	0.20	23.9	73.9	3.1
704	{H}-DCLGVMRKCIPDNDKCCRPNLVCSRTHEW CKYVF-{酰胺}	[Val5;Glu28]GpTx-1(1-34)	0.99	49	>50	>5	-	-	-
705	{H}-DCLG[Nva]MRKCIPDNDKCCRPNLVCSRTH EWCKYVF-{酰胺}	[Nva5;Glu28]GpTx-1(1-34)	0.43	33	>50	3.4	-	-	0.1
706	{H}-DCLG[2-Abu]MRKCIPDNDKCCRPNLVCSRT HEWCKYVF-{酰胺}	[2-Abu5;Glu28]GpTx-1(1-34)	1.4	>50	>50	>5	-	-	-
707	{H}-DCLG[2-Abu]LRKCIPDNDKCCRPNLVCSRT HEWCKYVF-{酰胺}	[2-Abu5;Leu6;Glu28]GpTx-1(1-34)	1.2	6	>50	>5	-	-	-
708	{H}-DCLG[Nva]LRKCIPDNDKCCRPNLVCSRTH EWCKYVF-{酰胺}	[Nva5;Leu6;Glu28]GpTx-1(1-34)	0.37	31	>50	2.8	-	-	0.1
709	{H}-DCLGVLRKCIPDNDKCCRPNLVCSRTHEW CKYVF-{酰胺}	[Val5;Leu6;Glu28]GpTx-1(1-34)	0.74	43	>50	4.8	-	-	0.2
710	{H}-DCLGVMRKCDPDNDKCCRPNLVCSRTHK WCKYVF-{酰胺}	[Val5;Asp10]GpTx-1(1-34)	0.69	35	>50	1.3	-	-	0.5
711	{H}-DCLGVMRKCIPENDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Val5;Glu12]GpTx-1(1-34)	0.48	26	>50	0.75	-	-	0.6
712	{H}-DCLGVMRKCDPENDKCCRPNLVCSRTHK WCKYVF-{酰胺}	[Val5;Asp10;Glu12]GpTx-1(1-34)	0.46	34	>50	1.7	-	-	0.3
713	{H}-DCLGVMRKCIPDNDKCCRPNLVCS[Cit]TH KWCKYVF-{酰胺}	[Val5;Cit25]GpTx-1(1-34)	0.83	36	>50	4.2	-	-	0.2
714	{H}-DCLGTMRKCDPDNDKCCRPNLVCSRTHK WCKYVF-{酰胺}	[Thr5;Asp10]GpTx-1(1-34)	1.6	48	>50	>5	-	-	-
715	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHGW CKYVF-{酰胺}	[Ala5;Gly28]GpTx-1(1-34)	1.0	>50	>50	>5	-	-	-

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716	{H}-D[2-Abu]LGAMRKCDPDNDKC[2-Abu]RPNLVCSRTHKWCKYVF-{酰胺}	[2-Abu2,17;Ala5;Asp10]GpTx-1(1-34)	3.7	49	>50	>5	-	-	-
717	{H}-D[2-Abu]LG[Nva]LRKCIPDNDKC[2-Abu]RPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu2,17;Nva5;Leu6;Glu28]GpTx-1(1-34)	>5	>50	>50	>5	-	-	-
718	{H}-D[2-Abu]LG[2-Abu]LRKCIPDNDKC[2-Abu]RPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu2,5,17;Leu6;Glu28]GpTx-1(1-34)	4.3	>50	>50	>5	-	-	-
719	{H}-D[2-Abu]LGALRKCIPDNDKC[2-Abu]RPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu2,17;Ala5;Leu6;Glu28]GpTx-1(1-34)	4.3	>50	>50	>5	-	-	-
720	{H}-D[2-Abu]LGVLRKCIPDNDKC[2-Abu]RPNLVCSRTHEWCKYVF-{酰胺}	[2-Abu2,17;Val5;Leu6;Glu28]GpTx-1(1-34)	>5	33	>50	>5	-	-	-
721	{H}-DCLGA[Nle]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala5;Nle6]GpTx-1(1-34)	0.15	45	>50	0.41	-	-	0.4
722	{H}-DCLGA[Nle]RKCEPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala5;Nle6;Glu10]GpTx-1(1-34)	0.33	44	48	0.48	144.9	101.0	0.7
723	{H}-DCLGALRKCEPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala5;Leu6;Glu10]GpTx-1(1-34)	0.38	>50	>50	1.2	-	-	0.3
724	{H}-DCLGAFRKCEPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala5;Phe6;Glu10]GpTx-1(1-34)	0.38	36	41	0.32	109.5	130.1	1.2
725	{H}-DCLGA[Nle]RKCIPENDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala5;Nle6;Glu12]GpTx-1(1-34)	0.38	47	>50	0.27	-	-	1.4
726	{H}-DCLGALRKCIPENDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala5;Leu6;Glu12]GpTx-1(1-34)	0.35	>50	49	0.58	138.2	83.4	0.6
727	{H}-DCLGA[Nle]RKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Nle6;Glu28]GpTx-1(1-34)	0.51	34	34	3.4	66.8	10.1	0.2
728	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Leu6;Glu28]GpTx-1(1-34)	1.6	43	41	6.6	26.7	6.3	0.2
729	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Ala5;Phe6;Glu28]GpTx-1(1-34)	1.1	48	>50	1.8	-	-	0.6
730	{H}-DCLGA[Nle]RKCIPDNDKCCRPNLVCSATHKWCKYVF-{酰胺}	[Ala5,25;Nle6]GpTx-1(1-34)	0.84	47	49	1.7	58.0	29.3	0.5
731	{H}-DCLGALRKCIPDNDKCCRPNLVCSATHKWCKYVF-{酰胺}	[Ala5,25;Leu6]GpTx-1(1-34)	0.60	38	37	2.8	61.5	13.2	0.2
732	{H}-DCLGAFRKCIPDNDKCCRPNLVCSATHKWCKYVF-{酰胺}	[Ala5,25;Phe6]GpTx-1(1-34)	0.29	>50	45	0.60	156.1	73.7	0.5
733	{H}-DCLGA[Nle]RKCIPDNDKCCRPNLVCSETHKWCKYVF-{酰胺}	[Ala5;Nle6;Glu25]GpTx-1(1-34)	1.6	33	42	5.2	25.9	8.1	0.3
734	{H}-DCLGALRKCIPDNDKCCRPNLVCSETHKW	[Ala5;Leu6;Glu25]GpTx	1.8	41	>50	9.3	-	-	0.2

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	CKYVF-{酰胺}	-1(1-34)							
735	{H}-DCLGAFRKCIPDNDKCCRPNLVCSETHKW CKYVF-{酰胺}	[Ala5;Phe6;Glu25]GpTx-1(1-34)	1.5	41	48	3.6	32.0	13.3	0.4
736	{H}-DCLGFFRKCIPDND[Pra]CCRPNLVCSRTHK WCKYVF-{酰胺}	[Phe6,Pra15]GpTx-1(1-34)	>5	32.6	>50	>5	-	-	-
737	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHHW CKYVF-{酰胺}	[Ala5;His28]GpTx-1(1-34)	0.40	19.2	46.6	1.6	117.3	28.7	0.2
738	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHSW CKYVF-{酰胺}	[Ala5;Ser28]GpTx-1(1-34)	0.65	21.9	>50	1.8	-	-	0.4
739	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHQW CKYVF-{酰胺}	[Ala5;Gln28]GpTx-1(1-34)	0.63	20.5	46.0	2.2	72.5	20.5	0.3
740	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[3Pa l]WCKYVF-{酰胺}	[Ala5;3Pal28]GpTx-1(1-34)	1.5	31.1	47.6	>5	32.5	-	-
741	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[4-氨基 F]WCKYVF-{酰胺}	[Ala5;4-氨基 F28]GpTx-1(1-34)	1.1	24.4	>50	2.3	-	-	0.5
742	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[K(Ac)]WCKYVF-{酰胺}	[Ala5;K(Ac)28]GpTx-1(1-34)	1.1	22.7	32.7	2.5	30.5	13.1	0.4
743	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[SD MA]WCKYVF-{酰胺}	[Ala5;SDMA28]GpTx-1(1-34)	0.22	26.5	46.5	1.1	213.8	43.1	0.2
744	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[hAr g]WCKYVF-{酰胺}	[Ala5;hArg28]GpTx-1(1-34)	0.47	39.7	>50	0.82	-	-	0.6
745	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[R(Me)]WCKYVF-{酰胺}	[Ala5;R(Me)28]GpTx-1(1-34)	0.25	40.0	>50	0.50	-	-	0.5
746	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Orn]WCKYVF-{酰胺}	[Ala5;Orn28]GpTx-1(1-34)	0.29	20.7	>50	0.76	-	-	0.4
747	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Da p]WCKYVF-{酰胺}	[Ala5;Dap28]GpTx-1(1-34)	0.37	38.3	34.5	0.78	94.0	44.4	0.5
748	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Cit] WCKYVF-{酰胺}	[Ala5;Cit28]GpTx-1(1-34)	0.87	24.2	>50	2.7	-	-	0.3
749	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[HC it]WCKYVF-{酰胺}	[Ala5;HCit28]GpTx-1(1-34)	0.79	20.3	46.4	2.3	58.6	20.1	0.3
750	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHDW CKYVF-{酰胺}	[Asp28]GpTx-1(1-34)	0.73	37.9	49.6	0.77	67.8	64.1	0.9
751	{H}-DCLGGVRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{酰胺}	[Gly5;Val6]GpTx-1(1-34)	>5	25.5	49.3	>5	-	-	-
752	{H}-DCLGGIRKCIPDNDKCCRPNLVCSRTHKWC KYVF-{酰胺}	[Gly5;Ile6]GpTx-1(1-34)	>5	25.4	44.7	>5	-	-	-

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753	{H}-DCLG[2-Abu][Nle]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[2-Abu5;Nle6]GpTx-1(1-34)	0.06	40.2	>50	0.16	-	-	0.4
754	{H}-DCLGGFRKCEPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Gly5;Phe6;Glu10]GpTx-1(1-34)	0.35	34.2	>50	0.33	-	-	1.1
755	{H}-DCLGGFRKCIPDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	[Gly5;Phe6;Glu28]GpTx-1(1-34)	>5	15.3	>50	>5	-	-	-
756	{4-Pen}-DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{酰胺}	4-Pen-[Ala5;Phe6;2-Abu13;Arg28]GpTx-1(1-34)	0.18	44.4	>50	0.26	-	-	0.7
757	{4-Pen}-DCLGAFRKCIPD[2-Abu]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	4-Pen-[Ala5;Phe6;2-Abu13]GpTx-1(1-34)	0.71	34.9	>50	0.28	-	-	2.5
758	{4-Pen}-DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	4-Pen-[2-Abu5,13;Leu6]GpTx-1(1-34)	0.46	32.7	23.7	0.69	51.8	34.5	0.7
759	{4-Pen}-DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRTHRWCKYVF-{酰胺}	4-Pen-[Nva5;Leu6;2-Abu13;Arg28]GpTx-1(1-34)	0.10	46.2	28.0	0.23	270.9	121.0	0.4
760	{4-Pen}-DCLG[Nva]LRKCIPD[2-Abu]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	4-Pen-[Nva5;Leu6;2-Abu13]GpTx-1(1-34)	0.19	35.2	27.4	0.25	145.4	109.2	0.8
761	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Guf]WCKYVF-{酰胺}	[Ala5;Guf28]GpTx-1(1-34)	0.16	26.9	>50	0.63	-	-	0.2
762	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[Dab]WCKYVF-{酰胺}	[Ala5;Dab28]GpTx-1(1-34)	0.32	23.3	>50	0.86	-	-	0.4
763	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTHQWCKYVF-{酰胺}	[Gln28]GpTx-1(1-34)	0.19	22.7	>50	0.27	-	-	0.7
764	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHFWCKYVF-{酰胺}	[Ala5;Phe28]GpTx-1(1-34)	4.1	41.4	>50	>5	-	-	-
765	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHYWCKYVF-{酰胺}	[Ala5;Tyr28]GpTx-1(1-34)	0.79	42.0	46.8	1.4	58.8	33.2	0.6
766	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHLWCKYVF-{酰胺}	[Ala5;Leu28]GpTx-1(1-34)	1.1	49.3	36.9	2.7	33.4	13.7	0.4
767	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHNWCKYVF-{酰胺}	[Ala5;Asn28]GpTx-1(1-34)	1.7	>50	43.8	3.2	25.6	13.6	0.5
768	{H}-DCLGAMRKCIPDNDKCCRPNLVCS[Cit]THKWCKYVF-{酰胺}	[Ala5;Cit25]GpTx-1(1-34)	1.8	23.5	>50	3.2	-	-	0.6
769	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHDWCKYVF-{酰胺}	[Ala5;Asp28]GpTx-1(1-34)	>5	39.0	>50	>5	-	-	-
770	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHMWCKYVF-{酰胺}	[Ala5;Met28]GpTx-1(1-34)	1.0	45.4	>50	4.1	-	-	0.3

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771	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTH[K(Me)]WCKYVF-{酰胺}	[Ala5;K(Me)28]GpTx-1(1-34)	1.6	40.1	>50	1.8	-	-	0.9
772	{H}-DCLGFMRKCIPDNDKCCRPNLVCSRTH[pS]WCKYVF-{酰胺}	[pS28]GpTx-1(1-34)	0.90	>50	>50	0.81	-	-	1.1
773	{H}-DCLGTMRKCDPENDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Thr5;Asp10;Glu12]GpTx-1(1-34)	4.5	28.4	>50	3.4	-	-	1.3
774	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYEF-{酰胺}	[1-Nal10;Glu33]GpTx-1(1-34)	0.30	28.3	12.7	0.53	42.8	24.2	0.6
775	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKEVF-{酰胺}	[1-Nal10;Glu32]GpTx-1(1-34)	>5	28.6	21.3	>5	-	-	-
776	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCEYVF-{酰胺}	[1-Nal10;Glu31]GpTx-1(1-34)	>5	26.8	28.5	>5	-	-	-
777	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYAF-{酰胺}	[1-Nal10;Ala33]GpTx-1(1-34)	0.20	39.5	8.6	0.20	43.7	42.4	1.0
778	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKAVF-{酰胺}	[1-Nal10;Ala32]GpTx-1(1-34)	0.51	35.0	15.8	0.44	31.0	36.2	1.2
779	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCAYVF-{酰胺}	[1-Nal10;Ala31]GpTx-1(1-34)	>5	36.5	38.0	3.2	-	12.0	-
780	{H}-DCLGFMRKC[1-Nal]PDNDKCCRPNLVCSRTHEWCKYVF-{酰胺}	[1-Nal10;Glu28]GpTx-1(1-34)	0.78	27.5	28.9	1.1	37.3	26.4	0.7
781	{H}-DCLGFMRKC[1-Nal]PDNDECCRPNLVCSRTHKWCKYVF-{酰胺}	[1-Nal10;Glu15]GpTx-1(1-34)	0.93	34.3	24.8	1.1	26.6	21.7	0.8
782	{H}-DCLGFMREC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Glu8;1-Nal10]GpTx-1(1-34)	1.1	30.7	12.4	1.2	11.2	10.1	0.9
783	{H}-DCLEFMRKC[1-Nal]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Glu4;1-Nal10]GpTx-1(1-34)	1.3	29.1	18.5	2.0	14.1	9.1	0.6
784	{H}-[1-Nal]CLGFMRECIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[1-Nal1;Glu8]GpTx-1(1-34)	1.0	32.0	26.0	0.90	25.9	29.0	1.1
785	{H}-[1-Nal]CLGFMEKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[1-Nal1;Glu7]GpTx-1(1-34)	1.8	30.6	27.7	1.9	15.4	14.7	1.0
786	{H}-[1-Nal]CLGFERKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[1-Nal1;Glu6]GpTx-1(1-34)	>5	26.3	33.9	>5	-	-	-
787	{H}-DCLGAMRKCIPDNDKCCRPNLVCSREHKWCKYVF-{酰胺}	[Ala5;Glu26]GpTx-1(1-34)	>5	27.3	24.9	>5	-	-	-
788	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTEKWCKYVF-{酰胺}	[Ala5;Glu27]GpTx-1(1-34)	>5	29.7	27.1	>5	-	-	-
789	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKW	[Ala5;Glu31]GpTx-1(1-3	>5	31.8	21.5	>5	-	-	-

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	CEYVF-{酰胺}	4)								
790	{H}-DCLGAMRKCIPDNDKCCRPNLVCSRTHKW CKYVFE-{酰胺}	[Ala5]GpTx-1(1-34)-Glu	≥5	28.5	25.5	≥5	-	-	-	-
791	{H}-DCLGA[METO1]RKCIPDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[Ala5.Met(O)6]GpTx-1 异构体 1	≥5	39.5	>50	≥5	-	-	-	-
792	{H}-DCLGA[METO1]RKCIPDNDKCCRPNLVCSR THKWCKYVF-{酰胺}	[Ala5.Met(O)6]GpTx-1 异构体 2	≥5	49.8	43.0	≥5	-	-	-	-
793	{H}-DCLGAFRKCIPD[Pra]DKCCRPNLVCSRTHK WCKYVF-{酰胺}	[Ala5;Phe6;Pra13]GpTx-1(1-34)	0.53	28.6	12.3	0.47	23.0	26.4	1.1	
794	{H}-DCLGAFRKCIPD[K(Ac-Pra)]DKCCRPNLVCS RTHKWCKYVF-{酰胺}	[Ala5;Phe6;K(Ac-Pra)13]GpTx-1(1-34)	0.89	37.8	>50	0.70	-	-	1.3	
795	{H}-DCLGAFRKCIPD[K(Ac-Pra)]DKCCRPNLVCS RTHRWCKYVF-{酰胺}	[Ala5;Phe6;K(Ac-Pra)13 ;Arg28]GpTx-1(1-34)	0.78	24.6	18.0	0.25	23.1	70.9	3.1	
796	{H}-DCLGALRKCIPD[Pra]DKCCRPNLVCSRLHR WCKYVF-{酰胺}	[Ala5;Leu6,26;Pra13;Arg 28]GpTx-1(1-34)	0.22	36.4	>50	0.48	-	-	0.5	
797	{H}-DCLG[2-Abu]LRKCIPD[Pra]DKCCRPNLVCS RTHKWCKYVF-{酰胺}	[2-Abu5;Leu6;Pra13]Gp Tx-1(1-34)	0.52	34.0	26.6	0.93	50.8	28.7	0.6	
798	{H}-DCLGAFRKCEPD[Pra]DKCCRPNLVCSRLHR WCKYVF-{酰胺}	[Ala5;Phe6;Glu10;Pra13; Leu26;Arg28]GpTx-1(1-34)	0.54	32.2	>50	0.56	-	-	1.0	
799	{H}-DCLG[2-Abu]LRKCIPD[K(Ac-Pra)]DKCCRP NLVCSRTHKWCKYVF-{酰胺}	[2-Abu5;Leu6;K(Ac-Pra) 13]GpTx-1(1-34)	0.75	28.1	48.5	0.70	65.1	69.4	1.1	
800	{H}-DCLGALRKCEPD[Pra]DKCCRPNLVCSRLH RWCKYVF-{酰胺}	[Ala5;Leu6,26;Glu10;Pra 13;Arg28]GpTx-1(1-34)	0.70	>50	>50	1.4	-	-	0.5	
801	{H}-DCLG[2-Abu]LRKCIPD[K(4-Pen)]DKCCRPN LVCSRTHRWCKYVF-{酰胺}	[2-Abu5;Leu6;K(4-Pen)1 3;Arg28]GpTx-1(1-34)	0.55	39.7	>50	0.81	-	-	0.7	
802	{H}-DCLGALRKCIP[Pra]NDKCCRPNLVCSRLHR WCKYVF-{酰胺}	[Ala5;Leu6,26;Pra12;Arg 28]GpTx-1(1-34)	0.26	>50	12.3	0.54	46.6	22.7	0.5	
803	{H}-DCLGAFRKCIP[Pra]NDKCCRPNLVCSRLHR WCKYVF-{酰胺}	[Ala5;Phe6;Pra12;Leu26; Arg28]GpTx-1(1-34)	0.13	36.5	2.5	0.12	19.9	20.7	1.0	
804	{H}-DCLG[2-Abu]FRKCIPD[K(4-Pen)]DKCCRPN LVCSRTHKWCKYVF-{酰胺}	[2-Abu5;Phe6;K(4-Pen)1 3]GpTx-1(1-34)	0.50	>50	5.3	0.35	10.5	15.2	1.5	
805	{H}-DCLG[Nva]LRKCIPD[K(4-Pen)]DKCCRPNLV CSRTHRWCKYVF-{酰胺}	[Nva5;Leu6;K(4-Pen)13; Arg28]GpTx-1(1-34)	0.31	37.5	12.2	0.27	39.4	45.7	1.2	
806	{H}-DCLG[Nva]LRKCIPD[K(4-Pen)]DKCCRPNLV CSRTHKWCKYVF-{酰胺}	[Nva5;Leu6;K(4-Pen)13] GpTx-1(1-34)	0.29	34.2	8.3	0.39	28.9	21.5	0.7	
807	{4-Pen}-DCLG[2-Abu]LRKCIPD[2-Abu]DKCCRP	4-Pen-[2-Abu5,13;Leu6;	0.54	36.8	>50	0.90	-	-	0.6	

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	NLVCSRTHRWCKYVF-{酰胺}	Arg28]GpTx-1(1-34)							
808	{H}-DCLG[2-Abu]LRKCIPD]K(4-Pen)]DKCCRPN LVCSRTHEWCKYVF-{酰胺}	[2-Abu5;Leu6;K(4-Pen)13;Glu28]GpTx-1(1-34)	1.8	>5	>5	4.1	-	-	0.4
809	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHRWC KYVF-{酰胺}	[Ala5;Phe6;Arg28]GpTx-1(1-34)	0.3	>5	>5	0.3	-	-	1.0
810	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHRW CKYVF-{酰胺}	[Ala5;Leu6;Arg28]GpTx-1(1-34)	0.2	>5	>5	0.2	-	-	1.0
811	{H}-GSDCLGAFRKCIPDNDKCCRPNLVCSRTHR WCKYVF-{酰胺}	Gly-Scr-[Ala5;Phe6;Arg28]GpTx-1(1-34)	0.3	>5	>5	0.3	-	-	1.0
812	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHR WCKYVF-{酰胺}	Gly-Scr-[Ala5;Leu6;Arg28]GpTx-1(1-34)	0.2	>5	>5	0.2	-	-	1.0
813	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHRWC KYVFW-{游离酸}	[Ala5;Phe6;Arg28]GpTx-1(1-34)-Trp-游离酸	>5	>5	>5	>5	-	-	-
814	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHRW CKYVFW-{游离酸}	[Ala5;Leu6;Arg28]GpTx-1(1-34)-Trp-游离酸	0.6	>5	>5	0.6	-	-	1.0
815	{H}-GSDCLGAFRKCIPDNDKCCRPNLVCSRTHR WCKYVFW-{游离酸}	Gly-Scr-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Trp-游离酸	>5	>5	>5	>5	-	-	-
816	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHR WCKYVFW-{游离酸}	Gly-Scr-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Trp-游离酸	>5	>5	>5	>5	-	-	-
817	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHRWC KYVFF-{游离酸}	[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	1.5	>5	>5	0.5	-	-	3.0
818	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHRW CKYVFF-{游离酸}	[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	2.3	>5	>5	0.8	-	-	2.9
819	{H}-GSDCLGAFRKCIPDNDKCCRPNLVCSRTHR WCKYVFF-{游离酸}	Gly-Scr-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	1.5	>5	>5	0.5	-	-	3.0
820	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHR WCKYVFF-{游离酸}	Gly-Scr-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	0.5	>5	>5	0.5	-	-	1.0
821	{H}-GSDCLGAFRKCIPDNDKCCRPNLVCSRTHR WCKYVF-{游离酸}	Gly-Scr-[Ala5;Phe6;Arg28]GpTx-1(1-34)-游离酸	3.2	>5	>5	3.2	-	-	1.0
822	{H}-GSDCLGALRKCIPDNDKCCRPNLVCSRTHR WCKYVF-{游离酸}	Gly-Scr-[Ala5;Leu6;Arg28]GpTx-1(1-34)-游离酸	3.7	>5	>5	3.7	-	-	1.0

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823	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHRWC KYVF-{游离酸}}	[Ala5;Phe6;Arg28]GpTx-1(1-34)-游离酸	3.4	>5	>5	3.4	-	-	1.0
824	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHAW CKYVF-{游离酸}}	[Ala5,28;Phe6]GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
825	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHDW CKYVF-{游离酸}}	[Ala5;Phe6;Asp28]GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
826	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHEWC KYVF-{游离酸}}	[Ala5;Phe6;Glu28]GpTx-1(1-34)-游离酸	>5	>5	>5	1.8	-	-	-
827	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHGW CKYVF-{游离酸}}	[Ala5;Phe6;Gly28]GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
828	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHHW CKYVF-{游离酸}}	[Ala5;Phe6;His28]GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
829	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHKW CKYVF-{游离酸}}	[Ala5;Phe6]GpTx-1(1-34)-游离酸	>5	>5	>5	2.3	-	-	-
830	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHLWC KYVF-{游离酸}}	[Ala5;Phe6;Leu28]GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
831	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHMW CKYVF-{游离酸}}	[Ala5;Phe6;Met28]GpTx-1(1-34)-游离酸	>5	>5	>5	1.6	-	-	-
832	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHNW CKYVF-{游离酸}}	[Ala5;Phe6;Asn28]GpTx-1(1-34)-游离酸	>5	>5	>5	4.6	-	-	-
833	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHPWC KYVF-{游离酸}}	[Ala5;Phe6;Pro28]GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
834	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHQW CKYVF-{游离酸}}	[Ala5;Phe6;Gln28]GpTx-1(1-34)-游离酸	>5	>5	>5	3.9	-	-	-
835	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHSWC KYVF-{游离酸}}	[Ala5;Phe6;Scr28]GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
836	{H}-DCLGAFRKCIPDADKCCRPNLVCSRTHRWC KYVF-{游离酸}}	[Ala5,13;Phe6;Arg28]GpTx-1(1-34)-游离酸	4.1	>5	>5	1.3	-	-	3.1
837	{H}-DCLGAFRKCIPDDDKCCRPNLVCSRTHRWC KYVF-{游离酸}}	[Ala5;Phe6;Asp13;Arg28]GpTx-1(1-34)-游离酸	>5	>5	>5	2.3	-	-	-
838	{H}-DCLGAFRKCIPDEDKCCRPNLVCSRTHRWC KYVF-{游离酸}}	[Ala5;Phe6;Glu13;Arg28]GpTx-1(1-34)-游离酸	>5	>5	>5	1.9	-	-	-
839	{H}-DCLGAFRKCIPDFDKCCRPNLVCSRTHRWC KYVF-{游离酸}}	[Ala5;Phe6,13;Arg28]GpTx-1(1-34)-游离酸	>5	>5	>5	1.2	-	-	-
840	{H}-DCLGAFRKCIPDGDKCCRPNLVCSRTHRWC KYVF-{游离酸}}	[Ala5;Phe6;Gly13;Arg28]GpTx-1(1-34)-游离酸	>5	>5	>5	1.5	-	-	-
841	{H}-DCLGAFRKCIPDHDKCCRPNLVCSRTHRWC	[Ala5;Phe6;His13;Arg28	>5	>5	>5	>5	-	-	-

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	KYVF-{游离酸}	[GpTx-1(1-34)-游离酸						
842	{H}-DCLGAFRKCIPDIDKCCRPNLVCSRTHRWC KYVF-{游离酸}	[Ala5;Phe6;Ile13;Arg28] GpTx-1(1-34)-游离酸	>5	>5	>5	3.0	-	-	-
843	{H}-DCLGAFRKCIPDKDKCCRPNLVCSRTHRWC KYVF-{游离酸}	[Ala5;Phe6;Lys13;Arg28]GpTx-1(1-34)-游离酸	3.6	2.8	>5	0.3	-	-	11.8
844	{H}-DCLGAFRKCIPDLDKCCRPNLVCSRTHRWC KYVF-{游离酸}	[Ala5;Phe6;Leu13;Arg28]GpTx-1(1-34)-游离酸	4.5	>5	>5	4.5	-	-	1.0
845	{H}-DCLGAFRKCIPDMDKCCRPNLVCSRTHRW CKYVF-{游离酸}	[Ala5;Phe6;Met13;Arg28]GpTx-1(1-34)-游离酸	4.7	>5	>5	0.8	-	-	5.8
846	{H}-DCLGAFRKCIPDPDKCCRPNLVCSRTHRWC KYVF-{游离酸}	[Ala5;Phe6;Pro13;Arg28]GpTx-1(1-34)-游离酸	2.9	>5	>5	2.9	-	-	1.0
847	{H}-DCLGAFRKCIPDQDKCCRPNLVCSRTHRWC KYVF-{游离酸}	[Ala5;Phe6;Gln13;Arg28]GpTx-1(1-34)-游离酸	>5	>5	>5	1.7	-	-	-
848	{H}-DCLGAFRKCIPDRDKCCRPNLVCSRTHRWC KYVF-{游离酸}	[Ala5;Phe6;Arg13,28]Gp Tx-1(1-34)-游离酸	4.5	>5	>5	0.6	-	-	7.1
849	{H}-DCLGAFRKCIPDSDKCCRPNLVCSRTHRWC KYVF-{游离酸}	[Ala5;Phe6;Ser13;Arg28]GpTx-1(1-34)-游离酸	>5	>5	>5	1.1	-	-	-
850	{H}-DCLGAFRKCIPDTDKCCRPNLVCSRTHRWC KYVF-{游离酸}	[Ala5;Phe6;Thr13;Arg28]GpTx-1(1-34)-游离酸	>5	>5	>5	1.3	-	-	-
851	{H}-DCLGAFRKCIPDVDKCCRPNLVCSRTHRWC KYVF-{游离酸}	[Ala5;Phe6;Val13;Arg28]GpTx-1(1-34)-游离酸	>5	>5	>5	1.7	-	-	-
852	{H}-DCLGAFRKCIPDWDKCCRPNLVCSRTHRW CKYVF-{游离酸}	[Ala5;Phe6;Trp13;Arg28]GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
853	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHRW CKYVF-{游离酸}	[Ala5;Leu6;Arg28]GpTx -1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
854	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHDW CKYVF-{游离酸}	[Ala5;Leu6;Asp28]GpTx -1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
855	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHEW CKYVF-{游离酸}	[Ala5;Leu6;Glu28]GpTx -1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
856	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHLWC KYVF-{游离酸}	[Ala5;Leu6,28]GpTx-1(1 -34)-游离酸	4.1	>5	>5	4.1	-	-	1.0
857	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHMW CKYVF-{游离酸}	[Ala5;Leu6;Met28]GpTx -1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
858	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHQW CKYVF-{游离酸}	[Ala5;Leu6;Gln28]GpTx -1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
859	{H}-DCLGALRKCIPDNDKCCRPNLVCSRTHSWC KYVF-{游离酸}	[Ala5;Leu6;Ser28]GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-

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860	{H}-DCLGALRKCIPDADKCCRPNLVCSRTHRW CKYVF-{游离酸}	[Ala5,13;Leu6;Arg28]Gp Tx-1(1-34)-游离酸	>5	>5	>5	4.5	-	-	-
861	{H}-DCLGALRKCIPDDDKCCRPNLVCSRTHRW CKYVF-{游离酸}	[Ala5;Leu6;Asp13;Arg2 8]GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
862	{H}-DCLGALRKCIPDEDKCCRPNLVCSRTHRWC KYVF-{游离酸}	[Ala5;Leu6;Glu13;Arg28]GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
863	{H}-DCLGALRKCIPDFDKCCRPNLVCSRTHRWC KYVF-{游离酸}	[Ala5;Leu6;Phe13;Arg28]GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
864	{H}-DCLGALRKCIPDHDKCCRPNLVCSRTHRW CKYVF-{游离酸}	[Ala5;Leu6;His13;Arg28]GpTx-1(1-34)-游离酸	>5	>5	>5	3.9	-	-	-
865	{H}-DCLGALRKCIPDIDKCCRPNLVCSRTHRWC KYVF-{游离酸}	[Ala5;Leu6;Ile13;Arg28] GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
866	{H}-DCLGALRKCIPDKDKCCRPNLVCSRTHRW CKYVF-{游离酸}	[Ala5;Leu6;Lys13;Arg28]GpTx-1(1-34)-游离酸	>5	>5	>5	2.3	-	-	-
867	{H}-DCLGALRKCIPDLDKCCRPNLVCSRTHRWC KYVF-{游离酸}	[Ala5;Leu6,13;Arg28]Gp Tx-1(1-34)-游离酸	>5	>5	>5	4.9	-	-	-
868	{H}-DCLGALRKCIPDMDKCCRPNLVCSRTHRW CKYVF-{游离酸}	[Ala5;Leu6;Met13;Arg2 8]GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
869	{H}-DCLGALRKCIPDQDKCCRPNLVCSRTHRW CKYVF-{游离酸}	[Ala5;Leu6;Gln13;Arg28]GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
870	{H}-DCLGALRKCIPDRDKCCRPNLVCSRTHRWC KYVF-{游离酸}	[Ala5;Leu6;Arg13,28]Gp Tx-1(1-34)-游离酸	>5	>5	>5	1.4	-	-	-
871	{H}-DCLGALRKCIPDSDKCCRPNLVCSRTHRWC KYVF-{游离酸}	[Ala5;Leu6;Ser13;Arg28]GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
872	{H}-DCLGALRKCIPDVDKCCRPNLVCSRTHRW CKYVF-{游离酸}	[Ala5;Leu6;Val13;Arg28]GpTx-1(1-34)-游离酸	>5	>5	>5	>5	-	-	-
873	{H}-DCLGALRKCIPDYDKCCRPNLVCSRTHRW CKYVF-{游离酸}	[Ala5;Leu6;Tyr13;Arg28]GpTx-1(1-34)-游离酸	4.8	>5	>5	>5	-	-	-

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表 30. PatchXpress®测定的电生理

SEQ ID NO:	命名	Nav1.3 使用 IC50 (μM)	Nav1.4 使用 IC50 (μM)	Nav1.5 使用 IC50 (μM)	Nav1.7 使用 IC50 (μM)	Nav1.4/ Nav1.3 使用	Nav1.5/ Nav1.3 使用	Nav1.4/ Nav1.7 使用	Nav1.5/ Nav1.7 使用	Nav1.3/ Nav1.7 使用
1	GpTx-1(1-34)	0.010	0.241	>10	0.005	24	>1000	48	>2000	2.0
528	虎纹捕鸟蛛毒素-IV	0.022	4.5	25.3	0.032	205	1150	141	791	0.7
529	虎纹捕鸟蛛毒素-I	0.905	24.89	>30	0.717	28	33	35	42	1.3
530	KIIIA	0.574	0.021		0.144	0	0	0	0	4.0
531	ProTxII	0.015	0.032	0.104	0.002	2	7	13	43	6.3
72	[Arg28]GpTx-1(1-34)	0.012	0.866	8.730	0.007	72	728	124	1247	1.7
22	[Ala5]GpTx-1(1-34)	0.129	4.460	>10	0.018	35	>78	248	>556	7.2
80	[1-Nal34]GpTx-1(1-34)	0.007	0.179	1.860	0.004	26	266	45	465	1.8
70	[Arg26]GpTx-1(1-34)	0.010	0.109	0.573	0.005	11	57	22	115	2.0
87	GpTx-1(1-34)-Trp	0.015	0.640	2.660	0.009	43	177	71	296	1.7
95	[Gln33]GpTx-1(1-34)	0.010	0.286	8.250	0.006	29	825	48	1375	1.7
77	[1-Nal1]GpTx-1(1-34)	0.066	0.439	7.6	0.023	7	115	19	330	2.9
78	[1-Nal10]GpTx-1(1-34)	0.039	0.402	12.91	0.005	10	331	80	2581	7.8
89	[Phe6]GpTx-1(1-34)	0.016	0.141	3.159	0.015	9	197	9	211	1.1
94	[Lys26;Thr27]GpTx-1(1-34)	0.016	0.462	1.393	0.004	29	87	116	348	4.0
121	[Leu26]GpTx-1(1-34)	0.023	0.508	5.008	0.003	22	218	169	1669	7.7

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123	[Nle6]GpTx-1(1-34)	0.009	0.066	1.149	0.008	7	124	8	137		1.1
161	[1-Nal6]GpTx-1(1-34)	0.004	0.115	0.358	0.003	28	87	41	128		1.5
167	[1-Nal32]GpTx-1(1-34)	0.012	0.061	0.988	0.004	5	82	15	247		3.0
170	[Trp6]GpTx-1(1-34)	ND	0.234	3.674	0.022	--	--	10	164		0.0
177	[Trp22]GpTx-1(1-34)	ND	0.689	4.779	0.039	--	--	18	122		0.0
180	[Trp33]GpTx-1(1-34)	ND	0.096	2.350	0.018	--	--	6	134		0.0
33	[Glu33]GpTx-1(1-34)	0.052	2.753	>10	0.027	53	192	102	370		1.9
148	[Glu18]GpTx-1(1-34)	0.098	1.635	>10	0.018	17	>102	91	>556		5.4
242	[Bip5]GpTx-1(1-34)	0.003	0.103	2.077	0.062	34	692	2	34		0.05
243	[Cha5]GpTx-1(1-34)	0.007	0.126	3.389	0.003	18	484	42	1130		2.3
244	[Leu6]GpTx-1(1-34)	0.018	0.365	>10	0.026	20	556	14	385		0.7
245	[Cha6]GpTx-1(1-34)	0.002	0.092	2.678	0.003	46	1339	31	893		0.7
246	[1'NMeW32]GpTx-1 (1-34)	0.018	0.154	6.849	0.006	9	381	26	1142		3.0
152	[Glu26]GpTx-1(1-34)	0.216	6.41	>10	0.052	30	46	123	192		4.2
174	[Trp18]GpTx-1(1-34)	0.042	1.46	>10	0.024	35	>238	61	>417		1.8
247	[pI-Phe5]GpTx-1(1-34)	0.090	1.1	>10	0.247	12	111	4	40		0.36
248	[Ile33]GpTx-1(1-34)	0.102	1.94	>10	0.037	19	98	52	270		2.8
249	[pI-Phe33]GpTx-1(1-34)	0.035	0.388	10.4	0.026	11	297	15	400		1.3
250	[1'NMeW33]GpTx-1 (1-34)	0.037	0.396	9.54	0.054	11	258	7	177		0.7
251	[Arg28;1-Nal32]GpTx-1(1-34)	0.006	0.193	1.06	0.005	32	177	39	212		1.2
108	GpTx-1(2-34)	0.015	0.251	4.944	0.007	17	334	36	706		2.1
132	Ac-GpTx-1(1-34)	0.084	2.12	>10	0.013	25	>119	163	>769		6.5

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252	[Ala5;Trp33]GpTx-1(1-34)	0.569	5.54	>10	0.034	10	>18	163	>294	>294	16.7
253	[Ala5;Trp32]GpTx-1(1-34)	2.98	>10	>10	0.103	3	>3	97	>97	>97	28.9
254	[Ala5;1-Nal32]GpTx-1(1-34)	0.122	2.8	>10	0.028	23	>82	100	>357	>357	4.4
255	[Ala5;Leu26]GpTx-1(1-34)	0.47	>10	>10	0.049	21	>21	204	>204	>204	9.6
256	[Ala5;1-Nal6]GpTx-1(1-34)	0.008	0.469	3.81	0.002	59	476	235	1905	1905	4.0
257	[Ala5;Phe6]GpTx-1(1-34)	0.022	0.824	>10	0.012	37	>455	69	>833	>833	1.8
22	[Ala5]GpTx-1(1-34)	0.158	11.14	>10	0.014	70	>63	795	>714	>714	11.3
258	[Ala5;1-Nal33]GpTx-1(1-34)	0.201	2.95	>10	0.048	15	>50	61	>208	>208	4.2
259	[Ala5;1-Nal10]GpTx-1(1-34)	0.482	>10	>10	0.097	21	>21	103	>103	>103	5.0
260	[Ala5;Arg28]GpTx-1(1-34)	0.44	>10	>10	0.077	23	>23	130	>130	>130	5.7
261	[Ala5;Trp6]GpTx-1(1-34)	0.081	6.11	>10	0.057	75	>123	107	>175	>175	1.4
262	[Ala5;Phe6;Leu26;Arg28]GpTx-1(1-34)	0.008	1.895	>10	0.002	237	>1250	948	>5000	>5000	4.0
263	[Ala5;Phe6;Leu26]GpTx-1(1-34)	0.011	1.196	>10	0.004	109	>909	299	>2500	>2500	2.8
515	[Phe6; Atz(氨基-PEG10)13]GpTx-1(1-34)	0.006	0.127	5.998	0.022	21	1000	6	273	273	0.3
590	[Phe6;Atz(20kDaPEG)13]GpTx-1(1-34)	0.232	7.98	>10	0.184	34	>43	43	>54	>54	1.3
--	[Phe6,Atz(2 kDa EtO-PEG*-{[Phe6, Atz13*]GpTx-1(1-34)})13]GpTx-1(1-34	0.008	0.254	1.43	0.013	32	179	20	110	110	0.6

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	); * = Et （同二聚偶联物 1）										
--	[Phe6,Atz(EtO-PEG4*-{[Phe6,Atz13*]GpTx-1(1-34)}13]GpTx-1(1-34); * = Et （同二聚偶联物 2）	0.046	0.299	0.863	0.019	7	19	16	45	2.4
19	[Glu3]GpTx-1(1-34)	-	3.81	>10	0.041	-	-	93	>244	-
21	[Ala3]GpTx-1(1-34)	-	0.569	>10	0.012	-	-	47	>833	-
63	[Arg4]GpTx-1(1-34)	-	0.165	5	0.003	-	-	55	1667	-
39	[Lys4]GpTx-1(1-34)	-	0.327	10.6	0.006	-	-	55	1767	-
265	[Gly5]GpTx-1(1-34)	-	12.8	>10	0.009	-	-	1422	>1111	-
88	[Ile5]GpTx-1(1-34)	-	2.12	>10	0.002	-	-	1060	>5000	-
268	[Met5]GpTx-1(1-34)	-	0.978	>10	0.002	-	-	489	>5000	-
272	[Val5]GpTx-1(1-34)	-	4.41	>10	0.018	-	-	245	>556	-
267	[Leu5]GpTx-1(1-34)	-	0.778	>10	0.007	-	-	111	>1429	-
649	[2-Abu5]GpTx-1(1-34)	-	>10	>10	0.083	-	-	>120	>120	-

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650	[Nva5]GpTx-1(1-34)	-	4.26	>10	0.038	-	-	112	>263	-
657	[NMePhe5]GpTx-1(1-34)	-	0.727	>10	0.018	-	-	40	>556	-
678	[Tle5]GpTx-1(1-34)	-	4.819	>10	0.023	-	-	210	>435	-
683	[Cpg5]GpTx-1(1-34)	-	1.87	>10	0.005	-	-	374	>2000	-
684	[Chg5]GpTx-1(1-34)	-	1.749	>10	0.007	-	-	250	>1429	-
688	[NMeLeu5]GpTx-1(1-34)	-	8.47	>10	0.026	-	-	326	>385	-
286	[Tyr6]GpTx-1(1-34)	-	3.79	10	0.069	-	-	55	145	-
283	[Pro6]GpTx-1(1-34)	-	4.11	10	0.042	-	-	98	238	-
294	[2PAL6]GpTx-1(1-34)	-	2.94	10	0.042	-	-	70	238	-
296	[SDMA7]GpTx-1(1-34)	-	0.606	14	0.006	-	-	101	2333	-
145	[Glu7]GpTx-1(1-34)	-	>10	>10	0.098	-	-	>102	>102	-
295	[K(Me2)7]GpTx-1(1-34)	-	2.21	>10	0.02	-	-	111	>500	-
298	[K(Me2)8]GpTx-1(1-34)	-	0.884	>10	0.004	-	-	221	>2500	-
297	[SDMA8]GpTx-1(1-34)	-	0.57	>10	0.005	-	-	114	>2000	-

[0977]

118	[Thr8]GpTx-1(1-34)	-	0.888	>10	0.009	-	-	99	>1111	-
119	[Asp10]GpTx-1(1-34)	-	2.45	>10	0.003	-	-	817	>3333	-
146	[Glu10]GpTx-1(1-34)	-	1.3	>10	0.002	-	-	650	>5000	-
90	[Asn10]GpTx-1(1-34)	-	0.749	>10	0.002	-	-	375	>5000	-
147	[Glu11]GpTx-1(1-34)	-	1.67	>10	0.002	-	-	835	>5000	-
163	[1-Nal13]GpTx-1(1-34)	-	0.291	7.33	0.002	-	-	146	3665	-
28	[Glu15]GpTx-1(1-34)	-	2.72	10	0.02	-	-	136	500	-
125	[2-Abu2,17]GpTx-1(1-34)	-	0.947	10	0.021	-	-	45	476	-
316	[2PAL18]GpTx-1(1-34)	-	1.57	13.7	0.003	-	-	523	4567	-
116	[Cit18]GpTx-1(1-34)	-	0.833	10	0.002	-	-	417	5000	-
49	[Lys18]GpTx-1(1-34)	-	0.58	16.4	0.002	-	-	290	8200	-
314	[K(Me2)18]GpTx-1(1-34)	-	0.774	10	0.005	-	-	155	2000	-
315	[SDMA18]GpTx-1(1-34)	-	0.593	10	0.006	-	-	99	1667	-
50	[Lys19]GpTx-1(1-34)	-	0.22	9.1	0.003	-	-	73	3033	-

[0978]

331	[Tyr22]GpTx-1(1-34)	-	2.03	>10	0.018	-	-	113	>556	-
8	[Ala22]GpTx-1(1-34)	-	0.429	6.2	0.006	-	-	72	1033	-
334	[2PAL22]GpTx-1(1-34)	-	1.86	16	0.007	-	-	266	2286	-
117	[Cit25]GpTx-1(1-34)	-	1.86	>10	0.004	-	-	465	>2500	-
335	[K(Me2)25]GpTx-1(1-34)	-	0.764	13.3	0.008	-	-	96	1663	-
9	[Ala25]GpTx-1(1-34)	-	2.24	10	0.012	-	-	187	833	-
151	[Glu25]GpTx-1(1-34)	-	5.53	>10	0.028	-	-	198	>357	-
337	[His26]GpTx-1(1-34)	-	0.246	4.95	0.003	-	-	82	1650	-
350	[4CO2-F26]GpTx-1(1-34)	-	6.18	>10	0.065	-	-	95	>154	-
153	[Glu28]GpTx-1(1-34)	-	10.7	>10	0.026	-	-	412	>385	-
750	[Asp28]GpTx-1(1-34)	-	12.9	>10	0.015	-	-	860	>667	-
763	[Gln28]GpTx-1(1-34)	-	4.61	>10	0.004	-	-	1153	>2500	-
355	[K(Me2)28]GpTx-1(1-34)	-	1.43	8.74	0.011	-	-	130	795	-
79	[1-Nal29]GpTx-1(1-34)	-	5.92	>10	0.033	-	-	179	>303	-

[0979]

129	[2-Nal29]GpTx-1(1-34)	-	7.37	>10	0.066	-	-	112	>152	-
384	[2PAL32]GpTx-1(1-34)	-	4.96	>10	0.035	-	-	142	>286	-
403	[4CO2-F33]GpTx-1(1-34)	-	0.742	>10	0.003	-	-	247	>3333	-
402	[2PAL33]GpTx-1(1-34)	-	0.277	3.46	0.01	-	-	28	346	-
696	[Ala5;Leu6]GpTx-1(1-34)	-	11.246	>10	0.03	-	-	375	>333	-
721	[Ala5;Nle6]GpTx-1(1-34)	-	2.828	>10	0.01	-	-	283	>1000	-
699	[Ala5;1'NMeW6]GpTx-1(1-34)	-	4.5	>10	0.051	-	-	88	>196	-
437	[Ala5;Glu29]GpTx-1(1-34)	-	>10	>10	>10	-	-	>1	>1	-
613	[3Pal5;Phe6]GpTx-1(1-34)	-	12.3	>10	0.063	-	-	195	>159	-
636	[2-Abu5;Leu6]GpTx-1(1-34)	-	3.211	>10	0.022	-	-	146	>455	-
635	[Aib5;Leu6]GpTx-1(1-34)	-	6.89	>10	0.02	-	-	345	>500	-
661	[Leu5,6]GpTx-1(1-34)	-	4.387	>10	0.011	-	-	399	>909	-
641	[Met5;Leu6]GpTx-1(1-34)	-	3.591	>10	0.27	-	-	13	>37	-
673	[NMeLeu5;Leu6]GpTx-1(1-34)	-	1.893	>10	0.012	-	-	158	>833	-

[0980]

674	[NMePhe5;Leu6]GpTx-1(1-34)	-	1.232	11.26	0.012	-	-	103	938	-
672	[NMeVal5;Leu6]GpTx-1(1-34)	-	5.495	>10	0.05	-	-	110	>200	-
705	[Nva5;Glu28]GpTx-1(1-34)	-	>10	>10	0.056	-	-	>179	>179	-
637	[Nva5;Leu6]GpTx-1(1-34)	-	9.928	>10	0.083	-	-	120	>120	-
632	[Sar5;Phe6]GpTx-1(1-34)	-	2.4	>10	0.025	-	-	96	>400	-
617	[Ser5;Phe6]GpTx-1(1-34)	-	3.63	>10	0.024	-	-	151	>417	-
659	[Tle5;Leu6]GpTx-1(1-34)	-	5.862	>10	0.017	-	-	345	>588	-
644	[Val5;Leu6]GpTx-1(1-34)	-	6.666	>10	0.2	-	-	33	>50	-
692	[Ala5;1'NMeW32]GpTx-1(1-34)	-	2.81	>10	0.018	-	-	156	>556	-
694	[Arg4;Met5]GpTx-1(1-34)	-	1.127	13.222	0.029	-	-	39	456	-
620	[DiMeO-F5;Phe6]GpTx-1(1-34)	-	5.09	>10	0.033	-	-	154	>303	-
693	[Met5;1'NMeW32]GpTx-1(1-34)	-	1.43	14.799	0.007	-	-	204	2114	-
723	[Ala5;Leu6;Glu10]GpTx-1(1-34)	-	16.757	>10	0.03	-	-	559	>333	-
708	[Nva5;Leu6;Glu28]GpTx-1(1-34)	-	>10	>10	0.042	-	-	>238	>238	-

[0981]

703	[Ala5;Phe6;Glu12]GpTx-1(1-34)	-	1.529	>10	0.028	-	-	55	>357	-
725	[Ala5;Nle6;Glu12]GpTx-1(1-34)	-	6.452	>10	0.023	-	-	281	>435	-
732	[Ala5,25;Phe6]GpTx-1(1-34)	-	7.788	>10	0.086	-	-	91	>116	-
809	[Ala5;Phe6;Arg28]GpTx-1(1-34)	-	3.29	>10	0.012	-	-	274	>833	-
810	[Ala5;Leu6;Arg28]GpTx-1(1-34)	-	6.89	>10	0.009	-	-	766	>1111	-
515	[Phe6; Atz(氨基-PEG10)13]GpTx-1(1-34)	-	0.14	n.d.	0.003	-	-	47	-	-
516	[Phe6;Atz(氨基-PEG10)22]GpTx-1(1-34)	-	0.422	n.d.	0.003	-	-	141	-	-
517	[Phe6;Atz(氨基-PEG10)33]GpTx-1(1-34)	-	0.353	n.d.	0.027	-	-	13	-	-
526	[Phe6;Atz(氨基-PEG10)15]GpTx-1(1-34)	-	0.179	n.d.	0.006	-	-	30	-	-
593	[Phe6,Atz(20kDa PEG)28]GpTx-1(1-34)	-	10	>10	0.733	-	-	14	>14	-
594	[Phe6,Atz(20kDa PEG)22]GpTx-1(1-34)	-	10	>10	0.728	-	-	14	>14	-
518	[Atz(氨基-PEG10)1;Ala5;Phe6]GpTx-1(1-34)	-		n.d.	0.264	-	-	0	-	-
519	[Ala5;Phe6;Atz(氨基-PEG10)12]GpTx-1(1-34)	-	0.463	n.d.	0.039	-	-	12	-	-

[0982]

520	[Ala5;Phe6;Atz(氨 基-PEG10)13]GpTx-1(1-34)	-		n.d.	0.093	-	-	0	-	-
521	[Ala5;Phe6;Atz(氨 基-PEG10)33]GpTx-1(1-34)	-		n.d.	0.296	-	-	0	-	-
522	[Phe6;Atz(氨 基-PEG10)33;1-Nal34]GpTx-1(1-34)	-	0.097	n.d.	0.003	-	-	32	-	-
523	[Phe6;Leu26;Atz(氨基-PEG10)33]GpTx-1(1-34)	-	0.209	n.d.	0.02	-	-	10	-	-
524	[Ala5;Phe6;Atz(氨 基-PEG10)15]GpTx-1(1-34)	-	0.85	n.d.	0.02	-	-	43	-	-
525	[Ala5;Phe6;Atz(氨 基-PEG10)22]GpTx-1(1-34)	-		n.d.	0.119	-	-	0	-	-
527	[Phe6;Atz(氨 基-PEG10)12;1-Nal34]GpTx-1(1-34)	-	0.108	n.d.	0.014	-	-	8	-	-
100	Ala-GpTx-1(1-34)	-	0.655	10	0.012	-	-	55	833	-
811	Gly-Ser-[Ala5;Phe6;Arg28]GpTx-1(1-34)	-	1.73	>10	0.011	-	-	157	>909	-
812	Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)	-	9.77	>10	0.012	-	-	814	>833	-
814	[Ala5;Leu6;Arg28]GpTx-1(1-34)-Trp- 游 离酸	-	>10	>10	0.05	-	-	>200	>200	-
817	Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	-	7	>10	0.116	-	-	60	>86	-
819	Gly-Ser-[Ala5;Phe6;Arg28]GpTx-1(1-34)-Phe-游离酸	-	>7	>10	0.047	-	-	>149	>213	-

[0983]

820	Gly-Ser-[Ala5;Leu6;Arg28]GpTx-1(1-34)-Phe-游离酸	-	>10	>10	0.056	-	-	>179	>179	-
414	GpTx-1(1-34)-2PAL	-	1.01	>10	0.027	-	-	37	>370	-
435	[Ala5;Glu28]GpTx-1(1-34)	-	>10	>10	0.614	-	-	>16	>16	-
761	[Ala5;Guf28]GpTx-1(1-34)	-	5.08	>10	0.005	-	-	1016	>2000	-
762	[Ala5;Dab28]GpTx-1(1-34)	-	13.7	>10	0.013	-	-	1054	>769	-
744	[Ala5;hArg28]GpTx-1(1-34)	-	>10	>10	0.014	-	-	>714	>714	-
749	[Ala5;HCit28]GpTx-1(1-34)	-	>10	>10	0.025	-	-	>400	>400	-
737	[Ala5;His28]GpTx-1(1-34)	-	>10	>10	0.026	-	-	>385	>385	-
748	[Ala5;Cit28]GpTx-1(1-34)	-	>10	>10	0.03	-	-	>333	>333	-
739	[Ala5;Gln28]GpTx-1(1-34)	-	>10	>10	0.037	-	-	>270	>270	-
743	[Ala5;SDMA28]GpTx-1(1-34)	-	>10	>10	0.041	-	-	>244	>244	-
738	[Ala5;Ser28]GpTx-1(1-34)	-	>10	>10	0.045	-	-	>222	>222	-
745	[Ala5;R(Me)28]GpTx-1(1-34)	-	>10	>10	0.051	-	-	>196	>196	-
746	[Ala5;Orn28]GpTx-1(1-34)	-	>10	>10	0.059	-	-	>169	>169	-

[0984]

753	[2-Abu5;Nle6]GpTx-1 (1-34)	-	0.94	>10	0.001	-	-	940	>10000	-
700	[Ala5;Asp10]GpTx-1(1-34)	-	>10	>10	0.05	-	-	>200	>200	-
704	[Val5;Glu28]GpTx-1(1-34)	-	>10	>10	0.029	-	-	>345	>345	-
709	[Val5;Leu6;Glu28]Gp Tx-1(1-34)	-	>10	>10	0.086	-	-	>116	>116	-
701	[Ala5;Asp10;Glu12]G pTx-1(1-34)	-	>10	>10	0.554	-	-	>18	>18	-
710	[Val5;Asp10]GpTx-1(1-34)	-	>10	>10	0.174	-	-	>57	>57	-
711	[Val5;Glu12]GpTx-1(1-34)	-	11.96	>10	0.074	-	-	162	>135	-
712	[Val5;Asp10;Glu12]G pTx-1(1-34)	-	>10	>10	0.116	-	-	>86	>86	-
713	[Val5;Cit25]GpTx-1(1 -34)	-	>10	>10	0.028	-	-	>357	>357	-
702	[Ala5;Phe6;Asp10]Gp Tx-1(1-34)	-	6.08	>10	0.04	-	-	152	>250	-
722	[Ala5;Nle6;Glu10]Gp Tx-1(1-34)	-	>10	>10	0.096	-	-	>104	>104	-
724	[Ala5;Phe6;Glu10]Gp Tx-1(1-34)	-	11.07	>10	0.079	-	-	140	>127	-
726	[Ala5;Leu6;Glu12]Gp Tx-1(1-34)	-	12.3	>10	0.021	-	-	586	>476	-
727	[Ala5;Nle6;Glu28]Gp Tx-1(1-34)	-	>10	>10	0.08	-	-	>125	>125	-

[0985]

--	[Ala5,Phe6,Atz(2 kDa EtO-PEG*-{[Ala5,Phe6,Atz13*,Leu26,Arg28]GpTx-1(1-34)})13,Leu26,Arg28]GpTx-1(1-34); * = Et（同二聚偶联物 3）	-	2.2	19.2	0.091	-	-	24	211	-
1029	生物素 [长链]-[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34)	-	27.3	>10	0.011	-	-	2482	>909	-
1030	[Ala5;Phe6;Glu10;K(生物素)13;Leu26;Arg28]GpTx-1(1-34)	-	7.13	>10	0.015	-	-	475	>667	-
--	生物素-Ahx-[Ala5,Phe6,Atz(2 kDa EtO-PEG*-{生物素 }-Ahx-[Ala5,Phe6,Atz13*,Leu26,Arg28]GpTx-1(1-34)})13,Leu26,Arg28]GpTx-1(1-34); * = Et（同二聚偶联物 4）	-	3.43	>10	0.091	-	-	38	>110	-
1032	DOTA-[Ala5]GpTx-1(1-34)	-	>10	>10	0.152	-	-	>66	>66	-
1033	[Ala5;Phe6;K(DOTA)13;Leu26;Arg28]GpTx-1(1-34)	-	13.1	>10	0.0275	-	-	476	>364	-
30	[Glu29]GpTx-1(1-34)	-	>10	>10	>10	-	-	-	-	-
22	[Ala5]GpTx-1(1-34)	-	10.426	>10	0.034	-	-	307	>294	-

[0986]

22	[Ala5]GpTx-1(1-34)	-	10.392	>10	0.03	-	-	346	>333	-
153	[Glu28]GpTx-1	-	18.1	>10	0.0501	-	-	361	>200	-
809	[Ala5;Phe6;Arg28]GpTx-1(1-34)	-	3.29	>10	0.012	-	-	274	>833	-
810	[Ala5;Leu6;Arg28]GpTx-1(1-34)	-	6.89	>10	0.009	-	-	766	>1111	-
1034	[Ala5,Phe6,2-Abu13,Leu26,Arg28]GpTx-1(1-34)	-	7.26	>10	0.0047	-	-	1545	>2128	-
1035	[Ala5,Phe6,Glu10,2-Abu13,Leu26,Arg28]GpTx-1(1-34)	-	16.6	>10	0.0035	-	-	4743	>2857	-
1036	[Ala5,Leu6,2-Abu13,Leu26,Arg28]GpTx-1(1-34)	-	18	>10	0.0087	-	-	2069	>1149	-
640	[Ala5,Phe6,**Pra**13,Leu26,Arg28]GpTx-1(1-34)	-	4.029	>10	0.003	-	-	1343	>3333	-
798	[Ala5;Phe6;Glu10;**Pra**13;Leu26;Arg28]GpTx-1(1-34)	-	10.4	15.3	0.012	-	-	867	1275	-
796	[Ala5;Leu6,26;**Pra**13;Arg28]GpTx-1(1-34)	-	10.6	>10	0.009	-	-	1178	>1111	-
800	[Ala5;Leu6,26;Glu10;**Pra**13;Arg28]GpTx-1(1-34)	-	>10	>10	0.013	-	-	>769	>769	-
799	[2-Abu5;Leu6;K(Ac-Pra)13]GpTx-1(1-34)	-	4.66	>10	0.011	-	-	424	>909	-
801	[2-Abu5;Leu6;K(4-Pen)13;Arg28]GpTx-1(1-34)	-	5.71	>10	0.002	-	-	2855	>5000	-

[0987]

807	4-Pen-[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34)	-	7.55	>10	0.003	-	-	2517	>3333	-
756	4-Pen-[Ala5;Phe6;2-Abu13;Arg28]GpTx-1(1-34)	-	3.34	>10	0.004	-	-	835	>2500	-
794	[Ala5;Phe6;**K(Ac-Pra**)13]GpTx-1(1-34)	-	1.46	>10	0.011	-	-	133	>909	-
1037	[Ala5,Phe6,Atz(PEG11-((2-羟乙基)硫代)乙酰胺)13,Leu26,Arg28]GpTx-1	-	5.07	>10	0.035	-	-	145	>286	-
1038	[Ala5,Phe6,Atz(**PEG3**-(2-羟乙基)硫代乙酰胺)13,Leu26,Arg28]GpTx-1(1-34)	-	1.8	>10	0.003	-	-	600	>3333	-
1039	[Ala5;Phe6;**Glu10**;Atz(PEG11-((2-羟乙基)硫代)乙酰胺)13;Leu26;Arg28]GpTx-1(1-34)	-	>10	>10	0.021	-	-	>476	>476	-
1040	[Ala5;Phe6;**Glu10**;Atz(**PEG3**-((2-羟乙基)硫代)乙酰胺)13;Leu26;Arg28]GpTx-1(1-34)	-	5.95	>10	0.013	-	-	458	>769	-
1041	((2-羟乙基)硫代)乙酰胺-NPEG11-三唑-[2-Abu5,13;Leu6;Arg28]GpTx-1(1-34)	-	>10	>10	0.087	-	-	>115	>115	-
1042	[2-Abu5,Leu6,K(乙基-三唑-PEG11-((2-羟乙基)硫代)乙酰胺)13,Arg28]GpTx-1(1-34)	-	9.88	>10	0.018	-	-	549	>556	-

[0988]

1043	[Ala5;**Leu6**,26;Atz(PEG11-((2-羟乙基)硫代)乙酰胺)13;Arg28]GpTx-1(1-34)	-	>10	>10	0.021	-	-	>476	>476	-
1044	[Ala5;**Leu6**,26;**Glu10**;Atz(PEG11-((2-羟乙基)硫代)乙酰胺)13;Arg28]GpTx-1(1-34)	-	>10	>10	0.054	-	-	>185	>185	-
1045	((2-羟乙基)硫代)乙酰胺-NPEG11-三唑-[Ala5,Phe6,2-Abu13,Arg28]GpTx-1(1-34)	-	9.65	>10	0.074	-	-	130	>135	-
--	Fc-肽偶联物 1	-	2.88	>10	0.002	-	-	1440	>5000	-
--	Fc-肽偶联物 2	-	13.7	>10	0.08	-	-	171	>125	-
--	免疫球蛋白-肽偶联物 1	-	>10	>10	0.565	-	-	>18	>18	-
--	免疫球蛋白-肽偶联物 2	-	6.73	>10	0.026	-	-	259	>385	-
--	Fc-肽偶联物 1	-	>10	>10	0.694	-	-	14	>14	-
--	Fc-肽偶联物 2	-	15.2	>10	0.169	-	-	90	>59	-
--	免疫球蛋白-肽偶联物 1	-	>10	>10	0.716	-	-	>14	>14	-
--	免疫球蛋白-肽偶联物 2	-	7.51	>10	0.079	-	-	95	>127	-
--	Fc-肽偶联物 3	-	>10	>10	1.45	-	-	>7	>7	-

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--	Fc-肽偶联物 4	-	>10	>10	0.474	-	-	>21	>21	-
--	免疫球蛋白-肽偶联物 3	-	>10	>10	0.077	-	-	>130	>130	-
--	免疫球蛋白-肽偶联物 4	-	>10	>10	0.126	-	-	>79	>79	-
--	Fc-肽偶联物 5	-	>10	>10	1.46	-	-	>7	>7	-
--	Fc-肽偶联物 6	-	>10	>10	0.264	-	-	>38	>38	-
--	免疫球蛋白-肽偶联物 5	-	>10	>10	0.927	-	-	>11	>11	-
--	免疫球蛋白-肽偶联物 6	-	>10	>10	0.271	-	-	>37	>37	-
--	Fc-肽偶联物 7	-	n.d.	n.d.	1.034	-	-	-	-	-
--	Fc-肽偶联物 8	-	>10	>10	0.473	-	-	>21	>21	-
--	免疫球蛋白-肽偶联物 7	-	7.87	>10	0.456	-	-	17	>22	-
--	免疫球蛋白-肽偶联物 8	-	0.607	9.24	0.148	-	-	4	62	-

[0990]

表 31. IonWorks® Quattro 测定的电生理： GpTx-1 肽类似物 PEG 偶联物的比较。

SEQ ID NO：	氨基酸序列	命名	IWQ 使用 Nav1.7 (μM)	IWQ 使用 Nav1.5 (μM)	IWQ 使用 Nav1.4 (μM)	IWQ 使用 Nav1.3 (μM)	Nav1.4/Nav 1.7	Nav1.4/Nav 1.3	Nav1.7/Nav 1.3
532	{H}-[Atz(氨基-PEG10)]DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	Atz(氨基-PEG10)-[Phe6]GpTx1(1-34)	0.084	4.95	0.95	0.034	11.3	27.7	2.4
533	{H}-[Atz(氨基-PEG10)]CLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Atz(氨基-PEG10)1;Phe6]GpTx1(1-34)	0.041	6.91	0.25	0.019	6.1	12.9	2.1
534	{H}-DCLG[Atz(氨基-PEG10)]FRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Atz(氨基-PEG10)5;Phe6]GpTx1(1-34)	16.257	14.9	8.9	16.793	0.5	0.5	1.0
535	{H}-DCLGF[Atz(氨基-PEG10)]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Atz(氨基-PEG10)6]GpTx1(1-34)	5.4	6.15	20.26	6.7	3.7	3.0	0.8
536	{H}-DCLGFFRKC[Atz(氨基-PEG10)]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Phe6;Atz(氨基-PEG10)10]GpTx1(1-34)	0.039	7.95	0.32	0.013	8.3	24.6	3.0
537	{H}-DCLGFFRKCI[Atz(氨基-PEG10)]DNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Phe6;Atz(氨基-PEG10)11]GpTx1(1-34)	0.136	8.02	1.10	0.056	8.1	19.6	2.4
538	{H}-DCLGFFRKCIP[Atz(氨基-PEG10)]NDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Phe6;Atz(氨基-PEG10)12]GpTx1(1-34)	0.050	6.31	0.16	0.016	3.2	9.8	3.1
515	{H}-DCLGFFRKCIPD[Atz(氨基-PEG10)]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Phe6;Atz(氨基-PEG10)13]GpTx1(1-34)	0.025	4.710	0.400	0.010	16.2	39.5	2.4
526	{H}-DCLGFFRKCIPDND[Atz(氨基-PEG10)]CCRPNLVCSRTHKWCKYVF-{酰胺}	[Phe6;Atz(氨基-PEG10)15]GpTx1(1-34)	0.046	>5	1.177	0.024	25.8	50.1	1.9
539	{H}-DCLGFFRKCIPDNDKCCRP[Atz(氨基-PEG10)]LVCSRTHKWCKYVF-{酰胺}	[Phe6;Atz(氨基-PEG10)20]GpTx1(1-34)	0.538	8.9	5.6	0.250	10.4	22.4	2.1
540	{H}-DCLGFFRKCIPDNDKCCRPN[Atz(氨基-PEG10)]VCSRTHKWCKYVF-{酰胺}	[Phe6;Atz(氨基-PEG10)21]GpTx1(1-34)	0.763	11.4	12.0	0.587	15.8	20.5	1.3

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516	{H}-DCLGFFRKCIPDNDKCCRPNL[Atz(氨基-PEG10)]CSRTHKWCKYVF-{酰胺}	[Phe6;Atz(氨基-PEG10)22]GpTx1(1-34)	0.111	7.9	1.1	0.059	10.1	19.1	1.9
541	{H}-DCLGFFRKCIPDNDKCCRPNLVC[Atz(氨基-PEG10)]RTHKWCKYVF-{酰胺}	[Phe6;Atz(氨基-PEG10)24]GpTx1(1-34)	1.738	6.2	8.9	0.701	5.1	12.7	2.5
542	{H}-DCLGFFRKCIPDNDKCCRPNLVCS[Atz(氨基-PEG10)]THKWCKYVF-{酰胺}	[Phe6;Atz(氨基-PEG10)25]GpTx1(1-34)	0.304	10.2	4.0	0.206	13.1	19.3	1.5
543	{H}-DCLGFFRKCIPDNDKCCRPNLVCSR[Atz(氨基-PEG10)]HKWCKYVF-{酰胺}	[Phe6;Atz(氨基-PEG10)26]GpTx1(1-34)	0.631	8.0	9.4	0.478	14.9	19.6	1.3
544	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRT[Atz(氨基-PEG10)]KWCKYVF-{酰胺}	[Phe6;Atz(氨基-PEG10)27]GpTx1(1-34)	2.6	>5	>5	3.7	######	########	0.7
545	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTH[Atz(氨基-PEG10)]WCKYVF-{酰胺}	[Phe6;Atz(氨基-PEG10)28]GpTx1(1-34)	0.049	5.9	22.3	0.036	453.4	625.5	1.4
546	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHK[Atz(氨基-PEG10)]CKYVF-{酰胺}	[Phe6;Atz(氨基-PEG10)29]GpTx1(1-34)	0.31	>5	>5	1.1	######	########	0.3
547	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCK[Atz(氨基-PEG10)]VF-{酰胺}	[Phe6;Atz(氨基-PEG10)32]GpTx1(1-34)	5.0	>5	>5	>5	######	########	######
517	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYI Atz(氨基-PEG10)]F-{酰胺}	[Phe6;Atz(氨基-PEG10)33]GpTx1(1-34)	0.10	>5	1.1	0.032	10.3	33.5	3.3
548	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYV [Atz(氨基-PEG10)]-{酰胺}	[Phe6;Atz(氨基-PEG10)34]GpTx1(1-34)	5.0	>5	>5	1.6	######	########	3.2
549	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYV F[Atz(氨基-PEG10)]-{酰胺}	[Phe6]GpTx1(1-34)-Atz(氨基-PEG10)	0.36	>5	>5	0.12	######	########	3.0
550	{H}-[Atz(氨基-PEG10)]DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{酰胺}	Atz(氨基-PEG10)-[Phe6;1-Nal34]GpTx1(1-34)	0.029	6.80	0.15	0.004			
551	{H}-[Atz(氨基-PEG10)]CLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{酰胺}	[Atz(氨基-PEG10)1;Phe6;1-Nal34]GpTx1(1-34)	0.039	4.3	0.36	0.014	9.2	24.9	2.7
552	{H}-DCLG[Atz(氨基-PEG10)]FRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{酰胺}	[Atz(氨基-PEG10)5;Phe6;1-Nal34]GpTx1(1-34)	4.6	>5	>5	2.5	######	########	1.8
553	{H}-DCLGF[Atz(氨基-PEG10)]RKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{酰胺}	[Atz(氨基-PEG10)6;1-Nal34]GpTx1(1-34)	4.1	>5	>5	>5	######	########	######
554	{H}-DCLGFFRKC[Atz(氨基-PEG10)]PDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{	[Phe6;Atz(氨基-PEG10)10;1-Nal34]GpTx1(1-	0.058	8.61	0.14	0.015			

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	酰胺}	34)								
527	{H}-DCLGFFRKCIP[Atz(氨基-PEG10)]NDKCCRPNLVCSRTHKWCKYV[1-Nal]-{酰胺}	[Phe6;Atz(氨基-PEG10)12;1-Nal34]GpTx1(1-34)	0.015	1.6	0.11	0.012	7.1	8.9		1.3
555	{H}-DCLGFFRKCIPDNDKCCRPNLVC[Atz(氨基-PEG10)]RTHKWCKYV[1-Nal]-{酰胺}	[Phe6;Atz(氨基-PEG10)24;1-Nal34]GpTx1(1-34)	0.57	>5	>5	0.35	######	########		1.6
556	{H}-DCLGFFRKCIPDNDKCCRPNLVCSR[Atz(氨基-PEG10)]HKWCKYV[1-Nal]-{酰胺}	[Phe6;Atz(氨基-PEG10)26;1-Nal34]GpTx1(1-34)	0.32	>5	>5	0.32	######	########		1.0
557	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRT[Atz(氨基-PEG10)]KWCKYV[1-Nal]-{酰胺}	[Phe6;Atz(氨基-PEG10)27;1-Nal34]GpTx1(1-34)	0.90	>5	>5	0.82	######	########		1.1
558	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHK[Atz(氨基-PEG10)]CKYV[1-Nal]-{酰胺}	[Phe6;Atz(氨基-PEG10)29;1-Nal34]GpTx1(1-34)	0.093	>5	>5	0.14	######	########		0.7
559	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCK[Atz(氨基-PEG10)]V[1-Nal]-{酰胺}	[Phe6;Atz(氨基-PEG10)32;1-Nal34]GpTx1(1-34)	5.0	>5	>5	2.2	######	########		2.3
522	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKY[Atz(氨基-PEG10)][1-Nal]-{酰胺}	[Phe6;Atz(氨基-PEG10)33;1-Nal34]GpTx1(1-34)	0.032	>5	0.39	0.014	12.0	27.3		2.3
560	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal][Atz(氨基-PEG10)]-{酰胺}	[Phe6;1-Nal34]GpTx1(1-34)-Atz(氨基-PEG10)	0.12	>5	2.2	0.037	18.3	58.3		3.2
561	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRTHKWCKYV[1-Nal]-{酰胺}	[Phe6;1-Nal34]GpTx1(1-34)	0.011	2.2	0.17	0.007	14.7	23.5		1.6
562	{H}-[Atz(氨基-PEG10)]DCLGAFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	Atz(氨基-PEG10)-[Ala5;Phe6]GpTx1(1-34)	0.24	>5	2.8	0.14	11.9	20.7		1.7
518	{H}-[Atz(氨基-PEG10)]CLGAFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Atz(氨基-PEG10)1;Ala5;Phe6]GpTx1(1-34)	0.36	>5	>5	0.14	######	########		2.5
563	{H}-DC[Atz(氨基-PEG10)]GAFRKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Atz(氨基-PEG10)3;Ala5;Phe6]GpTx1(1-34)	0.20	>5	>5	0.072	######	########		2.7
564	{H}-DCL[Atz(氨基-PEG10)]AFRKCIPDNDKCCRPNLVCSRTHKWCKYVF	[Atz(氨基-PEG10)4;Ala5;Phe6]GpTx1(1	2.8	>5	>5	1.4	######	########		2.0

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	-{酰胺}	-34)								
565	{H}-DCLGA[Atz(氨基 -PEG10)]RKCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala5;Atz(氨基 -PEG10)6]GpTx1(1-34)	5.0	>5	>5	>5	######	########	######
566	{H}-DCLGAF[Atz(氨基 -PEG10)]KCIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala5;Phe6;Atz(氨基 -PEG10)7]GpTx1(1-34)	5.0	>5	>5	>5	######	########	######
567	{H}-DCLGAFR[Atz(氨基 -PEG10)]CIPDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala5;Phe6;Atz(氨基 -PEG10)8]GpTx1(1-34)	2.3	>5	>5	1.4	######	########	1.6
568	{H}-DCLGAFRKC[Atz(氨基 -PEG10)]PDNDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala5;Phe6;Atz(氨基 -PEG10)10]GpTx1(1-34)	0.26	>5	>5	0.076	######	########	3.5
519	{H}-DCLGAFRKCIP[Atz(氨基 -PEG10)]NDKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala5;Phe6;Atz(氨基 -PEG10)12]GpTx1(1-34)	0.17	>5	1.5	0.088	8.7	16.8	1.9
520	{H}-DCLGAFRKCIPD[Atz(氨基 -PEG10)]DKCCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala5;Phe6;Atz(氨基 -PEG10)13]GpTx1(1-34)	0.27	>5	>5	0.11	######	########	2.5
524	{H}-DCLGAFRKCIPDND[Atz(氨基 -PEG10)]CCRPNLVCSRTHKWCKYVF-{酰胺}	[Ala5;Phe6;Atz(氨基 -PEG10)15]GpTx1(1-34)	0.21	>5	3.7	0.089	17.5	41.2	2.3
569	{H}-DCLGAFRKCIPDNDKCC[Atz(氨基 -PEG10)]PNLVCSRTHKWCKYVF-{酰胺}	[Ala5;Phe6;Atz(氨基 -PEG10)18]GpTx1(1-34)	0.23	>5	>5	0.11	######	########	2.2
570	{H}-DCLGAFRKCIPDNDKCCR[Atz(氨基 -PEG10)]NLVCSRTHKWCKYVF-{酰胺}	[Ala5;Phe6;Atz(氨基 -PEG10)19]GpTx1(1-34)	0.64	>5	>5	0.52	######	########	1.2
571	{H}-DCLGAFRKCIPDNDKCCRP[Atz(氨基 -PEG10)]LVCSRTHKWCKYVF-{酰胺}	[Ala5;Phe6;Atz(氨基 -PEG10)20]GpTx1(1-34)	5.0	>5	>5	4.0	######	########	1.3
572	{H}-DCLGAFRKCIPDNDKCCRPN[Atz(氨基 -PEG10)]VCSRTHKWCKYVF-{酰胺}	[Ala5;Phe6;Atz(氨基 -PEG10)21]GpTx1(1-34)	5.0	>5	>5	1.8	######	########	2.8
525	{H}-DCLGAFRKCIPDNDKCCRPNL[Atz(氨基 -PEG10)]CSRTHKWCKYVF-{酰胺}	[Ala5;Phe6;Atz(氨基 -PEG10)22]GpTx1(1-34)	0.66	>5	>5	0.23	######	########	2.9
573	{H}-DCLGAFRKCIPDNDKCCRPNLVC[Atz(氨基 -PEG10)]RTHKWCKYVF-{酰胺}	[Ala5;Phe6;Atz(氨基 -PEG10)24]GpTx1(1-34)	5.0	>5	>5	>5	######	########	######
574	{H}-DCLGAFRKCIPDNDKCCRPNLVCS[Atz(氨基 -PEG10)]THKWCKYVF-{酰胺}	[Ala5;Phe6;Atz(氨基 -PEG10)25]GpTx1(1-34)	0.90	>5	>5	1.6	######	########	0.6
575	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRT[Atz(氨基 -PEG10)]KWCKYVF-{酰胺}	[Ala5;Phe6;Atz(氨基 -PEG10)27]GpTx1(1-34)	5.0	>5	>5	>5	######	########	######
576	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTH[Atz(氨基	[Ala5;Phe6;Atz(氨基	1.7	>5	>5	1.7	######	########	1.0

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	-PEG10)]WCKYVF-{酰胺}	-PEG10)28]GpTx1(1-34)							
577	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHK[Atz(氨基-PEG10)]CKYVF-{酰胺}	[Ala5;Phe6;Atz(氨基-PEG10)29]GpTx1(1-34)	5.0	>5	>5	>5	######	########	######
578	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHKWCK[Atz(氨基-PEG10)]VF-{酰胺}	[Ala5;Phe6;Atz(氨基-PEG10)32]GpTx1(1-34)	5.0	>5	>5	>5	######	########	######
521	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHKWCKY[Atz(氨基-PEG10)]F-{酰胺}	[Ala5;Phe6;Atz(氨基-PEG10)33]GpTx1(1-34)	1.5	>5	>5	0.41	######	########	3.7
579	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHKWCKYVF[Atz(氨基-PEG10)]-{酰胺}	[Ala5;Phe6]GpTx1(1-34)-Atz(氨基-PEG10)	5.0	>5	>5	>5	######	########	######
580	{H}-DCLGAFRKCIPDNDKCCRPNLVCSRTHKWCKYVFW[Atz(氨基-PEG10)]-{酰胺}	[Ala5;Phe6]GpTx1(1-34)-Trp-Atz(氨基-PEG10)	1.2	>5	>5	0.77	######	########	1.6
581	{H}-[Atz(氨基-PEG10)]CLGFFRKCIPDNDKCCRPNLVCSRLHKWCKYVF-{酰胺}	[Atz(氨基-PEG10)1;Phe6;Leu26]GpTx1(1-34)	0.025	6.22	0.29	0.018			
582	{H}-DCLG[Atz(氨基-PEG10)]FRKCIPDNDKCCRPNLVCSRLHKWCKYVF-{酰胺}	[Atz(氨基-PEG10)5;Phe6;Leu26]GpTx1(1-34)	7.9	8.08	17.21	4.0			
583	{H}-DCLGF[Atz(氨基-PEG10)]RKCIPDNDKCCRPNLVCSRLHKWCKYVF-{酰胺}	[Atz(氨基-PEG10)6;Leu26]GpTx1(1-34)	7.4	8.36	20.91	5.8			
523	{H}-DCLGFFRKC[Atz(氨基-PEG10)]PDNDKCCRPNLVCSRLHKWCKYVF-{酰胺}	[Phe6;Atz(氨基-PEG10)10;Leu26]GpTx1(1-34)	0.027	7.19	0.50	0.014			
584	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRLHK[Atz(氨基-PEG10)]CKYVF-{酰胺}	[Phe6;Leu26;Atz(氨基-PEG10)29]GpTx1(1-34)	0.76	>5	>5	1.6	######	########	0.5

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585	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRLHKWCK[Atz(氨基-PEG10)]VF-{酰胺}	[Phe6;Leu26;Atz(氨基-PEG10)32]GpTx1(1-34)	5.0	>5	>5	>5	######	########	######
586	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRLHKWCKY[Atz(氨基-PEG10)]F-{酰胺}	[Phe6;Leu26;Atz(氨基-PEG10)33]GpTx1(1-34)	0.055	>5	1.8	0.026	33.1	69.6	2.1
587	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRLHKWCKYV[Atz(氨基-PEG10)]-{酰胺}	[Phe6;Leu26;Atz(氨基-PEG10)34]GpTx1(1-34)	1.4	>5	>5	1.1	######	########	1.2
588	{H}-DCLGFFRKCIPDNDKCCRPNLVCSRLHKWCKYVF[Atz(氨基-PEG10)]-{酰胺}	[Phe6;Leu26]GpTx1(1-34)-Atz(氨基-PEG10)	0.43	>5	>5	0.13	######	########	3.3

[0996] 表 32. PatchXpress®测定的偶联 GpTx-1 肽类似物的 Nav1.7 使用 IC50。

[0997]

SEQ ID NO:	命名	Nav1.7 使用 IC50 (μM)
1	GpTx-1(1-34)	0.005
515	[Phe6;Atz(氨基-PEG10)13]GpTx1(1-34)	0.022
515	[Phe6;Atz(氨基-PEG10)13]GpTx1(1-34)	0.003
516	[Phe6;Atz(氨基-PEG10)22]GpTx1(1-34)	0.003
517	[Phe6;Atz(氨基-PEG10)33]GpTx1(1-34)	0.027
518	[Atz(氨基-PEG10)1;Ala5;Phe6]GpTx1(1-34)	0.264
519	[Ala5;Phe6;Atz(氨基-PEG10)12]GpTx1(1-34)	0.039
520	[Ala5;Phe6;Atz(氨基-PEG10)13]GpTx1(1-34)	0.093
521	[Ala5;Phe6;Atz(氨基-PEG10)33]GpTx1(1-34)	0.296
522	[Phe6;Atz(氨基-PEG10)33;1-Nal34]GpTx1(1-34)	0.003
523	[Phe6;Leu26;Atz(氨基-PEG10)33]GpTx1(1-34)	0.020
524	[Ala5;Phe6;Atz(氨基-PEG10)15]GpTx1(1-34)	0.020
525	[Ala5;Phe6;Atz(氨基-PEG10)22]GpTx1(1-34)	0.119
526	[Phe6;Atz(氨基-PEG10)15]GpTx1(1-34)	0.006
527	[Phe6;Atz(氨基-PEG10)12;1-Nal34]GpTx1(1-34)	0.014

[0998] 实施例 4：血浆稳定性研究

[0999] 在人类、大鼠和小鼠血浆中研究了 GpTx-1 肽和 GpTx-1 肽类似物的稳定性。通过 GpTx-1 肽和 GpTx-1 肽类似物参考标准品在 50/50(v/v) 甲醇 / 水中制备了肽储备溶液，然后保存在 -20℃下。将 1mg/mL 的肽储备溶液用于在 HPLC 级水中配制 20μg/mL 的肽工作溶液。在使用前，将肽工作溶液保存在 2 至 8℃的冷藏机中。

[1000] 通过将 225μl 血浆加到装有 25μl 20μg/mL 的肽工作溶液的小瓶中制备了稳定性样品，然后在 37℃下孵育。人、大鼠或小鼠血浆中各肽的初始浓度为 2μg/mL。在五个时

间点(0、2、4、8和24小时)取25μl等分血浆样品加到96孔板的合适孔中,然后添加25μl内标溶液(100ng/mL,在50/50甲醇/水中制备的NAV肽类似物)和100μL0.1%的甲酸,将样品涡旋混合。将Oasis HLB μElution96孔固相萃取板用于从预处理的血浆样品中萃取GpTx-1或GpTx-肽模拟肽,将萃取物进样到(10μL)LC-MS/MS系统进行分析。

[1001] LC-MS/MS由与具有Turbo IonSpray® 电离源的5500QTRAP质谱仪(AB Sciex,Toronto,Canada)联用的Acquity UPLC系统(Waters,Milford,MA)组成。分析柱为Acquity UPLC BEH C_{18}2.1mm×50mm柱。流动相为0.1%的甲酸的乙腈/水溶液(5/95,v/v,流动相A)和0.1%的甲酸的乙腈/水溶液(95/5,v/v,流动相B)。使用AB Sciex Analyst®软件(版本1.5)收集和处理数据。

[1002] 所测试的肽的血浆稳定性来源于从LC-MS/MS分析中获得的对应于肽和内标的峰面积比,将所有数据归一化到0小时时间点的值。结果在下文的表33、表34和表35中示出。所测试的GpTx-1和GpTx-1肽类似物显示出在人、小鼠和大鼠血浆中显著的稳定性,这可能是由于它们紧凑、二硫键稳定化的结构。

[1003] 表33.GpTx-1和GpTx-1肽类似物在人血浆中的稳定性。

[1004]

	肽的保留百分比				
孵育时间(h)	GpTx-1(1-34); SEQ ID NO:1	[1-Nal10] GpTx-1(1-34); SEQ ID NO:78	[Ala5]GpTx-1(1-34); SEQ ID NO:22	GpTx-1(2-34); SEQ ID NO:108	Ac-GpTx-1(1-34); SEQ ID NO:132
0	100	100	100	100	100
2	102	99	105	107	100
4	101	93	99	92	104
8	98	97	101	91	101
24	93	82	105	82	97

[1005] 表34.GpTx-1和GpTx-1肽类似物在小鼠血浆中的稳定性。

[1006]

	肽的保留百分比				
孵育时间(h)	GpTx-1(1-34); SEQ ID NO:1	[1-Nal10]GpTx-1(1-34); SEQ ID NO:78	[Ala5]GpTx-1(1-34); SEQ ID NO:22	GpTx-1(2-34); SEQ ID NO:108	Ac-GpTx-1(1-34); SEQ ID NO:132
0	100	100	100	100	100
2	103	98	106	100	105
4	105	92	107	95	103
8	97	92	105	87	103
24	93	88	99	81	106

[1007] 表 35.GpTx-1 和 GpTx-1 肽类似物在大鼠血浆中的稳定性。

[1008]

	肽的保留百分比	
孵育时间(h)	GpTx-1(1-34); SEQ ID NO:1	[1-Nal10]GpTx-1(1-34); SEQ ID NO:78
0	100	100
2	110	104
4	109	106
6	100	108
8	111	112
24	91	89

[1009] 实施例 5 :GpTx-1 肽类似物的聚乙二醇化偶联物研究

[1010] 为了鉴定 GpTx-1 内能够通过半衰期延长部分修饰的位点,制备了一些列在各个非半胱氨酸位置包含炔丙基甘氨酸的位置类似物。在折叠后,使含有炔烃的肽接受与约 500Da 分子量的叠氮基 PEG 的铜催化 1,3- 偶极环加成反应,以得到具有三唑键合的位点特异性聚乙二醇化肽,从而将序列中的炔丙基甘氨酸或 Pra 残基转化成 3-(1,2,3- 三唑 -4- 基) 丙氨酸或 Atz 残基。该系列类似物的电生理筛选 (上文的表 30、31 和 32) 鉴定出了 GpTx-1 内的多个位点,包括 SEQ ID NO :1 的 N 端以及第 1、10、12、13、15、22、28 和 33 位,其中大的化学部分能够引入而不显著降低在 $Na_v1.7$ 或 $Na_v1.3$ 的效力。一般来讲,这些位置往往位于 GpTx-1 的亲水性表面上,远离疏水性结合面或围绕疏水性结合面的周边。鉴定了这些位置后,制备了 [Phe6 ;Atz13]GpTx-1(1-34)(SEQ ID NO :591) 或 [Ala5 ;Phe6 ;Atz13]GpTx-1(1-34)(SEQ ID NO :1028) 或生物素 -Ahx--[Ala5,Phe6,Atz13,Leu26,Arg28]GpTx-1(1-34)(SEQ ID NO :1031) 的较高分子量偶联物 (20kDa PEG ;SEQ ID NO :590) 和同二聚构建体 (参见图 81A) 并进行了测试 (参见表 30 和图 46-58)。将这些在相对于天然 GpTx-1 序列 (SEQ ID NO :1) 第 13 位具有不同大小的共价连接到两种肽每一者的 PEG 接头的同二聚体中的四种命名如下 (* = 乙基) :

[1011] [Phe6，Atz(2kDa EtO-PEG*-{[Phe6，Atz13*]GpTx-1(1-34)})13]GpTx-1(1-34)(“同二聚偶联物 1”)(参见图 81A)；

[1012] [Phe6，Atz(500Da EtO-PEG*-{[Phe6，Atz13*]GpTx-1(1-34)})13]GpTx-1(1-34)(“同二聚偶联物 2”)；

[1013] [Ala5，Phe6，Atz(2kDa EtO-PEG*-{[Ala5，Phe6，Atz13*，Leu26，Arg28]GpTx-1(1-34)})13，Leu26，Arg28]GpTx-1(1-34)(“同二聚偶联物 3”)；

[1014] 生物素-Ahx-[Ala5，Phe6，Atz(2kDa EtO-PEG*-{生物素-Ahx-[Ala5，Phe6，Atz13*，Leu26，Arg28]GpTx-1(1-34)})13，Leu26，Arg28]GpTx-1(1-34)(“同二聚偶联物 4”)。

[1015] 实施例 6：GpTx-1 的 NMR 结构测定

[1016] 在水中、pH 约 3 和 T = 298K 条件下通过高分辨率 NMR 光谱获得了 GpTx-1 的结构。使用标准 2D 实验在 Bruker Avance III800MHz 光谱仪上采集了数据。(参见 Wutchrich，NMR of Proteins and Nucleic Acids，John Wiley & Sons，Canada，(1986))。使用 Cyana2.1 软件，根据 500NOE 限制条件 (216 长程)、45 二面角限制条件、11 氢键限制条件以及 3 二硫键限制条件计算了结构。主链原子的最终 RMSD 为 0.1±0.05A，而所有重原子的最终 RMSD 为 0.74±0.12A。(有关肽主链的 20 种最低能量构象的叠加图，参见图 7；有关来自肽的 20 种最低能量构象的重原子的叠加图，参见图 8；有关肽主链的带状图示，参见图 9)。该结构证实 6 个半胱氨酸残基的二硫键连接为 C_2-C_{17}、C_9-C_{23} 和 C_{16}-C_{30} 或 C1-C4、C2-C5、C3-C6 模式，从而使 GpTx-1 成为肽的抑制性胱氨酸结 (ICK) 家族的成员。

[1017] GpTx-1(SEQ ID NO：1) 的折叠结构在性质上为两亲的，其中平坦疏水面在分子的一侧，而亲水 (在大多数情况下为阳离子型) 面在相对侧。GpTx-1 的系统类比 (具体地讲，用丙氨酸和谷氨酸进行位置扫描) 鉴定出若干残基对 $Na_v1.7$ 和 $Na_v1.3$ 处的活性至关重要。这些残基，即相对于 SEQ ID NO：1 的 Phe5、Met6、His27、Trp29、Lys31、Tyr32 和 Phe34 聚集在 GpTx-1 的一个面上。SEQ ID NO：1 的第 27 至 34 位残基形成 C 端 β 链，而 Phe5 和 Met6 与该链相邻并形成该疏水面的其余部分。由于改变该面的性质的变化会破坏针对 $Na_v1.7$ 和 $Na_v1.3$ 的活性，因此，该结构可为与 VGSC 在结合界面处相互作用的分子的一部分。(参见图 10 和图 11)。

[1018] 实施例 7：在小鼠中进行初步药代动力学测定

[1019] 药代动力学研究。进行了初步药代动力学 (PK) 研究。一项 PK 研究用得自 Charles River Laboratories 的 7 周龄雄性 CD-1 小鼠进行。小鼠具有由供应商置于颈动脉中的导管。经静脉内向 3 只小鼠并经皮下向 3 只小鼠给予 [Ala5]GpTx-1(SEQ ID NO：22)。经皮下向 3 只小鼠给予 GpTx-1(SEQ ID NO：1)。所有剂量均为 1mg/kg 并且静脉内注射经由侧尾静脉进行。在给药后 3、15、30 分钟以及 1、2、4、6、8 和 24 小时采集经静脉内给药动物的血样，在给药后 15、30 分钟以及 1、2、4、6、8 和 24 小时采集经皮下给药动物的血样。对于各样品，经由颈动脉导管收集 15μL 血液并混合在 35μL0.1M 的柠檬酸盐缓冲液中。接着将样品冷冻在 -80℃下直至分析。

[1020] 另一 PK 研究用得自 Taconic 的 7 周龄未经改造的雄性 CD-1 小鼠进行。将 [Ala5]GpTx-1(SEQ ID NO：22) 以 1mg/kg 经皮下给予 12 只小鼠且以 1mg/kg 经由侧尾静脉经静脉内给予 12 只小鼠。在给药后 0.5、1、2、4、8 和 24 小时，对各给药途径的 2 只小鼠实施安乐

死并采集血样和脑。将脑称重并立即冷冻在 -80℃下。将血样收集在经 EDTA 处理的微型容器中然后在 13000rpm 下离心 5 分钟，之后，提取血浆并在 96 孔板中在 -80℃下冷冻。

[1021] 另一 PK 研究用得自 Taconic 的 7 周龄未经改造的 CD-1 小鼠进行。以 5mg/kg 经皮下向 21 只小鼠给予 [Ala5]GpTx-1(SEQ ID NO :22)。在给药后 0.5、1、1.25、1.5、2、3 和 4 小时，对 3 只小鼠实施安乐死并采集血样和脑。将脑称重并立即冷冻在 -80℃下。将血样收集在经 EDTA 处理的微型容器中然后在 13000rpm 下离心 5 分钟，之后，提取血浆并在 96 孔板中在 -80℃下冷冻。

[1022] LC-MS/MS 分析程序。在 50/50(v/v) 甲醇 / 水中由肽参考标准品制备了肽储备溶液 (1mg/mL) 并保存在 -20℃下。使用 1mg/mL 肽储备溶液在 50/50(v/v) 甲醇 / 水中制备了 100μg/mL 的肽工作溶液。将肽工作溶液保存在 2 至 8℃的冷藏机中。

[1023] 在经柠檬酸盐缓冲的小鼠血液 (血液 /0.1M 柠檬酸盐缓冲液，30/70，v/v) 中制备了标准样品。通过在经柠檬酸盐缓冲的小鼠血液中使用 100μg/mL 肽工作溶液连续稀释现制的 5000ng/mL 溶液制备了 5、10、25、50、100、250、500 和 1000ng/mL 的标准浓度。取 25μl 等分血样加到 96 孔板的合适孔中，接着添加 50μl 内标溶液 (100ng/mL，在 50/50 甲醇 / 水中制备的肽类似物) 和 150μl 0.1M $ZnSO_4$，将样品涡旋混合 5 分钟，然后在 4000rpm 下离心 10 分钟。接着使用 Oasis HLB μElution96 孔固相萃取板萃取上清液以提取肽，然后将萃取物进样 (10μL) 到 LC-MS/MS 系统进行分析。

[1024] LC-MS/MS 由与具有 Turbo IonSpray® 电离源的 5500QTRAP 质谱仪 (AB Sciex，Toronto，Canada) 联用的 Acquity UPLC 系统 (Waters，Milford，MA) 组成。分析柱为 Acquity UPLC BEH C_{18} 2.1mm×50mm 柱。流动相为 0.1％的甲酸的乙腈 / 水溶液 (5/95，v/v，流动相 A) 和 0.1％的甲酸的乙腈 / 水溶液 (95/5，v/v，流动相 B)。使用 AB Sciex Analyst® 软件 (版本 1.5) 收集和处理数据。

[1025] 相对于相应肽标准品的浓度，使用面积比的 $1/x^2$ 加权线性最小二乘回归法，由峰面积比 (肽 / 内标) 得出了校准曲线。使用得自校准标准品的回归方程来反算各标准品和血样的测量浓度。

[1026] 结果。在药代动力学研究中，据发现 GpTx-1(SEQ ID NO :1) 在 1mg/kg 和 0.5mg/kg 静脉内剂量下对小鼠是致死性的。GpTx-1(SEQ ID NO :1) 的 1mg/kg 皮下剂量对小鼠而言可耐受，并显示出持续 1 小时的可测血浆浓度。(参见图 16)。[Ala5]GpTx-1(SEQ ID NO :22) 的 1mg/kg 静脉内剂量在小鼠中耐受，大致体内半衰期为 15 分钟。(参见图 17A 和图 17B)。[Ala5]GpTx-1(SEQ ID NO :22) 的 1mg/kg 皮下剂量在血液中也产生了可测暴露量。(参见图 17B)。在另一研究中，5mg/kg 皮下剂量在血浆中产生了持续 3 小时在约 0.6μM 的肽浓度，该值比 PatchXpress® (PX) 测得的体外 Nav1.7 IC_{50} 高 40 倍，计算得到的 t1/2 ＝ 0.6h，高于 1mg/kg 皮下剂量和静脉内剂量并适用于进一步的体内测试。(参见图 17B)。

[1027] 实施例 8 :离子通道反向筛选 (counterscreen)

[1028] 心脏离子通道反向筛选 (hERG 和 hNav1.5)。

[1029] 如下文所述进行了心脏离子通道反向筛选 (hERG 和 hNav1.5)，其代表性结果显示于图 18 和图 19A-B 中。

[1030] 使用 PatchXpress® 系统针对克隆的人类 Nav1.5 钠通道进行反向筛选。

[1031] 细胞系。经人类 hNav1.5 稳定转染的 HEK293 细胞购自 Cytomyx，Inc.。

[1032] 细胞外 (HB-PS) 记录溶液含有 70mM NaCl、67mM N- 甲基 -D- 葡糖胺、4mM KCl、1.8mM $CaCl_2$、1mM $MgCl_2$、10mM HEPES、10mM 葡萄糖，用 HCl 调节至 pH7.4。内部记录溶液含有 130mM CsF、10mM NaCl、10mM EGTA、2mM $MgCl_2$、10mM HEPES，用 CsOH 调节至 pH7.20。在应用前将参考标准品或供试品的储备溶液稀释到 HB-PS 中。供试品包括本文所述的肽或肽偶联物。使用标准化步骤方案引发通过 hNav1.5 钠通道的离子电流。将细胞保持在 -80mV 下。使用以 10 秒间隔重复的具有固定幅度的脉冲模式（条件化前脉冲 :-120mV，维持 50ms ；去极化测试步骤达到 -30mV 后维持 20ms)，测量了由于供试品所致的 hNav1.5 钠电流的初始阻断及稳态阻断。以间断模式在 10kHz 下获取电流并在 3kHz 下过滤。当建立全细胞配置时，将细胞洗涤 3 分钟，然后应用对照媒介物 5 分钟。接着，PatchXpress 脚本工具的 DataStable_PC 功能仅在基线电流稳定或再经过 5 分钟时才允许实验开始。然后应用对照和各浓度的供试品 5 分钟。各浓度以 1 分钟的间隔添加三次。为了测定 IC_{50}，将供试品以 1μM、3μM、10μM 和 30μM 累积地应用于细胞（在各供试品浓度之间不洗出 ;n ≥ 3，其中 n ＝细胞数）。使用 PatchXpress Commander v1.4(Molecular Devices，Sunnyvale，CA) 进行了电生理数据采集并使用 DataXpress v2.04(Molecular Devices，Sunnyvale，CA) 进行了分析。使用在供试品应用之前和之后的三个峰值内向电流来计算各浓度下的电流抑制百分比。良好记录的接受标准包括 :(1) 密封电阻＞ 200MΩ，(2) 接入电阻＜ 10MΩ，(3) 峰值尾电流＞ 200pA，(4) 漏电流＜峰值尾电流的 25%，(5) 对照媒介物中的停止＜ 2.5% / 分钟。

[1033] 使用 PatchXpress® 系统针对人类 IKr(hERG) 钾通道进行反向筛选。

[1034] 细胞培养。稳定表达人类 ERG(hERG) 钾通道的 HEK293 细胞购自 Millipore（目录号 CYL3039)。HEK-hERG 细胞的生长培养基含有 DMEM/F12(Invitrogen#11320)、1X 非必需氨基酸 (Gibco#11140)、10％胎牛血清 (Gibco#16000) 和 400μg/ml 遗传霉素 (Gibco#10131-027)。将细胞在 37℃、潮湿、含 95％空气与 5％ CO_2 的环境中维持培养。T75Corning 培养瓶的接种密度为 400 万个细胞，每周两次或只要细胞密度达到 80％的汇合度时即按 1 :3 的比率传代。在 PatchXpress 7000A® 实验当天，通过在 37℃下使用 0.05％胰蛋白酶 -EDTA(Sigma)3 分钟将细胞从 T75 培养瓶提离。接着在 37℃、潮湿、含 95％空气与 5％ CO_2 的氛围中将它们重悬在生长培养基中至少 30 分钟，然后加载到 SealChip 记录室 (AVIVA Biosciences) 上。

[1035] 通过 PatchXpress® 7000A(Molecular Devices) 进行电生理记录。全细胞膜片钳记录的细胞内溶液含有（以 mM 计）氯化钾 (70)、氟化钾 (60)、氯化镁 (2)、乙二醇四乙酸 (EGTA，11)、三磷酸腺苷镁 (5) 和 HEPES(10)。用 KOH 将 pH 值调节至 7.2，将最终同渗容摩设为 295mOsm。细胞外溶液含有（以 mM 计）氯化钠 (135)、氯化钾 (4)、氯化镁 (1)、氯化钙 (1.8)、HEPES(10) 和葡萄糖 (10)。用 NaOH 将 pH 值调节至 7.4，并将最终同渗容摩设为 305mOsm。

[1036] 达到全细胞记录模式后，将细胞保持在 -80mV 的保持电位下。使用从 -80mV 的保持

电压达到 -50mV 后持续 500 毫秒的电压阶跃来建立峰值外向尾电流测量的基线或参考点。此后进行去极化步骤，达到 +30mV 后持续 2 秒以驱动通道达到失活状态。返回 -50mV 后持续 2 秒的阶跃取消失活，从而揭露最大峰值外向尾电流。每 10 秒重复电压阶跃一次。由复极化 -50mV 阶跃的峰值外向尾电流与通道活化前 -50mV 下的第一基线电流之间的差值确定总 hERG 外向尾电流。

[1037] 测试样品制备。将包括本文所述的肽和肽偶联物的测试化合物（最多 10μM）连续稀释到含有 0.1％ w/v 牛血清白蛋白 (BSA) 的细胞外记录缓冲液中，随后转移到玻璃灌注贮存器中。接着将 3μL 连续稀释样转移到 900μL 测定缓冲液中，测定缓冲液中含有 0.1％ w/vBSA。

[1038] PatchXpress®程序。对于药物效力测量，由 4 种浓度 (0.3、1、3 和 10μM) 生成累积浓度反应曲线。间隔 60 秒三次添加各浓度的测试化合物以确保记录室中的测定缓冲液完全交换。随后的添加之间存在 3 分钟等待时间。添加测试化合物之前，将装有测定缓冲液和媒介物对照 (0.3％ DMSO) 的两个玻璃小瓶用作对照（即 1x 测定缓冲液、1x0.3％ DMSO 以及 4 种递增浓度的测试化合物）。

[1039] 数据分析。必须目视检查每个成功的全细胞记录的外向 hERG 尾电流的质量。良好质量记录的一般标准是 :1) 在药物添加程序期间，-80mV 下的保持电流不得超过 300pA ；2) 峰值外向尾电流必须大于 300pA ；以及 3) 在 8 分钟控制期期间 0.3％ DMSO 中的峰值外向尾电流改变不大于 2.5％ / 分钟。由 Protocol Engine(Amgen) 使用非线性混合模型生成效力估计值，以定量细胞间测定的一致性并对相同细胞类型群体提供药物效力的准确测量 (Miu 等人，2006，JALA11 :195)。

[1040] GpTx-1(SEQ ID NO :1) 和 [Ala5]GpTx-1(SEQ ID NO :22) 相对于 hERG 的反向筛选结果显示在图 18 中。GpTx-1(SEQ ID NO :1) 和 [Ala5]GpTx-1(SEQ ID NO :22) 相对于 hNav1.5 的反向筛选结果显示在图 19A 和图 19B 中。

[1041] 实施例 9 :体内疼痛模型

[1042] 可在任何相关的体内疼痛模型中测试本发明的组合物。实施例包括 :

[1043] 触诱发痛 -Von Frey 测试。使用 Von Frey 细丝来评估啮齿动物的机械敏感性。将小鼠置于金属丝网底面上，封闭在单独的测试室中并使其驯化直至镇静。接着向小鼠爪子施加具有各种弯曲力的经校准细丝以测量对无害触觉（例如触摸）刺激的反应。对细丝系列的反应和无反应模式决定动物的机械阈值。此阈值用作测定法的终点。

[1044] 大鼠神经性疼痛模型。通过异氟烷吸入麻醉将雄性 SD 大鼠 (200g) 麻醉，并在背根神经节的远侧且在进入坐骨神经之前在 L5 和 L6 节段将左腰脊神经紧密结扎 (4-0 丝质缝合线)，如 Kim 和 Chung 首先描述 (An experimental model for peripheral neuropathy produced by segmental spinal nerve ligation in the rat.Pain50 :355-363,(1992))。闭合切口，使大鼠恢复。该程序在左后爪中引起机械（触觉）异常疼痛，如通过记录在经由金属丝网观察笼垂直于爪跖面（足垫之间）施加分级刺激（在 4.0 至 148.1mN 范围内的 von Frey 细丝）时受影响的爪子（与神经损伤位点同侧）从中缩回时的压力而评估。通过依序增加及降低刺激强度并使用如 Chaplan，S.R. 等人所述的 Dixon 非参数测试分析缩爪数据而测定缩爪阈值 (PWT)(Quantitative assessment of tactile allodynia in the rat paw.J.Neurosci.Meth,53 :55-63(1994))。

[1045] 大鼠 CFA 炎性疼痛模型。在雄性 SD 大鼠 (200g) 左后爪中注射完全弗氏佐剂 (CFA)。该程序在左后爪中引起机械（触觉）和热异常疼痛，如通过记录在经由金属丝网观察笼或通过施加热辐射而垂直于爪跖面（足垫之间）施加分级刺激（在 4.0 至 148.1mN 范围内的 von Frey 细丝）时受影响的爪子从中缩回时的压力而评估。通过依序增加及降低刺激强度并使用如 Chaplan 等人 (1994) 所述的 Dixon 非参数测试分析缩爪数据而测定 PWT。仅在大鼠未表现出运动功能障碍（例如爪拖地或下垂）或皮肤破损且其 PWT 低于 39.2mN（相当于 4.0g）时才将大鼠包括在研究中。在 CFA 注射后的适当时间，通过皮下注射而用测试肽和 / 或测试媒介物 - 偶联肽（通常为 60mg/kg 的筛选剂量）或对照溶液 (PBS 或其他媒介物）将大鼠处理一次并测定 PWT。使用下式将平均缩爪阈值 (PWT) 转化成最大可能效应百分比 (% MPE)：% MPE = 100*（经处理大鼠的 PWT- 对照大鼠的 PWT)/(15- 对照大鼠的 PWT)。因此，截止值 15g（对于机械异常疼痛为 148.1mN) 相当于 100％的 MPE 并且对照反应相当于 0% MPE。

[1046] 预计本发明的优选分子在与对标靶的 IC_{50} 相比适当的暴露下产生具有 PD 的镇痛作用。

[1047] 小鼠福尔马林疼痛模型实验程序。向啮齿动物爪子中注射福尔马林激发已得到充分研究的疼痛形式，该疼痛由动物缩爪次数来定量。福尔马林注射后的疼痛在两个特征性时期中产生：第一期持续约 10 分钟并且可能对应于由外周神经元介导的即刻疼痛。在福尔马林注射后约 10 分钟开始并且再持续 30 至 40 分钟的第二期对应于脊髓中神经元的敏感化以及外周疼痛感觉神经元的亢进。对该应用中所提供的化合物进行了测试以观察其是否减少福尔马林反应 II 期中的缩爪次数并因此是否为潜在的镇痛药物 (Bregman H 等人，“Identification of a potent，state-dependent inhibitor of Nav1.7with oral efficacy in the formalin model of persistent pain.”J Med Chem54(13)：4427-4445，2011)。

[1048] 所有体内功效实验中均使用雄性 CD-1 小鼠 (8 至 12 周龄，Harlan Laboratories，Frederick，MD)。动物受试者自由取食 (Teklad Global 无大豆蛋白挤出型啮齿动物饲料 2020X) 及饮水，并在整个研究期间维持 12 小时光 / 暗循环。将所有动物以每笼 4 只动物分组圈养在具有玉米芯垫料的标准固底笼中。将动物群落维持在约 21℃和 60％湿度下。根据国际疼痛研究协会 (International Association for the Study of Pain) 指南开展所有实验。

[1049] 在测试当天，在驯化期间或在驯化之前，向动物给予研究化合物或媒介物。给药后，使所有小鼠 (n = 12) 习惯行为分析室（尺寸：10cm 直径、14cm 高，在高架玻璃顶部具有盖板的圆柱体）5 分钟，接着注射福尔马林。在下面设置摄像机以记录小鼠行为 (5 分钟驯化和 40 分钟测试阶段）。在测试时，将小鼠稍微限制在布手套中并使用胰岛素注射器 (U100，0.3cc，28-30G) 在左后爪背面注射 20μL2％福尔马林溶液。福尔马林注射后立即将动物放回腔室中并观察 40 分钟。记录 5 分钟间隔内的抬爪 / 舔爪行为，此后测量了同侧和对侧爪宽度。研究完成后，立即对动物施以安乐死。

[1050] 在第一项小鼠福尔马林疼痛模型研究中，以 5mg/kg 皮下 1 小时预处理给予 [Ala5] GpTx-1(1-34)(SEQ ID NO：22)，用吗啡以 1mg/kg 皮下 30 分钟预处理作为阳性对照。（参见图 59)。肽对第一或急性期（福尔马林注射后 0-5 分钟）无作用。（参见图 60)。与媒介

物 (PBS) 相比,肽显著缩短了在第二期 (福尔马林注射后 5-40 分钟) 抬起和 / 或舔受影响的爪子所花的时间。(参见图 61)。在该实验中,用作阳性对照的 1mg/kg 的吗啡皮下剂量未明显减轻动物中的疼痛反应,在以下的研究中将其增至 3mg/kg。肽的末期血浆暴露 (福尔马林注射后 45 分钟时的肽血浆浓度) 为 0.80±0.21μM。肽和吗啡阳性对照相对于媒介物 (PBS) 均未明显减轻由福尔马林注射所引起的爪子肿胀。(参见图 62)。

[1051] 用 5、1.67 和 0.5mg/kg 皮下 1 小时预处理剂量重复小鼠福尔马林疼痛模型以测定 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 的剂量反应。(参见图 63)。肽在第一期 (福尔马林注射后 0-5 分钟) 中在任何剂量下均无作用。(参见图 64)。阳性对照 (3mg/kg 的吗啡皮下剂量) 确实显著缩短了第一期中抬起 / 舔受影响的爪子所花的时间。5mg/kg 的 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 皮下剂量证实了在研究第二期中抬爪 / 舔爪所花的时间的显著缩短,与吗啡阳性对照一样。(参见图 65)。然而,较低的肽剂量 (1.67 和 0.5mg/kg s.c.) 相对于媒介物在第二期中无明显作用。末期暴露 (福尔马林注射后 45 分钟时的肽血浆浓度) 对于 5.0、1.67 和 0.5mg/kg 的剂量而言分别为 0.58±0.26μM、0.15±0.05μM 和 0.04±0.2μM。相对于媒介物 (PBS),肽和吗啡阳性对照均未显著减轻福尔马林注射所导致的爪子肿胀。(参见图 66)。在前两项小鼠福尔马林实验中,[Ala5]GpTx-1(1-34)(SEQ ID NO:22) 在 0.60-0.80μM 之间的血浆浓度下显示出抬爪 / 舔爪的显著可重现减少。在福尔马林疼痛模型中测试了另一种肽 [Glu29]GpTx-1(1-34)(SEQ ID NO:30)。用谷氨酸取代第 29 位的色氨酸大大降低针对 Nav1.7 的效力,因此制备了 [Glu29]GpTx-1 并作为阴性对照加以测试。5mg/kg 的 [Glu29]GpTx-1 皮下剂量对小鼠福尔马林疼痛模型中抬爪 / 舔爪所花的时间无明显作用,末期平均肽血浆浓度为 0.502±0.271μM,从而表明肽 Nav1.7 效力与在福尔马林疼痛模型中的功效有关。(参见图 95-98)。

[1052] 用 5、3 和 1mg/kg 皮下 1 小时预处理剂量重复小鼠福尔马林疼痛模型以进一步研究 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 的剂量反应。(参见图 67)。肽在第一期 (福尔马林注射后 0-5 分钟) 中在任何剂量下均无作用。(参见图 68)。5mg/kg 的肽皮下剂量证实了在研究第二期中抬爪 / 舔爪所花的时间的显著缩短,与吗啡阳性对照一样。然而,较低的肽剂量未在第二期中显示出相对于媒介物对照抬爪 / 舔爪行为的减轻。1mg/kg s.c. 组与媒介物对照并无明显不同,而 3mg/kg s.c. 组似乎显著增加了抬爪 / 舔爪所花的时间。(参见图 69)。末期暴露 (福尔马林注射后 45 分钟时的肽血浆浓度) 对于 5、3 和 1mg/kg 的剂量而言分别为 1.84±0.18μM、0.53±0.23μM 和 0.20±0.05μM。相对于媒介物 (PBS),肽和吗啡阳性对照均未显著减轻福尔马林注射所导致的爪子肿胀。(参见图 70)。

[1053] 小鼠旷场分析实验方案。为了确认福尔马林模型中由测试化合物产生的功效不归因于动物镇静或损害,还测试了化合物对动物总体运动的作用 (旷场测试)。向未经处理的动物施用测试化合物并将其置于新环境中,自动记录动物在探索新环境期间进行的运动。运动减少 50%或以上表示福尔马林测试中的功效不能归于真实痛觉缺失。

[1054] 所有体内功效实验中均使用雄性 CD-1 小鼠 (8 至 12 周龄,Harlan Laboratories, Frederick, MD)。动物受试者自由取食 (Teklad Global 无大豆蛋白挤出型啮齿动物饲料 2020X) 及饮水,并在整个研究期间维持 12 小时光 / 暗循环。将所有动物以每笼 4 只动物分组圈养在具有玉米芯垫料的标准固底笼中。将动物群落维持在约 21℃和 60%湿度下。根据国际疼痛研究协会 (International Association for the Study of Pain) 指南开展所

有实验。

[1055] 在测试当天，向动物给予研究化合物或媒介物，并使其适应测试室至少 30 分钟。在给药后的适当时间，将小鼠 (N = 8) 置于清洁的旷场室内 (Kinder Scientific Photobeam Activity System)。在无光条件下，记录了系统上总体动物运动的变化，持续 60 分钟。评估了以下参数 :总基本运动、总直立、总直立时间和总细微运动。

[1056] 旷场分析的结果。3mg/kg 皮下剂量的 [Ala5]GpTx-1(1-34)(SEQ ID NO :22) 在 1 小时预处理时间下对 CD-1 小鼠的总基本运动、总细微运动、总直立或总直立时间无影响。没有一种肽剂量相对于媒介物对照显著减少了探索行为。然而，在 5mg/kg 皮下剂量与 1 小时预处理下，肽相对于媒介物显著减小了 CD-1 小鼠自主活动的总细微运动和总直立时间分量。总基本运动和总直立也减少。(参见图 71-74)。末期暴露 (肽注射后 2h 时的肽血浆浓度) 对于 5 和 3mg/kg s.c. 剂量而言分别为 1.79±0.38μM 和 0.89±0.33μM。在此实验中，对自主活动无明显作用的 3mg/kg 剂量使肽血浆浓度相当于已在福尔马林疼痛模型中显示出可重现功效的那些肽血浆浓度。较高的肽血浆浓度 (> 1.5μM) 对自主活动产生了明显的作用，如通过 5mg/kg 剂量下末期暴露为 2.1±0.47μM 的 [Ala5]GpTx-1(1-34)(SEQ ID NO :22) 的重复旷场分析所证实。(参见图 99-102)。在旷场分析中测试了其他三种肽 :[Glu29]GpTx-1(1-34)(SEQ ID NO :30)、[Glu28]GpTx-1(1-34)(SEQ ID NO :153) 和 [Ala5，Phe6，Glu10,2-Abu13，Leu26，Arg28]GpTx-1(SEQ ID NO :1035)。用谷氨酸取代第 29 位的色氨酸大大降低针对 Nav1.7 的效力，因此制备了 [Glu29]GpTx-1(SEQ ID NO :30) 并作为阴性对照加以测试。5mg/kg 皮下剂量的 [Glu29]GpTx-1 在旷场分析中对小鼠自主活动无明显作用，末期平均肽血浆浓度为 0.771±0.272μM。(参见图 103-106)。5mg/kg 剂量的 [Glu28]GpTx-1(1-34)(SEQ ID NO :153) 显著减少了旷场分析中的自主活动，末期平均肽血浆浓度为 1.28±0.403μM，与 5mg/kg 剂量的 [Ala5]GpTx-1(SEQ ID NO :22) 的结果相似。(参见图 107-110)。在旷场分析中 5mg/kg 剂量的 [Ala5，Phe6，Glu10,2-Abu13，Leu26,Arg28]GpTx-1(SEQ ID NO :1035) 引起动物垂死行为或致死，末期平均肽血浆浓度为 1.72±0.313μM。

[1057] 小鼠藜芦定疼痛模型实验方案。藜芦定是在注射到啮齿动物爪子中时引起疼痛退缩 (舔爪和抬爪或警惕) 反应的电压门控钠离子通道的非选择性活化剂 (Hille B，Ion Channels of Excitable Membranes，Sinauer Associates，Sunderland MA2001)。因此，作为钠通道抑制剂的测试化合物 (如本发明的那些化合物) 不仅定量其对疼痛的作用，还定量对由钠通道活化所引起的疼痛的作用。也就是说，测试化合物对藜芦定诱导的抬爪和舔爪的作用不仅度量镇痛功效，还度量钠通道的体内受体占用率。

[1058] 所有体内功效实验中均使用雄性 CD-1 小鼠 (8 至 12 周龄，Harlan Laboratories，Frederick，MD)。动物受试者自由取食 (Teklad Global 无大豆蛋白挤出型啮齿动物饲料 2020X) 及饮水，并在整个研究期间维持 12 小时光 / 暗循环。将所有动物以每笼 4 只动物分组圈养在具有玉米芯垫料的标准固底笼中。将动物群落维持在约 21℃和 60％湿度下。根据国际疼痛研究协会 (International Association for the Study of Pain) 指南开展所有实验。

[1059] 在测试当天，在驯化期间或在驯化之前，向动物给予研究化合物或媒介物。给药后，使所有小鼠 (n = 12) 习惯行为分析室 (尺寸 :10cm 直径、14cm 高，在高架玻璃顶部具有

盖板的圆柱体)5 分钟,接着注射藜芦定。在下面设置摄像机以记录小鼠行为 (5 分钟驯化和 20 分钟测试阶段)。在测试时,将小鼠稍微限制在布手套中并使用胰岛素注射器 (U100,0.3cc,28-30G) 在左后爪背面注射 20μL 溶于 1%乙醇 / 磷酸盐缓冲生理食盐水悬浮液中的 1μg 藜芦定 (Sigma-Aldrich#V109)。藜芦定注射后立即将动物放回腔室中并观察 20 分钟。记录 5 分钟间隔内的抬爪 / 舔爪行为,此后测量了同侧和对侧爪宽度。研究完成后,立即对动物施以安乐死。

[1060] 在第一个小鼠藜芦定疼痛模型中,在 1 小时预处理时间下经皮下给予 5mg/kg 的 [Ala5]GpTx-1(1-34)(SEQ ID NO:22),并在 30 分钟预处理时间下经腹膜内 (“i.p.”) 给予 30mg/kg 的美西律作为对照。在 CD-1 小鼠中测量了对藜芦定诱导 (1μg 爪背注射) 的自发伤害感受行为的抗伤害感受作用。总体上,被美西律明显逆转的媒介物组中存在良好的抬爪反应。在 5mg/kg 下,[Ala5]GpTx-1(1-34)(SEQ ID NO:22) 未能显著减少抬爪行为。(参见图 75)。在所有组中均为爪子肿胀的减轻。(参见图 76)。然而,在研究实验的进程时,肽确实在 10-15 分钟和 15-20 分钟时间区间中呈现出一定的作用。(参见图 77)。末期暴露 (肽注射后 1.5 小时的肽血浆浓度) 对于 5mg/kg 剂量而言为 0.70±0.10μM。

[1061] 在重复小鼠藜芦定疼痛模型时,在 1 小时预处理时间下经皮下给予 1 和 5mg/kg 的 [Ala5]GpTx-1(1-34)(SEQ ID NO:22),并在 30 分钟预处理时间下经腹膜内给予 30mg/kg 的美西律作为对照。媒介物组存在强烈的抬爪反应,与美西律明显相反。在 1 和 5mg/kg 下,[Ala5]GpTx-1(1-34)(SEQ ID NO:22) 对抬爪行为无作用。(参见图 78)。任何组中爪子肿胀均未减轻。(参见图 79)。肽剂量在整个实验进程中无显著作用。(参见图 80)。末期暴露 (肽注射后 1.5h 的肽血浆浓度) 对于 5 和 1mg/kg 剂量而言分别为 0.72±0.13μM 和 0.09±0.05μM。

[1062] 用于筛选本发明分子的治疗性实施方案的体内疼痛模型的上述实例不具有限制性。技术人员应了解其他相关的疼痛模型。

[1063] 实施例 10:初步心脏安全性评估

[1064] 分离的灌注兔心 (Langendorff 制备物)。如下文所述,测定了 [Ala5]GpTx-1(1-34)(SEQ ID NO:22) 在分离的灌注兔心 (Langendorff 制备物) 测定法中的作用,其结果显示在下表 36 和表 37 中。

[1065] 表 36.1μM[Ala5]GpTx-1(1-34)(SEQ ID NO:22) 在经分离的灌注兔心测定法 (Langendorff 制备物) 中对心电图间期的作用。肽对心室复极 (QTc 或 JTc 间期) 无延迟作用。肽对心率 (HR) 无作用。肽也对心室去极化和传导 (QRS 和 PR 间期) 无作用。(缩写 :HR,心率 ;PR 间期,心房去极化开始 (P 波) 至心室去极化开始 (QRS 复合波) 的时间间隔 ;QRS 持续时间,QRS 复合波自开始至结束的时间间隔,其为心室去极化的持续时间 ;QT 间期,自 QRS 复合波开始至 T 波结束的时间间隔,其为心室去极化和复极化的持续时间 ;QTc 间期,经 HR 修正的 QT 间期 ;JT 间期,QT 间期与 QRS 持续时间之间的差 (JT = QT-QRS),其为心室复极化的持续时间 ;以及 JTc 间期,经 HR 修正的 JT 间期)。

[1066]

统计(归一化值),%

平均值

处理	HR	PR	QRS	QT	QTcF	JT	JTcF
1% BSA	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1uM SEQ ID NO:22	-0.18	-3.52	-1.55	-4.19	-4.22	-4.57	-4.60

标准偏差

处理	HR	PR	QRS	QT	QTcF	JT	JTcF
1% BSA	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1uM SEQ ID NO:22	1.87	2.19	2.66	2.48	2.10	3.12	2.75

[1067] 表 37. 1μM[Ala5]GpTx-1(1-34)(SEQ ID NO:22)在经分离的灌注兔心测定法(Langendorff 制备物)中对血液动力学参数的作用。肽对 LV 收缩力(dP/dt+)无作用,对冠状血流量(CF)也无作用。肽对冠状动脉血管无直接作用。(缩写:LVSP,左心室收缩压;LVDP,左心室舒张压;dP/dt+,LV 压力的最大增加速率;dP/dt-,LV 压力的最小降低速率;LVDevP,LV 形成压,LVDevP = LVSP-LVDP;以及 CF,冠脉流量)。

[1068]

LVP,归一化值(%)

μM	LVSP,平均值	LVDP,平均值	dP/dt+,平均值	dP/dt-,平均值	流速,平均值	LVDevP	N
Baseline	1.64	0.02	1.72	2.60	0.04	1.69	4
1uM SEQ ID NO:22	-4.81	-3.16	-4.55	-2.93	0.29	-3.22	4

LVP,标准偏差

μM	LVSP,SD	LVDP,SD	dP/dt+,SD	dP/dt-,SD	流速 SD	LVDevP,SD	N
基线	2.13	0.40	1.61	3.66	0.45	2.51	4
1uM SEQ ID NO:22	1.41	7.16	2.72	0.93	7.99	1.10	4

[1069] 获取和驯化。从 Harlan Laboratories 获得 6 只 14 至 22 周龄且 2.5 至 3.5 公斤的雌性新西兰白兔。接收后,由兽医人员检查兔子以确保健康状态可接受。由兽医和工作人员提供兽医护理。在使用前将兔子驯化至少 7 天。不健康兔子不用于研究。

[1070] 识别方法。由供应商为各兔子分配识别号。由供应商向各兔子粘贴含有识别号的耳标。此识别号与兔子到达日期、出生日期、来源和性别一起显示在笼子卡片上。将本研究中所用兔子的识别号及其最终体重记录在笔记本中。灌注介质的组成。灌注介质由经改性的充氧 Krebs-Henseleit 缓冲液(心脏 37℃)组成,该缓冲液由以下各物质构成(mM):NaCl(120)、KCl(4.7)、$MgSO_4$(1.2)、KH_2PO_4(1.2)、d- 葡萄糖(11.1)、$CaCl_2$(1.8)、$NaHCO_3$(25)和丙酮酸钠(2.0)。用 95% O_2/5% CO_2 对此灌注介质不断鼓泡。为测试[Ala5]GpTx-1(1-34)

(SEQ ID NO:22),在缓冲液中添加 1% BSA。

[1071] 麻醉和心脏摘除。用戊巴比妥(50mg/kg,IV;耳静脉)麻醉各兔子。通过捏爪(足部退缩反射)评估疼痛完全抑制。将兔子限制在兔笼限制器中,同时进行麻醉诱导以避免伤害动物和研究者。

[1072] 暴露心脏:在将动物麻醉后切除心脏。通过经腹切口接近膈膜并小心地切开以暴露胸腔。由双侧切口沿最后一根肋骨下缘向第一根肋骨打开胸部,然后将胸廓折到动物头上,从而暴露出心脏。为摘取心脏,将该器官轻轻地托在手指之间以避免损伤,在切割主动脉、腔静脉和肺血管之前稍微抬起。

[1073] 通过 Langendorff 设备灌注经分离的心脏制备物。快速摘取心脏,安装到 Langendorff 设备上,在恒定压力下用充氧的 Krebs-Henseleit 缓冲液灌注。如果自发搏动(无节奏)的心脏在平衡期间对于各参数(机械活动、心率、心脏间期等)表现出可接受而稳定的基线值,则将相应的心脏包括在研究中。在整个研究期间将灌注缓冲液温度维持在约 37℃。

[1074] 实验计划。将各个心脏 (N = 总计 4) 平衡约 30 至 60 分钟。此平衡时期后,在 1% BSA 中采集基线测量值约 10 分钟。此时期之后,将心脏暴露于 1μM 的 [Ala5]GpTx-1(1-34)(SEQ ID NO:22)20 分钟。在研究期间使用计算机化数据采集系统连续测量心脏参数。(有关详细信息和验证研究,参见 Qu 等人,BeKm-1,A Peptide Inhibitor of hERG potassium currents,prolongs QTc intervals in isolated rabbit heart,J.Pharmacol.Exp.Ther.(337):2-8(2011))。

[1075] 心电图测量。用置于心脏上的柔性单极电极记录同步双导联表面接触心电图,一个电极位于心室的心外膜上,而另一个电极位于左心房的心外膜上。

[1076] 血液动力学测量。用水使左心室 (LV) 中的乳胶球囊膨胀至达到约 5-10mmHg 的 LVEDP。用管子将球囊与压力传感器连接以测量 LVEDP 和 LVSP。用连接到主动脉套的侧臂口的压力传感器测量了冠脉灌注压 (CPP)。

[1077] 数据分析。采用 Notocord 自动执行了左心室压力 (LVP) 和 CPP 分析。评估了平衡时期最后 30 秒以及各剂量暴露时期的测量值并用于确定效应。用 EMKA ecgAUTO 软件 (EMKA Technologies,Paris,France) 分析了心电图 (ECG),并分析了 1 分钟连续 ECG 波形(下一事件标记之前 30 秒)的 HR、PR、QRS 和 QT 间期。汇集各个心脏的值以确定各变量在各个浓度下的平均值。还确定了各变量在基线与各浓度之间的平均变化百分比。对于 QT 间期的 HR 修正,使用了 Fridericia's 等式 ($QTcF = QT/RR^{1/3}$)。将数据表示为各变量在基线与各浓度之间的平均变化百分比。HR、PR、QRS、QTc 和 JTc 变化≥ 10%以及 +dP/dt 和 CF 变化≥ 15%被视为具有药物相关性。所有值均表示为平均值土 S.D.。

[1078] 结果。在 1μM 的浓度下,[Ala5]GpTx-1(1-34)(SEQ ID NO:22) 在经分离的灌注兔心测定法 (Langendorff 制备物)中无作用。肽对心室复极化 (QTc 或 JTc 间期)无延迟作用且对心率无作用。肽也对心室去极化和传导 (QRS 和 PR 间期)无作用。肽对 LV 收缩力 (dP/dt+) 无作用,对冠状血流量 (CF) 也无作用。肽对冠状动脉血管无直接作用。

[1079] 实施例 11:位点特异性肽偶联

[1080] 使用以下方案将毒素肽类似物(有关毒素肽类似物氨基酸序列,参见表 5A 和表 5B) 位点特异性地偶联到人类免疫球蛋白重链上的键合位点 (SEQ ID NO:3087 的 C273) 处

或人类免疫球蛋白 Fc 结构域上 (SEQ ID NO :3089 的 C52 处)。

[1081] 制备肽 - 接头构建体。使含炔烃的肽与两种不同长度的叠氮基 -PEG 溴乙酰胺进行铜催化的 1,3- 偶极环加成反应,得到具有三唑键合的位点特异性聚乙二醇化肽,从而将序列中的炔丙基甘氨酸或 Pra 残基转化成 3-(1,2,3- 三唑 -4- 基) 丙氨酸或 Atz 残基。(参见图 81B)。现制了在第 13 位含有炔丙基甘氨酸 (Pra) 或在 N 端含有 4- 戊炔酰基 (4-Pen) 的肽 (7.4mM,溶于 6.7mL 水中)、叠氮基 -PEG11- 溴乙酰胺 (150mM,0.964mL,溶于水中)、三 ((1- 苄基 -1H-1,2,3- 三唑 -4- 基) 甲基) 胺 (TBTA,10nM,2.2mL,溶于 DMSO 中)、抗坏血酸钠 (50mM,10.1mL,溶于水中) 和硫酸铜 (II)(35mM,2.9mL,溶于水中) 溶液。按以下顺序向 50mL 离心管中添加肽和试剂以达到以下最终浓度。添加肽储备溶液 (6.7mL),最终浓度为 3.7mM,接着添加叠氮基 -PEG11- 溴乙酰胺 (0.402mL),最终浓度为 4.5mM。添加 TBTA(0.603mL),最终浓度为 0.45mM,并充分混合。接着添加抗坏血酸钠 (4.522mL),最终浓度为 16.9mM,并充分混合。添加 $CuSO_4$(1.292mL),最终浓度为 3.4mM。使溶液静置 1 小时,此时通过 LC-MS 判断反应完成。用吸管向 25mL SPE 滤管中添加 SP 高性能琼脂糖 (SP Sepharose High Performance) 浆液 (8mL)。用洗涤缓冲液 (50mL20mM NaOAc,pH = 4.0) 调节凝胶,用肽溶液上样,洗涤 (50mL,20mM NaOAc,pH = 4.0 和 50mL,20mM NaOAc,pH = 4.0,0.1M NaCl) 并用 45ml1M NaCl,20mM NaOAc, pH = 4.0 洗脱到 50mL 离心管中。通过使用 Agilent 制备型上样泵以 30mL/min 上样到制备型 HPLC 柱 (Phenomenex Luna5u C18(2)100A AXIA,250×30mm) 而纯化产物混合物。将柱子用 10% B 冲洗 10 分钟。将柱子连接到制备型 HPLC(Agilent),将肽通过 10-40% B 的梯度经 60min 洗脱,然后是 10min 冲洗和 10min 平衡。通过 LC-MS 分析级分,合并并冻干,得到纯的肽 - 接头构建体以供偶联 IgG 或 Fc 结构域。

[1082] 抗体制备 / 还原。在反应缓冲液 (20mM 磷酸钠 pH6.8、2mM EDTA) 中将抗 -DNP mAb(E273C,hIgG1)(κ /IgG1z) 浓缩至约 5mg/ml。

[1083] 所用的人 IgG 重链单体的氨基酸序列如下 (可变区带下划线 ;C273 键合位点为斜体并带有下划线):

[1084] QVQLVESGGGVVQPGRSLRLSCAASGFTFSSYGMHWVRQAPGKGLEWVAVIWYDGSNKYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVYYCARYNFNYGMDVWGQGTTVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPCVKFNWYVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK//SEQ ID NO. :3087。

[1085] 所用的人 IgG kappa 轻链单体的氨基酸序列如下 (可变区带下划线):

[1086] DIQMTQSPSSVSASVGDRVTITCRASQGISRRLAWYQQKPGKAPKLLIYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQANSFPFTFGPGTKVDIKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNSQESVTEQDSKDSTYSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC//SEQ ID NO. :3088。

[1087] 所用的人 IgG1z Fc 结构域单体的氨基酸序列如下 (C52 键合位点为斜体并带有下划线):

[1088] DKTHTCPPCPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPCVKFNWYVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK//SEQ ID NO.:3089。

[1089] 表 38. 所制备的免疫球蛋白 - 肽偶联物和 Fc 结构域 - 肽偶联物。“单价”偶联分子在分子中具有一个毒素肽（即肽经由接头共价偶联到分子中的一个 HC 或 Fc 结构域单体，但不偶联到另一 HC 或 Fc 结构域单体）；“二价”偶联分子具有两个毒素肽（即一个肽经由接头共价偶联到分子中的各 HC 或 Fc 结构域单体）。SEQ ID NO:1046、1047 和 1048 在表 5A 中示出。

[1090]

命名	毒素肽的SEQ ID NO	毒素肽上的接头和残基键合位置	偶联分子中免疫球蛋白单体的SEQ ID NO	单价或二价
Fc-肽偶联物1	1046	第13位残基侧链的PEG11-(乙酰胺甲基)接头	3089、3089	单价
Fc-肽偶联物2	1046	第13位残基侧链的PEG11-(乙酰胺甲基)接头	3089、3089	二价
免疫球蛋白-肽偶联物1	1046	第13位残基侧链的PEG11-(乙酰胺甲基)接头	3087、3088、3087、3088	单价
免疫球蛋白-肽偶联物2	1046	第13位残基侧链的PEG11-(乙酰胺甲基)接头	3087、3088、3087、3088	二价
Fc-肽偶联物3	1047	第13位残基侧链的PEG11-(乙酰胺甲基)接头	3089、3089	单价
Fc-肽偶联物4	1047	第13位残基侧链的PEG11-(乙酰胺甲基)接头	3089、3089	二价
免疫球蛋白-肽偶联物3	1047	第13位残基侧链的PEG11-(乙酰胺甲基)接头	3087、3088、	单价

[1091]

			3087、3088	
免疫球蛋白-肽偶联物4	1047	第13位残基侧链的PEG11-(乙酰胺甲基)接头	3087、3088、3087、3088	二价
Fc-肽偶联物5	1048	N端的乙酰胺甲基-NPEG11-三唑接头	3089、3089	单价
Fc-肽偶联物6	1048	N端的乙酰胺甲基-NPEG11-三唑接头	3089、3089	二价
免疫球蛋白-肽偶联物5	1048	N端的乙酰胺甲基-NPEG11-三唑接头	3087、3088、3087、3088	单价
免疫球蛋白-肽偶联物6	1048	N端的乙酰胺甲基-NPEG11-三唑接头	3087、3088、3087、3088	二价
Fc-肽偶联物7	1046	第13位残基侧链的PEG3-(乙酰胺甲基)接头	3089、3089	单价
Fc-肽偶联物8	1046	第13位残基侧链的PEG3-(乙酰胺甲基)接头	3089、3089	二价
免疫球蛋白-肽偶联物7	1046	第13位残基侧链的PEG3-(乙酰胺甲基)接头	3087、3088、3087、3088	单价
免疫球蛋白-肽偶联物8	1046	第13位残基侧链的PEG3-(乙酰胺甲基)接头	3087、3088、3087、3088	二价

[1092] 通过在室温下将 mAb 与 1 :1 摩尔比的 TCEP :半胱氨酸 (2 :1 的 TECP :mAb) 孵育 30 分钟而还原经工程改造的半胱氨酸。使用经反应缓冲液平衡的 Zeba 离心式脱盐柱 (≥ 7kD Pierce) 移除 TCEP。在上样前,使用 amicon ultra(10,000-30,000MWCO) 离心浓缩机将大

规模制备物浓缩至适当体积。

[1093] 肽制备。将含有溴乙酰胺官能团的冻干肽 - 接头以 20mg/ml 重悬在水中，接着立即进行偶联反应。

[1094] 偶联反应。在反应缓冲液中将肽与经还原的 mAb 以 2.5 :1 摩尔比的肽 :半胱氨酸混合 (5 :1 的肽 :mAb)，mAb 的浓度为 5mg/ml，且在 4℃下孵育 12-16 小时。免疫球蛋白中经工程改造的游离半胱氨酸与肽 - 接头中的溴乙酰胺官能团反应，形成具有稳定硫代乙酰胺键合的位点特异性免疫球蛋白 - 肽偶联物。(参见图 81B 和图 82)。如果一个半胱氨酸发生反应，则结果是单价免疫球蛋白 - 肽偶联物 ；但是如果两个半胱氨酸均发生反应，则结果是二价免疫球蛋白 - 肽偶联物。

[1095] 偶联物的纯化。孵育后，将偶联反应物脱盐以移除过量的游离肽，然后上样到 HiTrap SP-HP 柱 (GE Healthcare ；制备物＜ 10mg 时，1ml 柱 ；制备物＞ 10mg 时，5ml 柱)。在 5 倍柱体积的 90％缓冲液 A(10mM 磷酸钠 pH6.5、5％乙醇)、10％缓冲液 B(10mM 磷酸钠 pH6.5、5％乙醇、1M NaCl) 中冲洗柱子。从 10％缓冲液 B 至 70％缓冲液 B 经 20 倍柱体积梯度洗脱偶联物 (参见表 38)。未经修饰的 mAb 首先洗脱，接着是单价免疫球蛋白 - 肽偶联物 (1 个肽 /mAb)，再是二价免疫球蛋白 - 肽偶联物 (2 个肽 /mAb)。由 mAb 过度还原产生的更高级偶联物随后洗脱。(有关 mAb 免疫球蛋白 - 肽偶联物，参见图 83 ；有关 Fc 结构域 - 肽偶联物，参见图 84)。纯化后，将偶联物在 A5SU 储存缓冲液 (10mM 乙酸钠 pH5.0、9％蔗糖) 中配制，并浓缩至 10mg/ml 以便在 -80℃下保存。

[1096] 偶联物的分析。对偶联物进行了还原性 SDS-PAGE，以确认与重链的偶联 (大小增加约 5kD) ；并进行了非还原性 SDS-PAGE，以确认内部二硫键保持完整。(有关 mAb 免疫球蛋白 - 肽偶联物，参见图 83 ；有关 Fc 结构域 - 肽偶联物，参见图 84)。对偶联物进行了分析型 SEC 以确定是否存在聚集 (Superdex-20010/300 柱，100mM 磷酸钠、250mM NaCl、pH6.8 等度洗脱，1ml/min，持续 35min)。(参见图 85)。

[1097] 偶联物的 LC-MS-TOF 分析。使用 Agilent6224TOF LC/MS 光谱仪，通过非还原法记录了肽偶联物的 LC/MS 光谱。校准后，将 5μg 完整的样品上样到 Zorbax300SB C6 柱 (1×50mm，3.5μm，Agilent Technologies)，在 75℃下以 50μl/min 的流速运行。使用 90％正丙醇 /0.1％ TFA(缓冲液 B) 和 0.1％ TFA/ 水 (缓冲液 A) 的梯度从柱中洗脱肽 - 偶联物。梯度条件为 20％至 90％缓冲液 B，14 分钟。(有关二价 mAb- 肽偶联物，参见图 86 ；有关二价 Fc 结构域 - 肽偶联物，参见图 87)。MS 光谱表明分别向免疫球蛋白和免疫球蛋白 Fc 结构域添加了两个肽。存在多个峰归因于不同的糖基化同种型。

[1098] 特异性反应结果。由 100mg 抗 -DNP mAb(E273C，hIgG1) 和 15mg 肽 - 接头构建体 (SEQ ID NO :1062) 获得了 22mg 二价偶联物 (免疫球蛋白 - 肽偶联物 2) 和 11mg 单价偶联物 (免疫球蛋白 - 肽偶联物 1)。在 A5SU 缓冲液中将样品浓缩至 10mg/mL，并在 -80℃下以等分试样的形式保存。

[1099] 肽偶联物的模型。仅出于说明性目的，建立了 Fc- 肽偶联物 1、Fc- 肽偶联物 2、免疫球蛋白 - 肽偶联物 1 和免疫球蛋白 - 肽偶联物 2 的模型 (MOE ；Chemical Computing Group :Montreal，Quebec，Canada，2010)。(参见图 88-91)。使用程序 MOE(MOE ；Chemical Computing Group :Montreal，Quebec，Canada，2010) 由免疫球蛋白晶体结构 (1HZH.pdb) 构建了抗 -DNP mAb(E273C)hIgG1(包含免疫球蛋白单体 SEQ ID NO :3087、SEQ ID NO :3088、

SEQ ID NO:3087、SEQ ID NO:3088)和抗-DNP mAb(E52C)hIgG1Fc结构域(SEQ ID NO:3089的同二聚体)的同源模型。指明了免疫球蛋白中的结合位点Cys273和免疫球蛋白Fc结构域中的结合位点Cys52。PEG11接头以任意构象示为将免疫球蛋白和免疫球蛋白Fc结构域中的适当半胱氨酸残基连接到肽中的Atz13残基。通过GpTx-1的NMR结构构建了肽(SEQ ID NO:1046)的同源模型(MOE;Chemical Computing Group:Montreal,Quebec,Canada,2010)并相对于免疫球蛋白和免疫球蛋白Fc结构域以任意取向显示。显示了一个或两个肽以反映各肽偶联物的单价或二价性质。

[1100] 实施例12:肽偶联物在小鼠中的初步药代动力学

[1101] 毒素肽偶联物的药代动力学(PK)研究。用得自Taconic的7周龄未经改造CD-1小鼠进行了初步PK研究。以1mg/kg或10mg/kg向四个独立组中的12只小鼠经皮下给予Fc-P2(Fc-肽偶联物2)或其对照Fc(SEQ ID NO:1062)。在单独的队列中,以1mg/kg或10mg/kg向四个独立组中的12只小鼠经皮下给予Ab-P2(免疫球蛋白-肽偶联物2)或其对照Ab(抗-DNP mAb(E273C,hIgG1;含免疫球蛋白单体SEQ ID NO:3087、SEQ ID NO:3088、SEQ ID NO:3087、SEQ ID NO:3088))。在颈背进行皮下注射。在给药后0.5、1、2、4、8和24小时,对来自4种给药途径中每一者的2只小鼠施以安乐死并采集血样和脑。将脑称重并立即冷冻在-80℃下。将血样收集在经EDTA处理的微型容器中然后在13000rpm下离心5分钟,之后,提取血浆并在96孔板中在-80℃下冷冻。

[1102] LC-MS/MS分析程序。在含1%BSA的DPBS中由偶联物参考标准品制备了肽偶联物(免疫球蛋白-肽偶联物2或Fc-肽偶联物2)储备溶液(100μg/mL),并保存在-20℃下。在小鼠血清中制备了标准样品。通过在小鼠血清中使用100μg/mL肽偶联物储备溶液连续稀释现制的10,000ng/mL溶液而制备25、50、100、250、500、1000、2500、5000和10,000ng/mL的标准浓度。取25μl等分血清样品加到96孔板的合适孔中,然后添加25μl内标溶液(1μg/mL,在含1%BSA的DPBS中制备的用[^{15}N,$^{13}C_6$]-Leu均匀标记的αDA-IgG2)。接着通过在96孔板格式下使用经抗人Fc小鼠抗体固定的磁珠进行免疫亲和捕获而处理血浆样品,然后进行胰蛋白酶消化并使用Oasis HLB μElution96孔固相萃取板进行固相萃取以萃取胰蛋白酶肽,将萃取物进样(10μL)到LC-MS/MS系统上进行分析。

[1103] LC-MS/MS由与具有Turbo IonSpray®电离源的5500QTRAP质谱仪(AB Sciex,Toronto,Canada)联用的Acquity UPLC系统(Waters,Milford,MA)组成。分析柱为Acquity UPLC BEH C_{18}(100×2.1mm,1.7um)。流动相为0.1%的甲酸的乙腈/水溶液(5/95,v/v,流动相A)和0.1%的甲酸的乙腈/水溶液(95/5,v/v,流动相B)。使用肽SEQ ID NO:1062的N端DCLGAFR(SEQ ID NO:1050)作为替代肽用于肽偶联物(免疫球蛋白-肽偶联物2或Fc-肽偶联物2)定量分析。

[1104] 使用AB Sciex Analyst®软件(版本1.5)收集和处理数据。

[1105] 相对于相应肽偶联物标准品的浓度,使用面积比的$1/x^2$加权线性最小二乘回归法,由峰面积比(肽/内标)得出了校准曲线。使用得自校准标准品的回归方程来反算各标准品和小鼠血浆样品的测量浓度。

[1106] 初步PK研究的结果表明,肽偶联物的暴露分别略低于未经修饰的IgG和Fc。(参见图88和图89)。在两种情况下,10mg/kg皮下剂量在24小时时产生了等于或接近相应肽

偶联物的体外 Nav1.7IC_{50} 的血浆浓度。(Fc- 肽偶联物 2) 的 C_{max} 在 8 小时与 24 小时之间达到,但 (免疫球蛋白 - 肽偶联物 2) 的 Cmax 出现在 24 小时时或之后。由于实验短暂而不能计算准确的体内 $t_{1/2}$。以 10mg/kg 皮下剂量与 24 小时的预处理时间,在小鼠旷场分析中对免疫球蛋白 - 肽偶联物 2 和 Fc- 肽偶联物 2 两者进行了测试,它们对动物的自主活动无明显作用。(参见图 111-114)。以 10mg/kg 皮下剂量与 24 小时的预处理时间,在小鼠福尔马林疼痛模型中对免疫球蛋白 - 肽偶联物 2 和 Fc- 肽偶联物 2 两者进行了测试,它们对研究第一期或第二期中抬起 / 舔受影响的爪子所花的时间无明显作用。(参见图 115-117)。可能的是,该剂量不足以覆盖体内靶标并观察到功效。

[1107] 缩写

[1108] 除非在具体的环境中另外定义,否则在此整个说明书中使用的缩写均如下所定义。

[1109] Ac 乙酰基 (用于指代乙酰化残基)

[1110] AcBpa 乙酰化对苯甲酰基 -L- 苯丙氨酸

[1111] ACN 乙腈

[1112] AcOH 乙酸

[1113] ADCC 抗体依赖性细胞毒性

[1114] Aib 氨基异丁酸

[1115] bA β - 丙氨酸

[1116] Bpa 对苯甲酰基 -L- 苯丙氨酸

[1117] BrAc 溴乙酰基 ($BrCH_2C(O)$

[1118] BSA 牛血清白蛋白

[1119] Bzl 苄基

[1120] Cap 己酸

[1121] CBC 全血计数

[1122] CNS 中枢神经系统

[1123] COPD 慢性阻塞性肺病

[1124] CTL 细胞毒性 T 淋巴细胞

[1125] DCC 二环己基碳二亚胺

[1126] Dde 1-(4,4- 二甲基 -2,6- 二氧代 - 亚环己基) 乙基

[1127] DOPC 1,2- 二油酰基 -sn- 甘油 -3- 磷酸胆碱

[1128] DOPE 1,2- 二油酰基 -sn- 甘油 -3- 磷酸乙醇胺

[1129] DPPC 1,2- 二棕榈酰基 -sn- 甘油 -3- 磷酸胆碱

[1130] DRG 背根神经节

[1131] DSPC 1,2- 二硬脂酰基 -sn- 甘油 -3- 磷酸胆碱

[1132] DTT 二硫苏糖醇

[1133] EAE 实验性自身免疫性脑脊髓炎

[1134] ECL 增强的化学发光

[1135] ESI-MS 电子喷雾电离质谱

[1136] Et 乙基

[1137] FACS 荧光活化细胞分选

[1138] Fmoc 芴甲氧羰基

[1139] HOBt 1-羟基苯并三唑

[1140] HPLC 高效液相色谱

[1141] HSL 高丝氨酸内酯

[1142] IB 包涵体

[1143] IWQ IonWorks® Quattro

[1144] KCa 钙活化钾通道（包括 IKCa、BKCa、SKCa）

[1145] KLH 琥珀酰化钥孔俄血兰蛋白

[1146] Kv 电压门控钾通道

[1147] Lau 月桂酸

[1148] LPS 脂多糖

[1149] LYMPH 淋巴细胞

[1150] MALDI-MS 基质辅助激光解吸电离质谱

[1151] Me 甲基

[1152] MeO 甲氧基

[1153] MeOH 甲醇

[1154] MHC 主要组织相容性复合体

[1155] MMP 基质金属蛋白酶

[1156] MW 分子量

[1157] MWCO 截留分子量

[1158] 1-Nap 1-萘基丙氨酸

[1159] Nav，Na_v 电压门控钠通道

[1160] NEUT 中性粒细胞

[1161] Nle 正亮氨酸

[1162] NMP N-甲基-2-吡咯烷酮

[1163] OAc 乙酸盐（酯）

[1164] PAGE 聚丙烯酰胺凝胶电泳

[1165] PBMC 外周血单核细胞

[1166] PBS 磷酸盐缓冲盐水

[1167] Pbf 2,2,4,6,7-五甲基二氢苯并呋喃-5-磺酰基

[1168] PCR 聚合酶链反应

[1169] PD 药效动力学

[1170] Pec 哌可酸

[1171] PEG 聚（乙二醇）

[1172] Pic 吡啶甲酸

[1173] PK 药代动力学

[1174] PNS 外周神经系统

[1175] PX PatchXpress®

[1176] pY 磷酸酪氨酸

[1177] RBS 核糖体结合位点

[1178] RT 室温 (25℃)

[1179] Sar 肌氨酸

[1180] SDS 十二烷基硫酸钠

[1181] STK 丝氨酸 - 苏氨酸激酶

[1182] t-Boc 叔丁氧羰基

[1183] tBu 叔丁基

[1184] TCR T 细胞受体

[1185] TFA 三氟乙酸

[1186] TG 三叉神经节

[1187] THF 胸腺体液因子

[1188] Trt 三苯甲基

[1189] TTX 河豚毒素

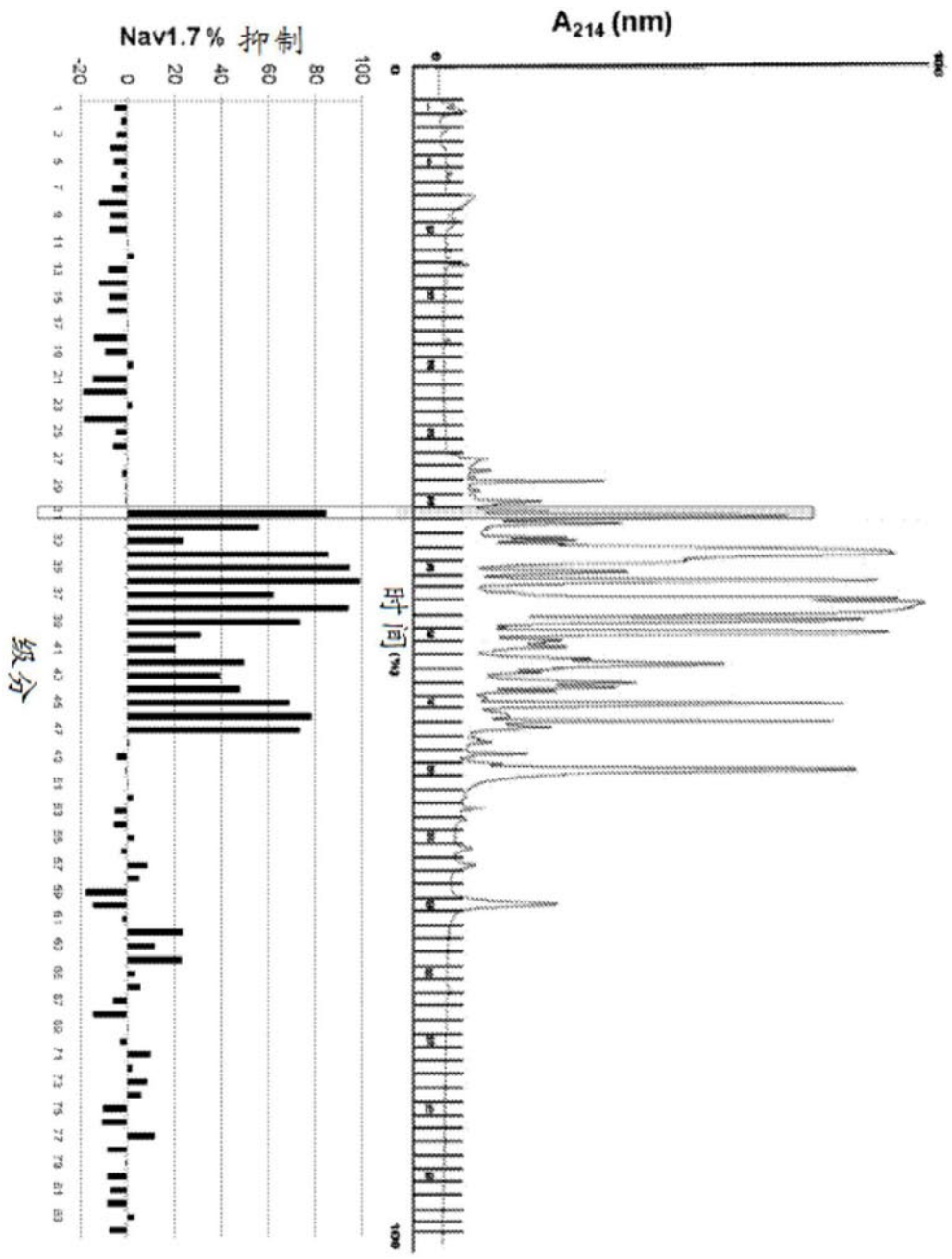


图 1

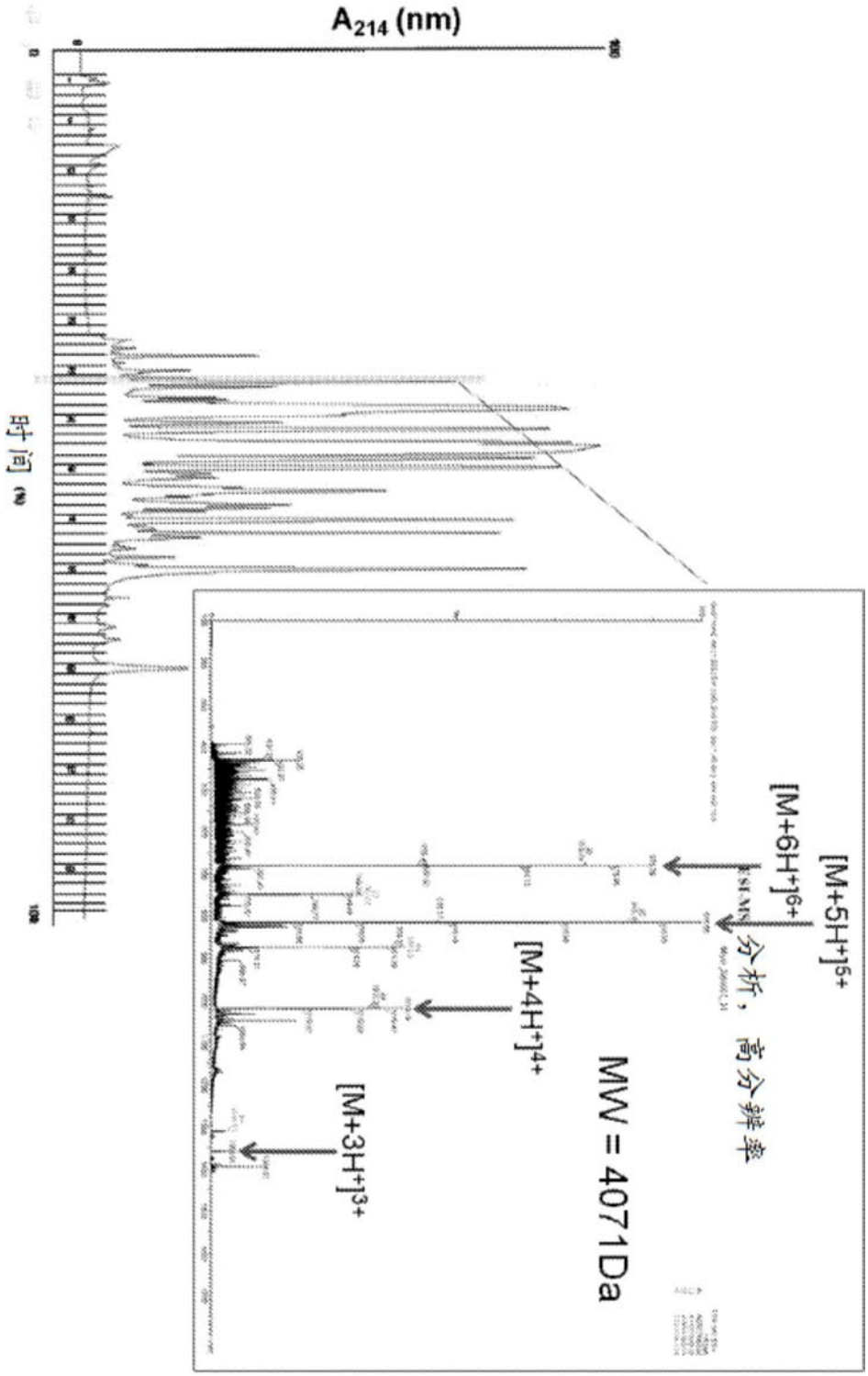


图 2

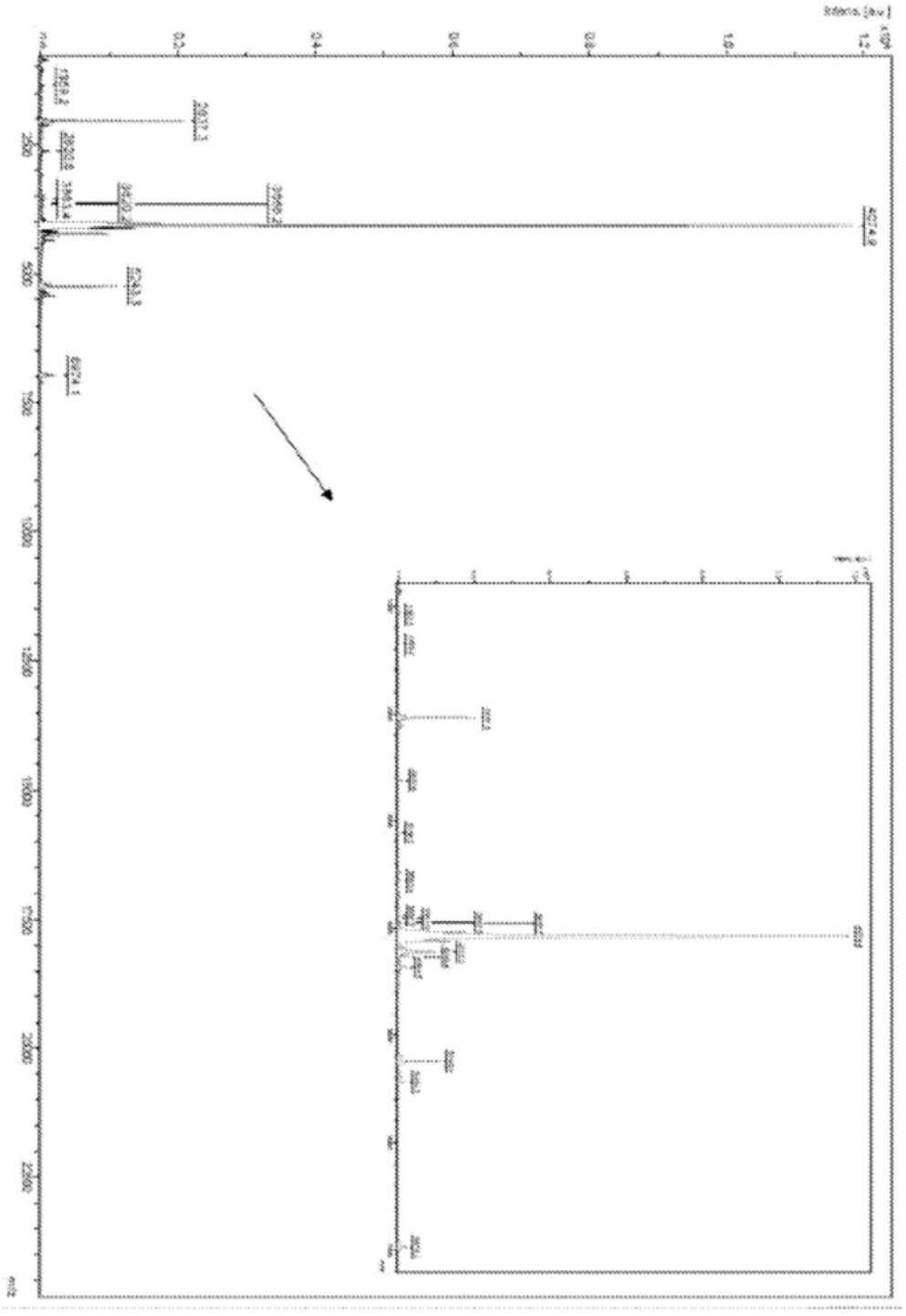


图 3

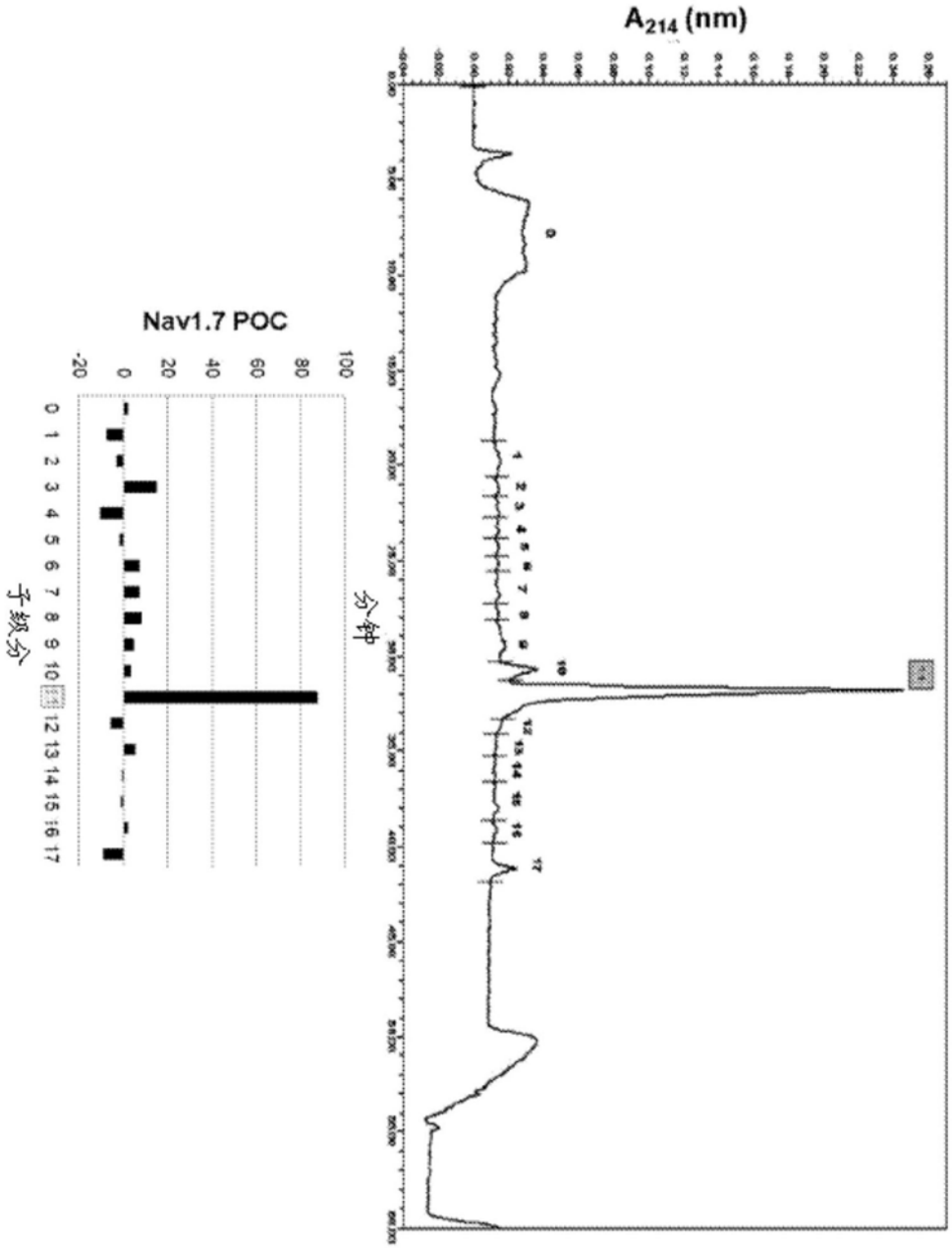

A214 (nm)
Nav1.7 POC
-20
0
20
40
60
80
100
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
子级分
分钟

图 4

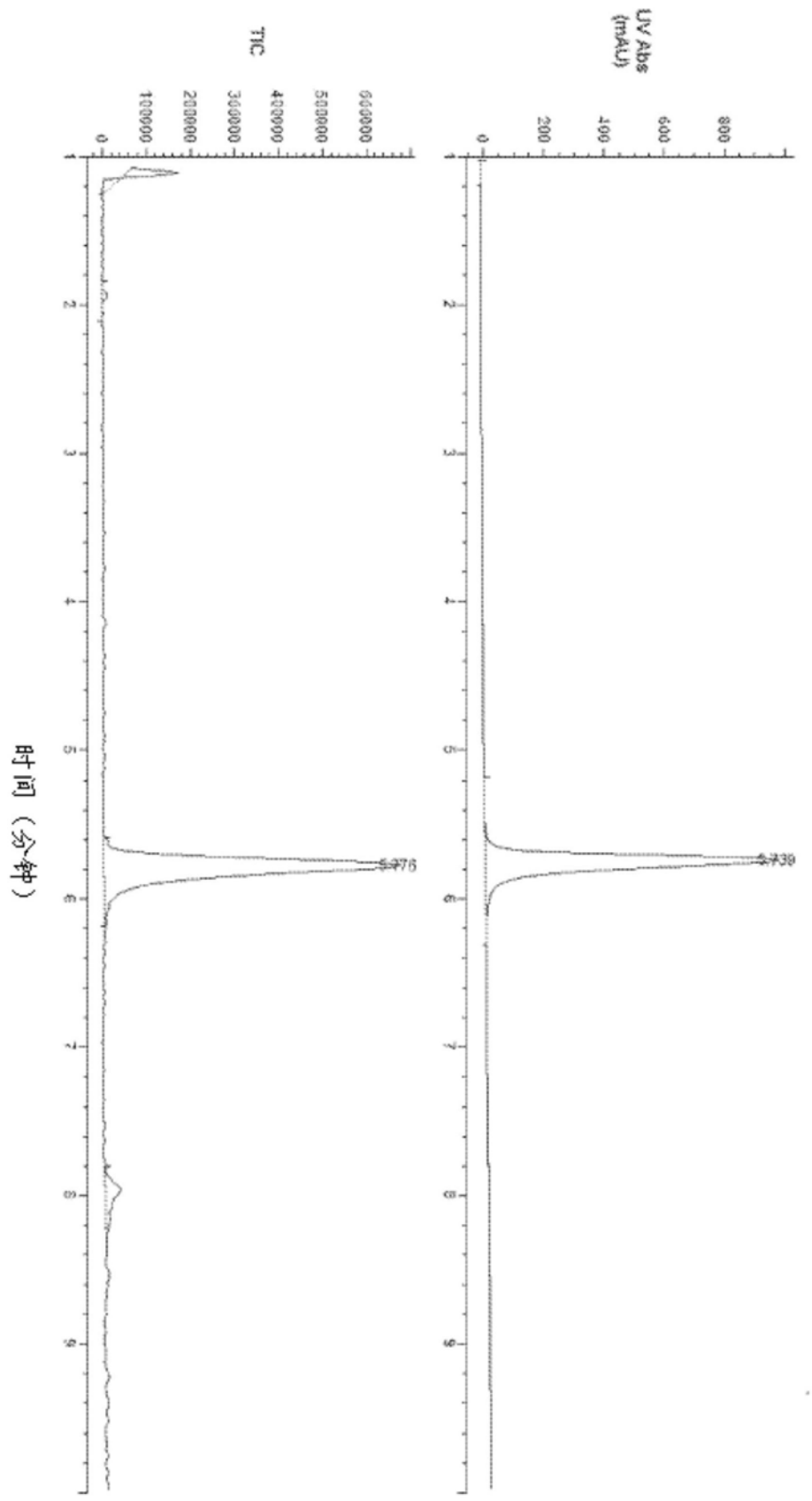


图 5

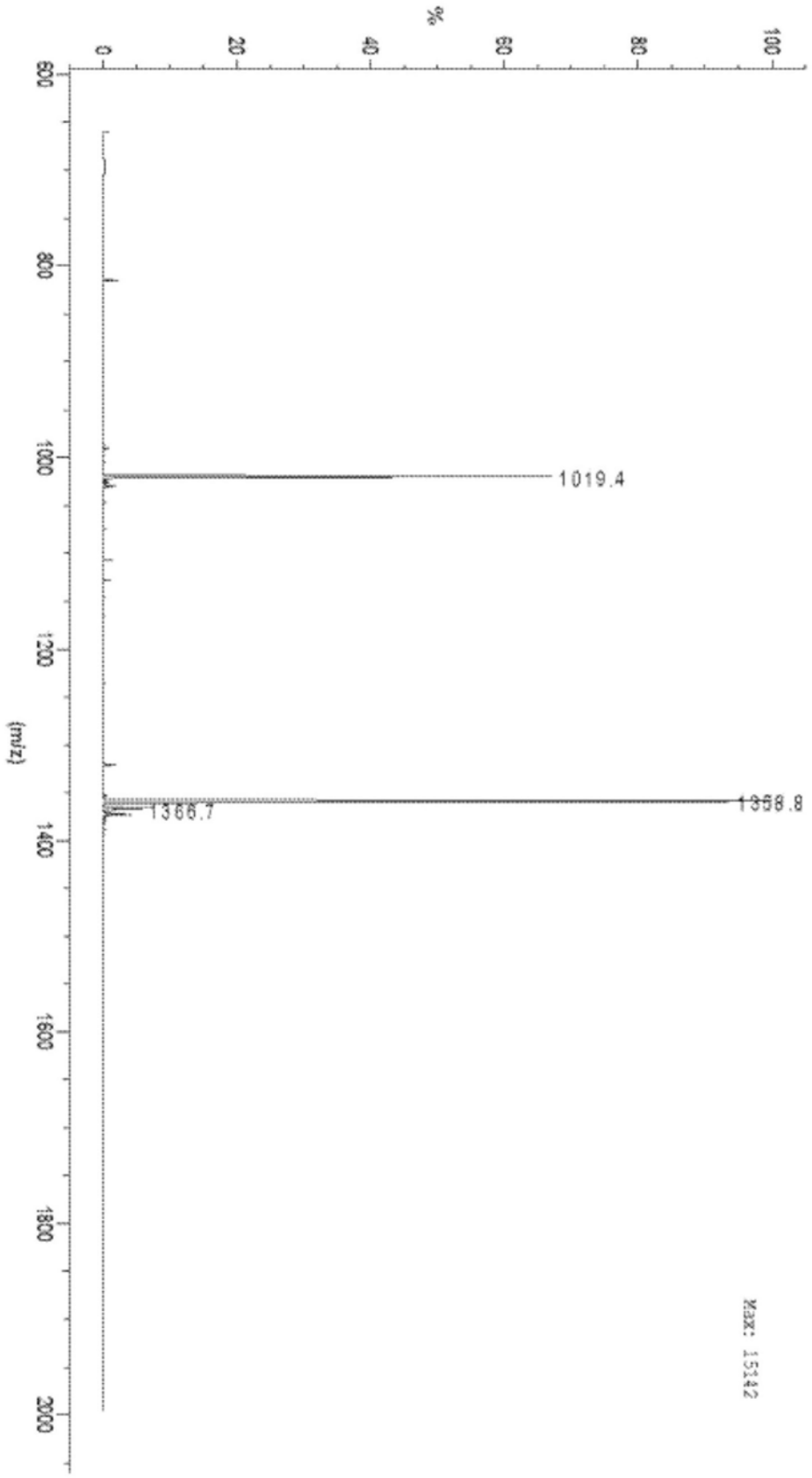

%
0
20
40
60
80
100
600
800
1000
1200
1400
1600
1800
2000
(m/z)
1019.4
1366.7
Max: 15142

图 6

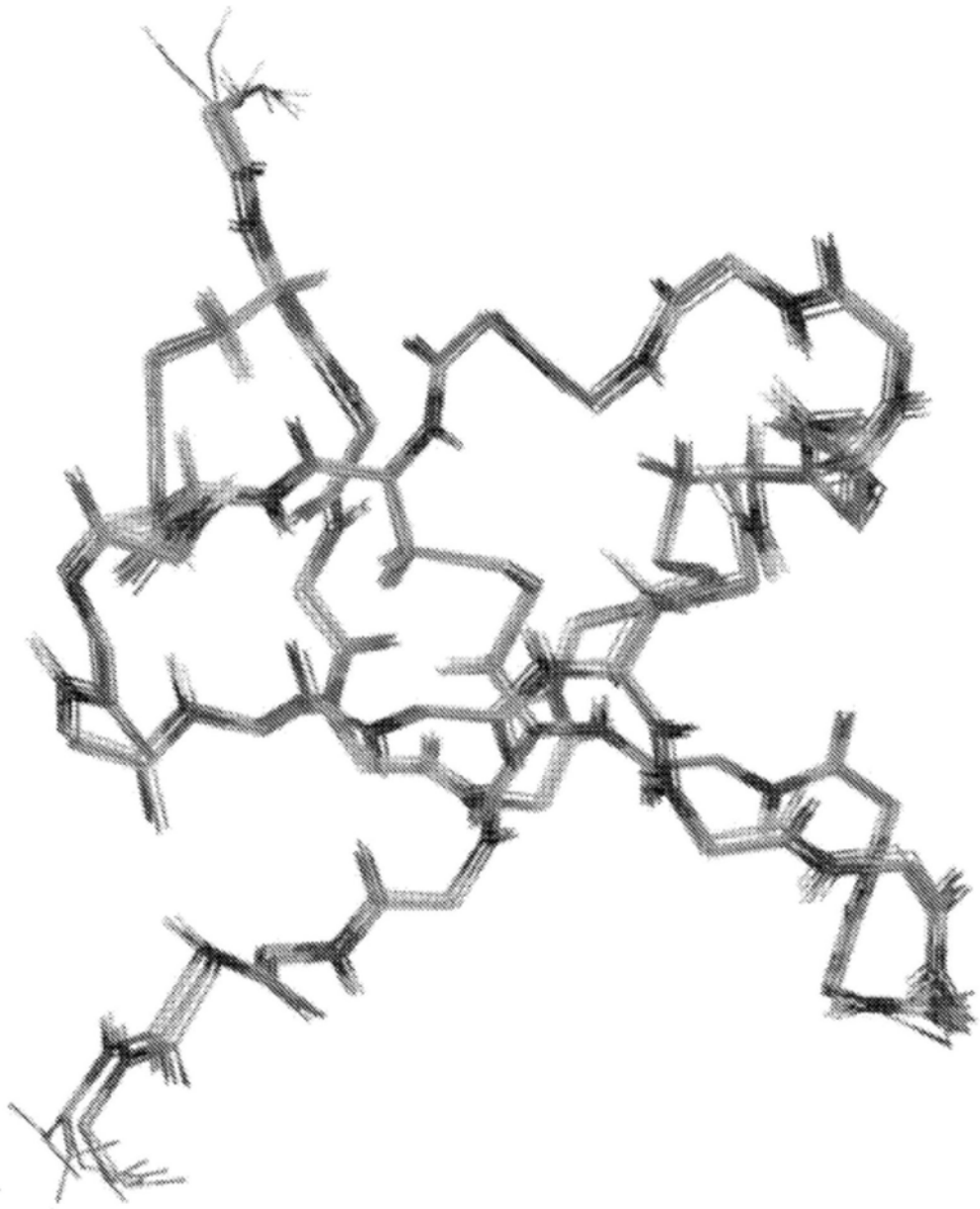


图 7

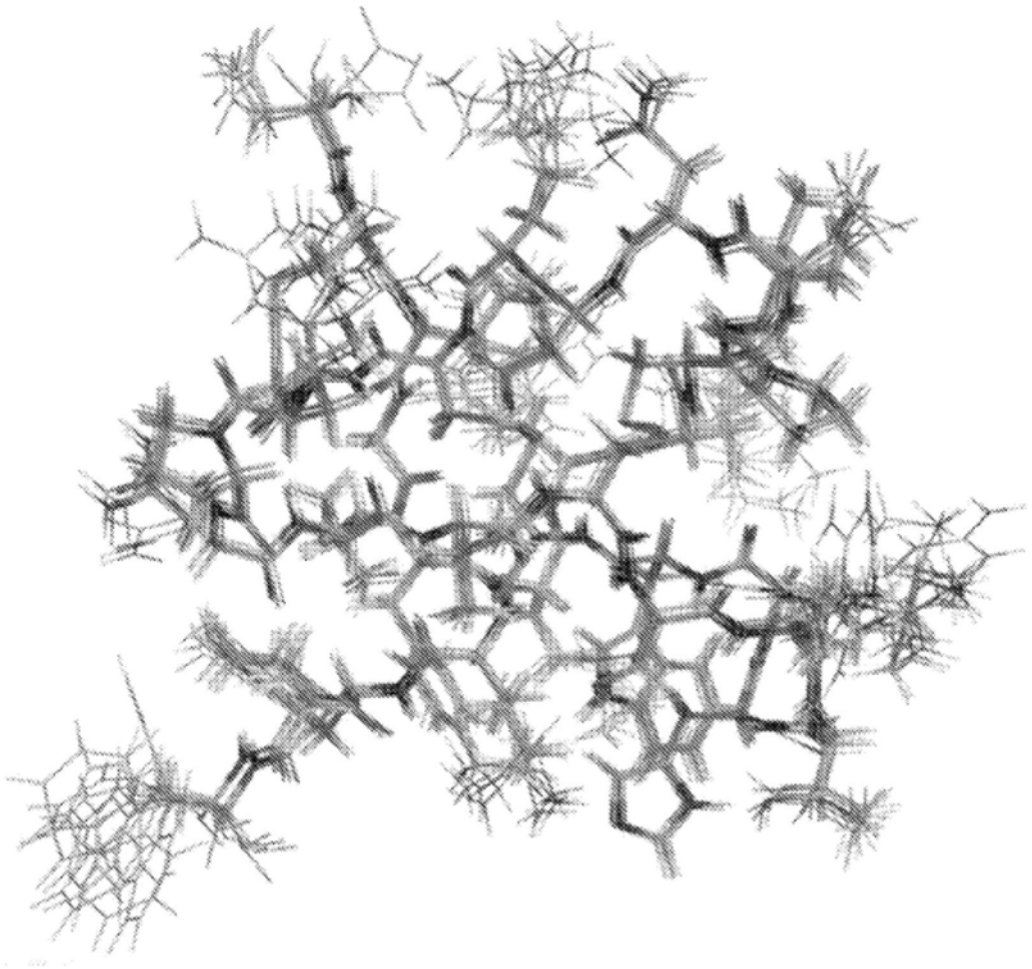


图 8

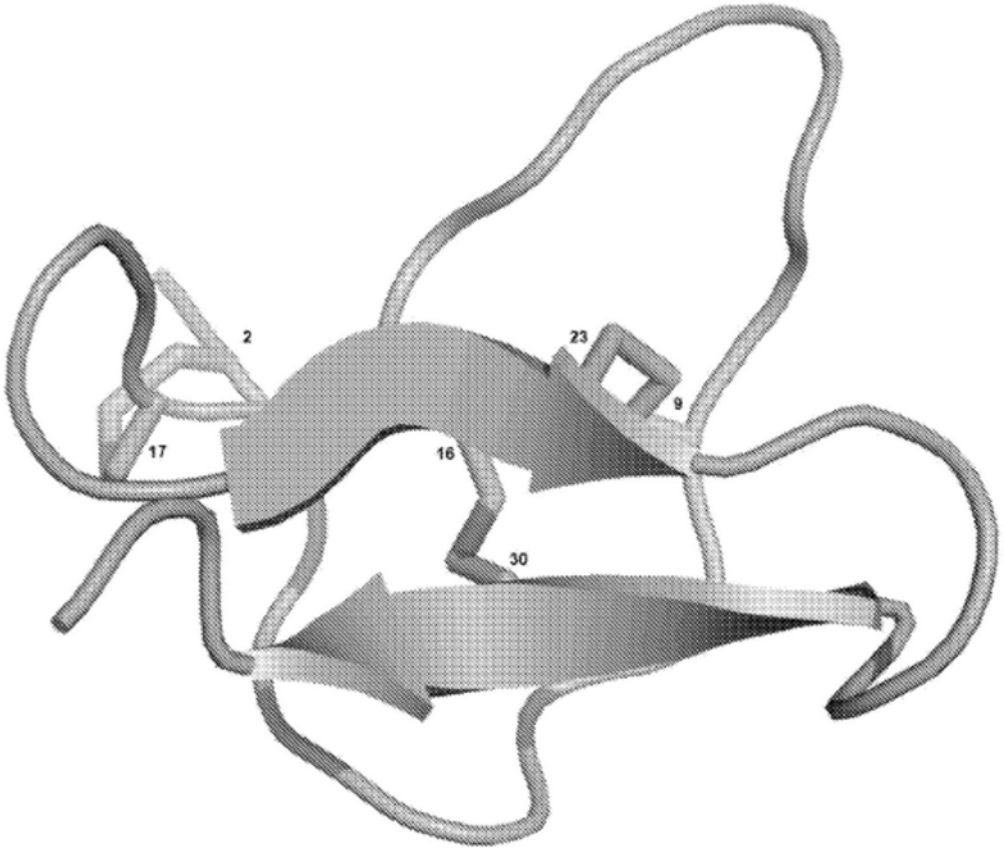


图 9

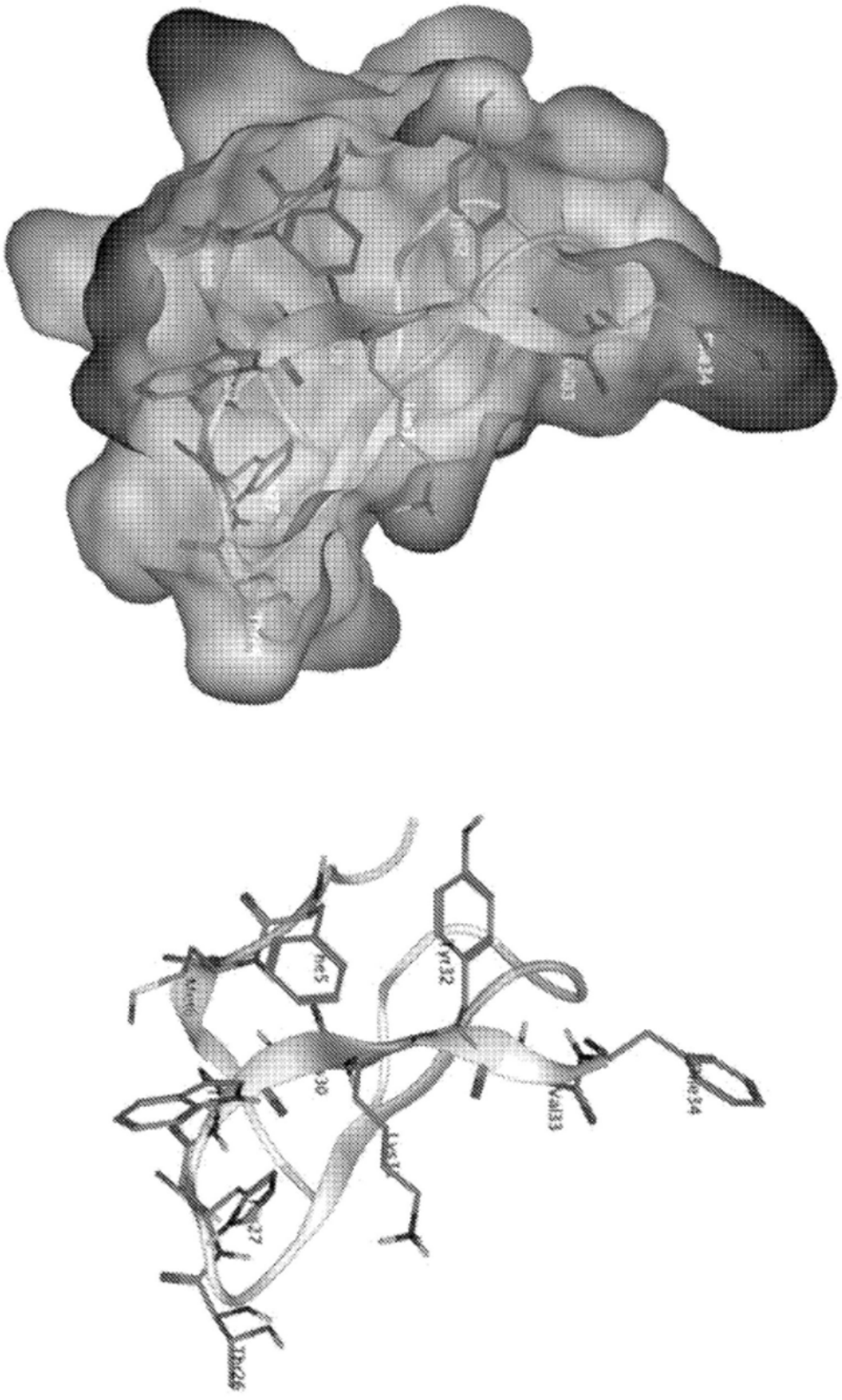


图 10

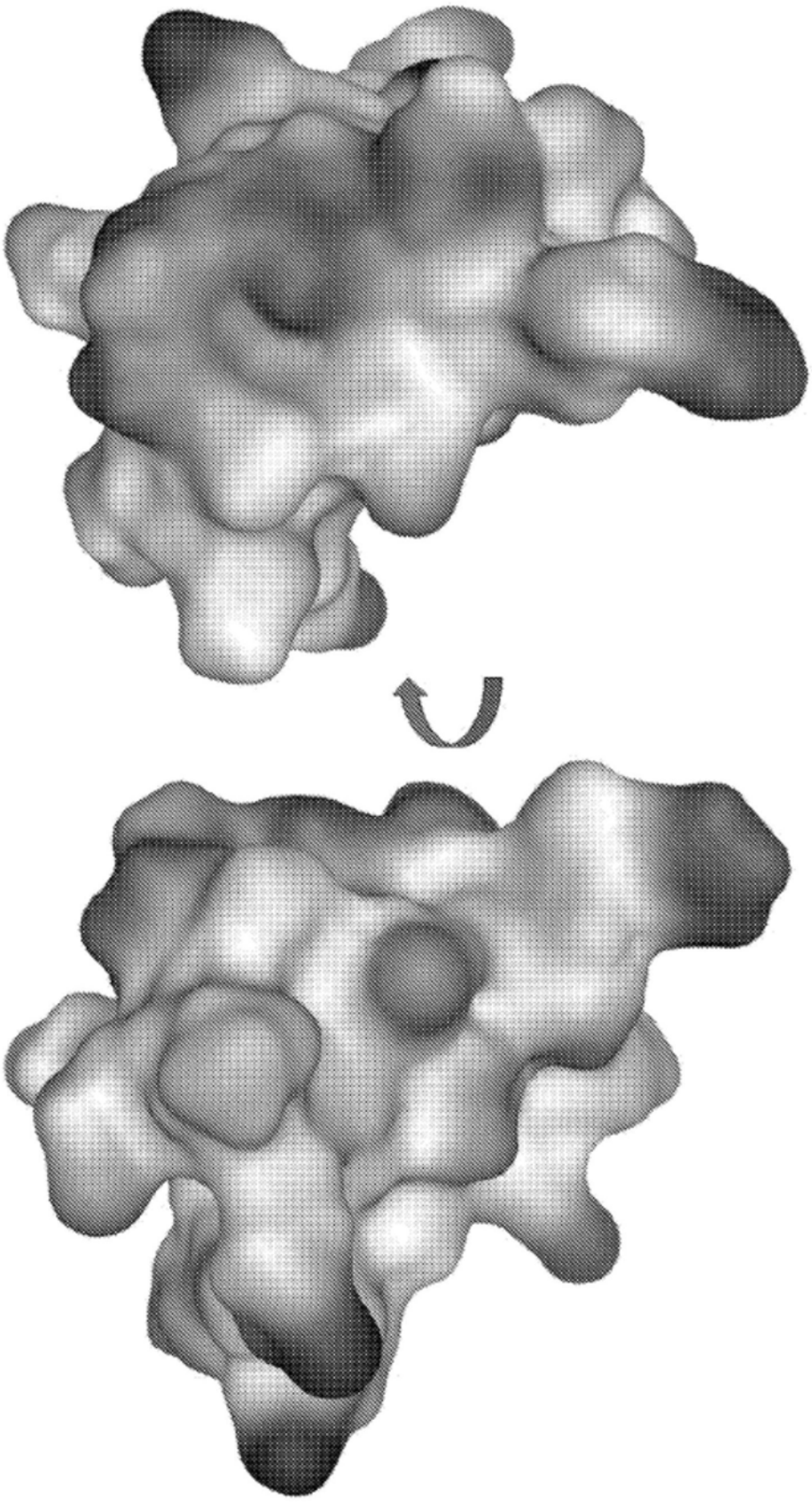


图 11

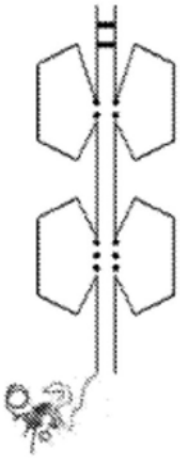


图 12A

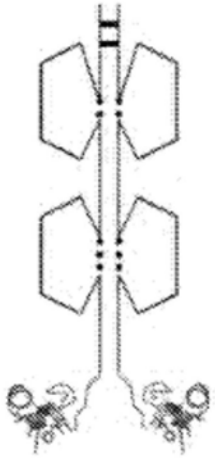


图 12B

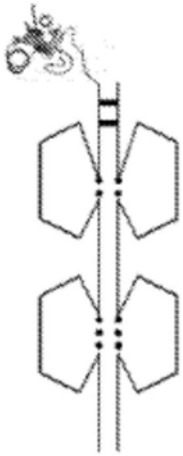


图 12C

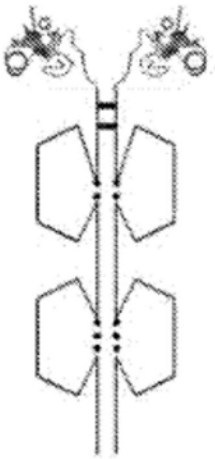


图 12D

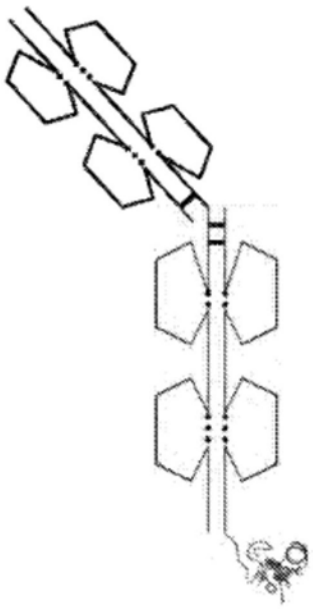


图 12E

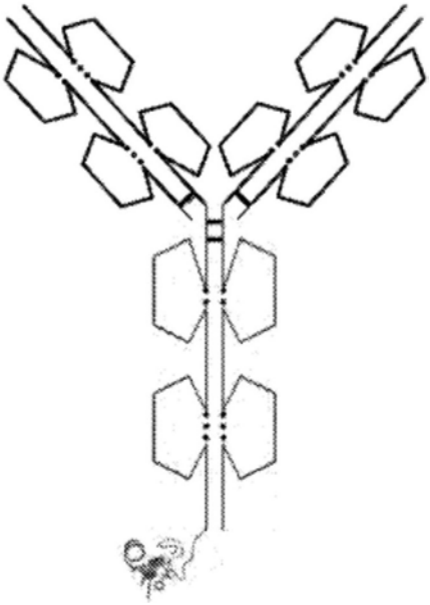


图 12F

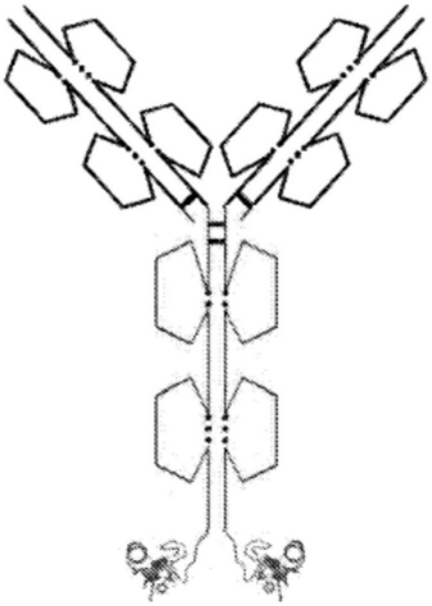


图 12G

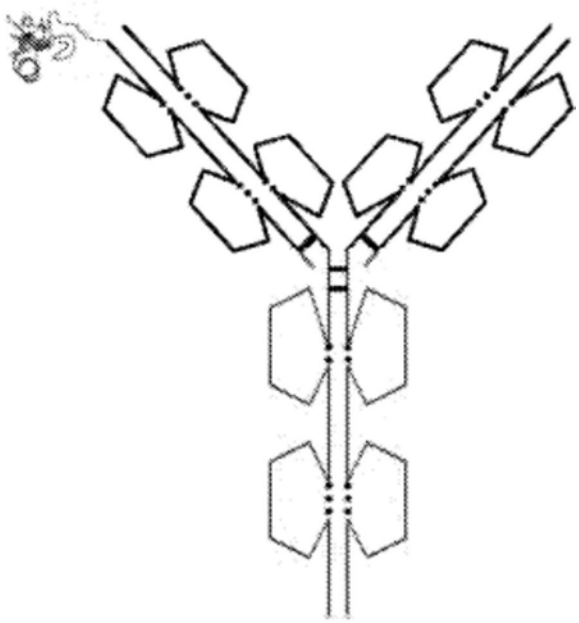


图 12H

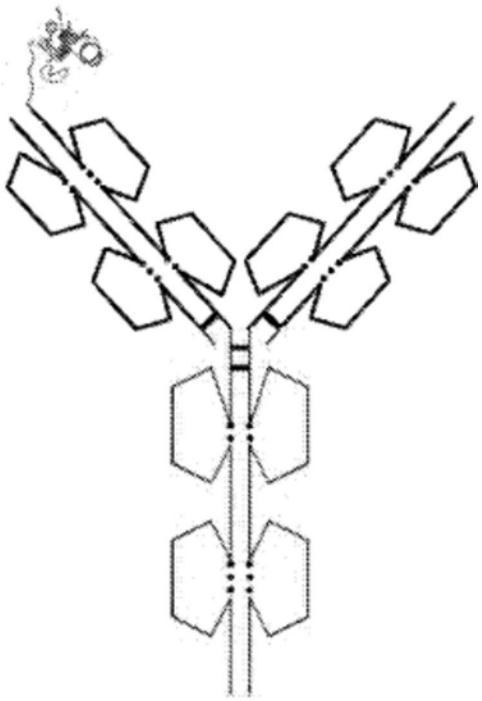


图 12I

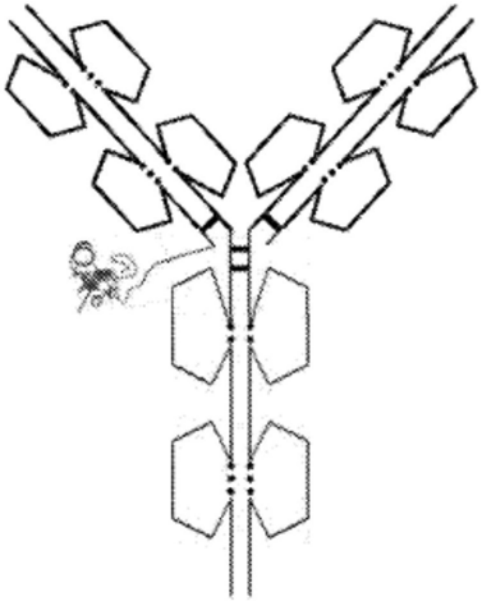


图 12J

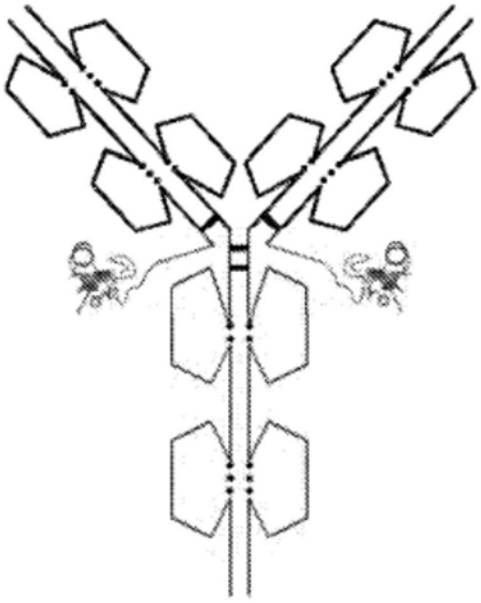


图 12K

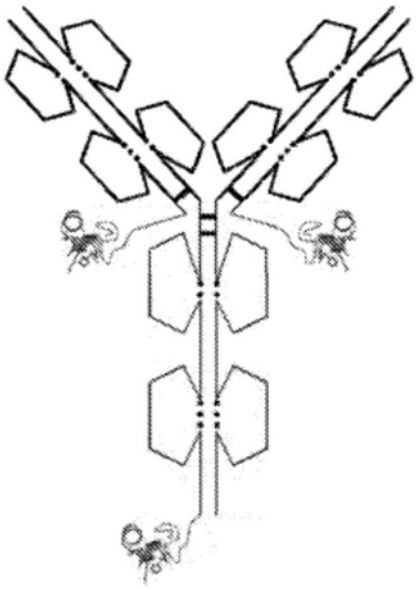


图 12L

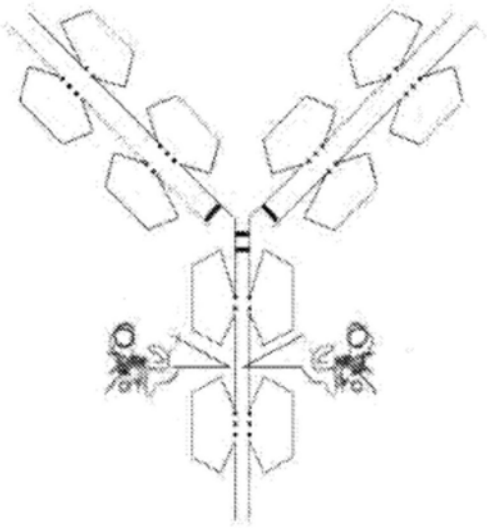


图 12M

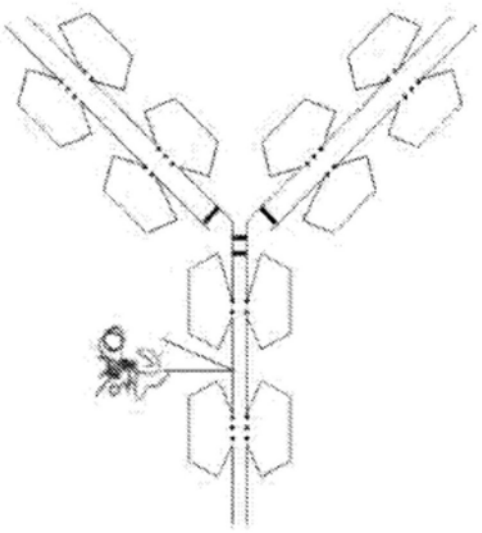


图 12N

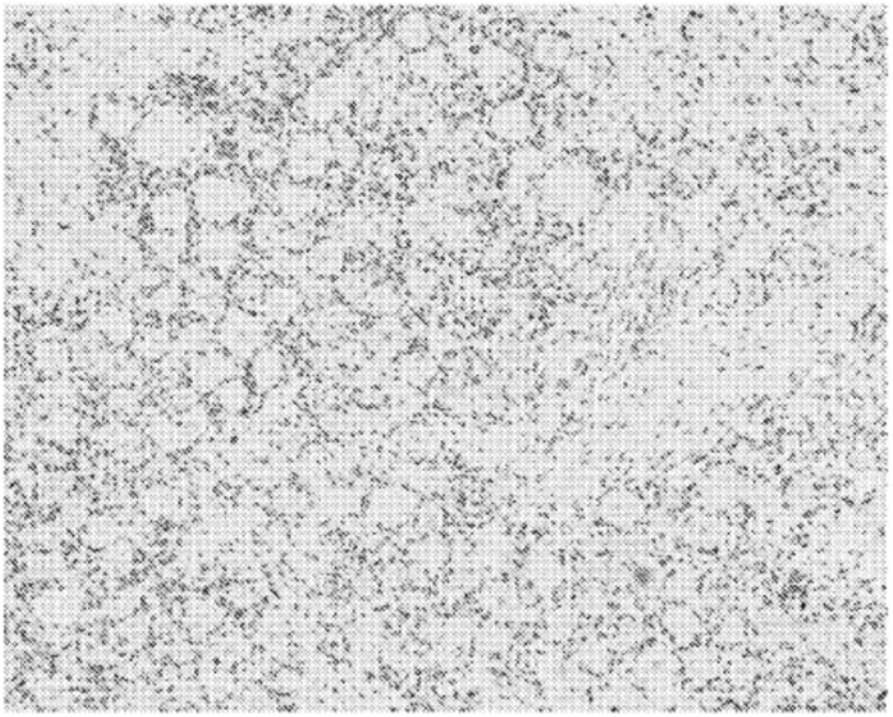


图 13A

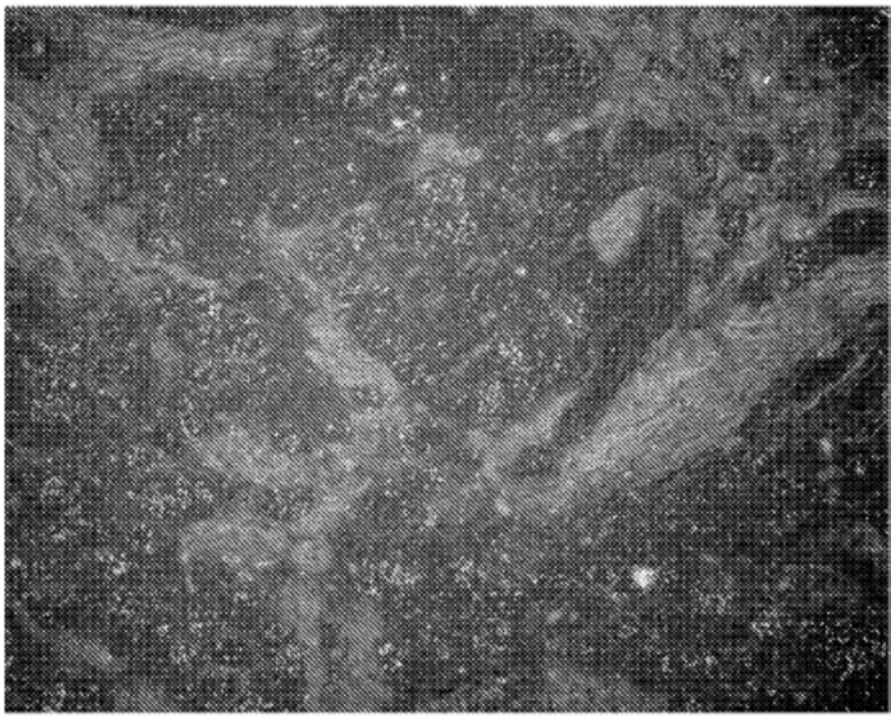


图 13B

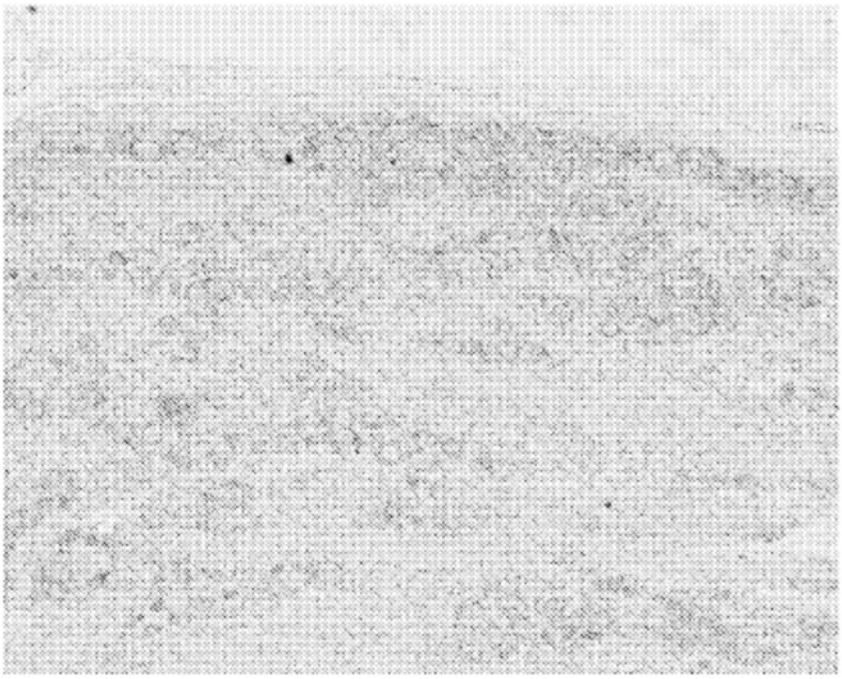


图 13C

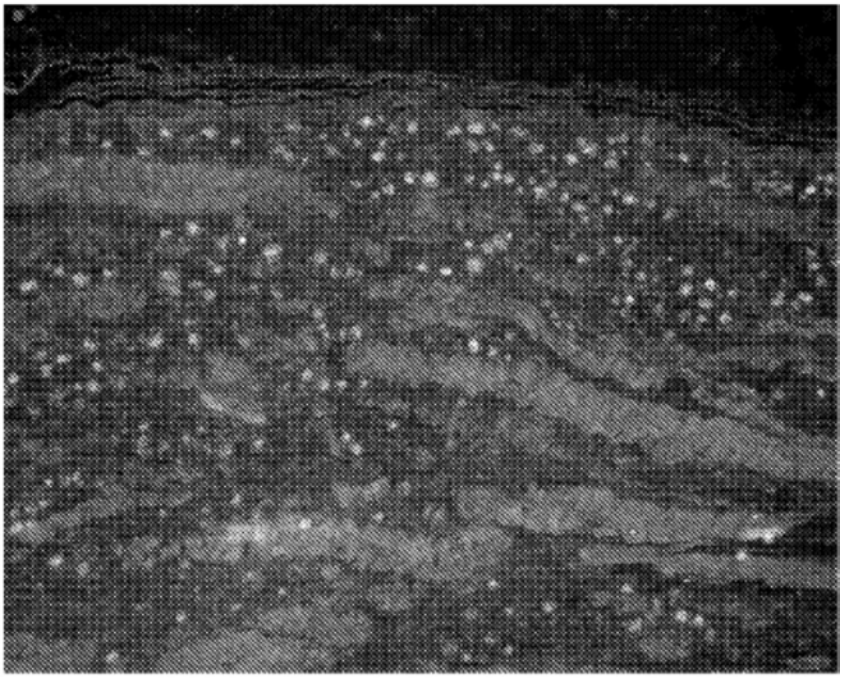


图 13D

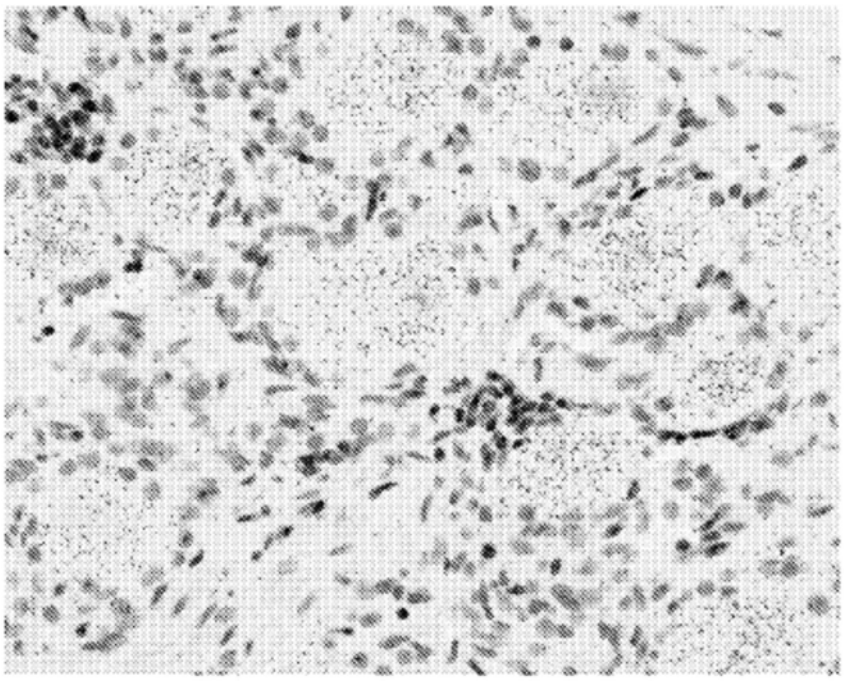


图 13E

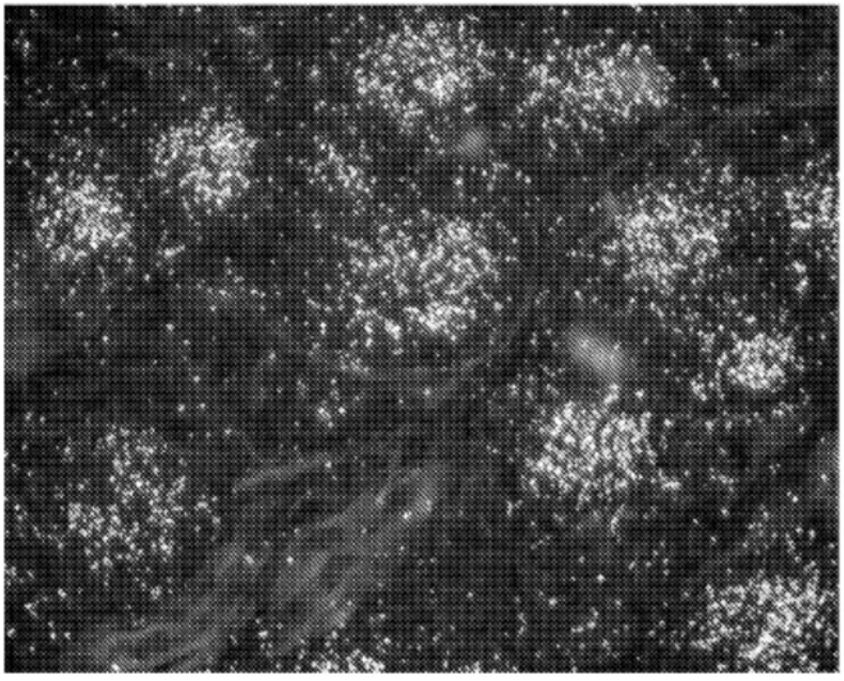


图 13F

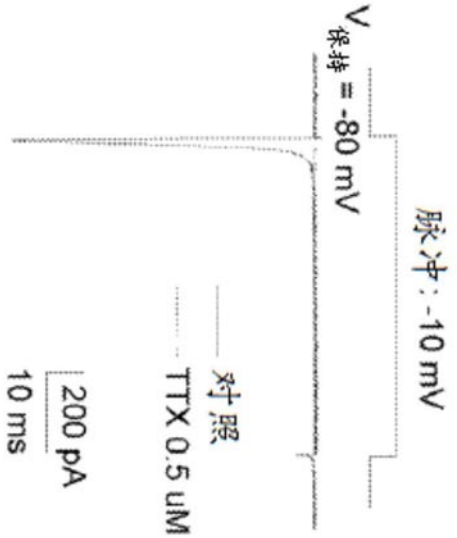


图 14A

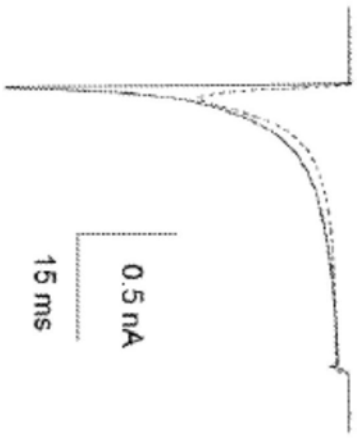


图 14B

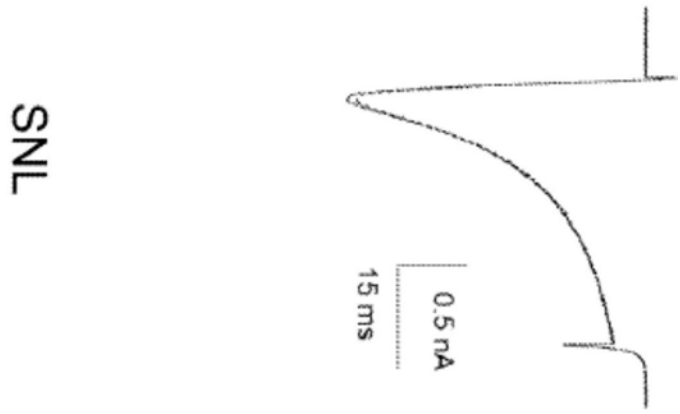


图 14C

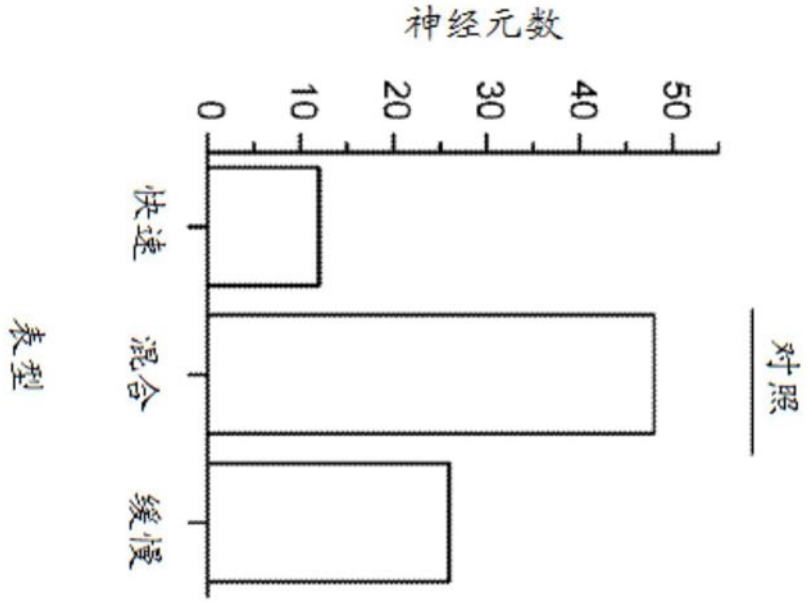


图 14D

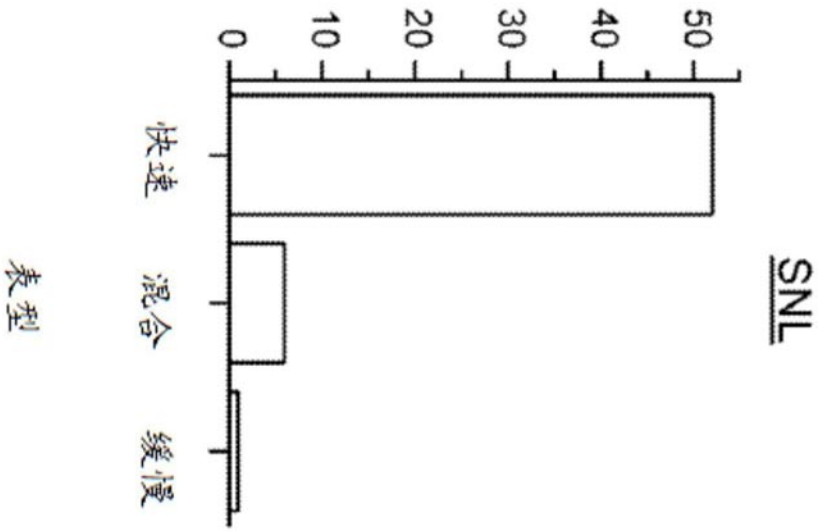


图 14E

```
KIIIA              1 CCNCSSKWCR-DHSRCC                      16
GpTx-1{1-34}       1 DCLGFMRKCIPDNDKCCRPN-LVCSRTHKWCKYVF   34
虎纹捕鸟蛛毒素-IV  1 ECLEIFKACNPSNDQCCKSSKLVCSRKTRWCKYQI   35
虎纹捕鸟蛛毒素-I   1 ACKGVFDACTPGKNECCPNR--VCSDKHKWCKWKL   33
ProTx II           1 YCQKWMWTCD-SERKCCEGM--VCR---LWCKKKLW  30
                       *       *       **
```

图 15A

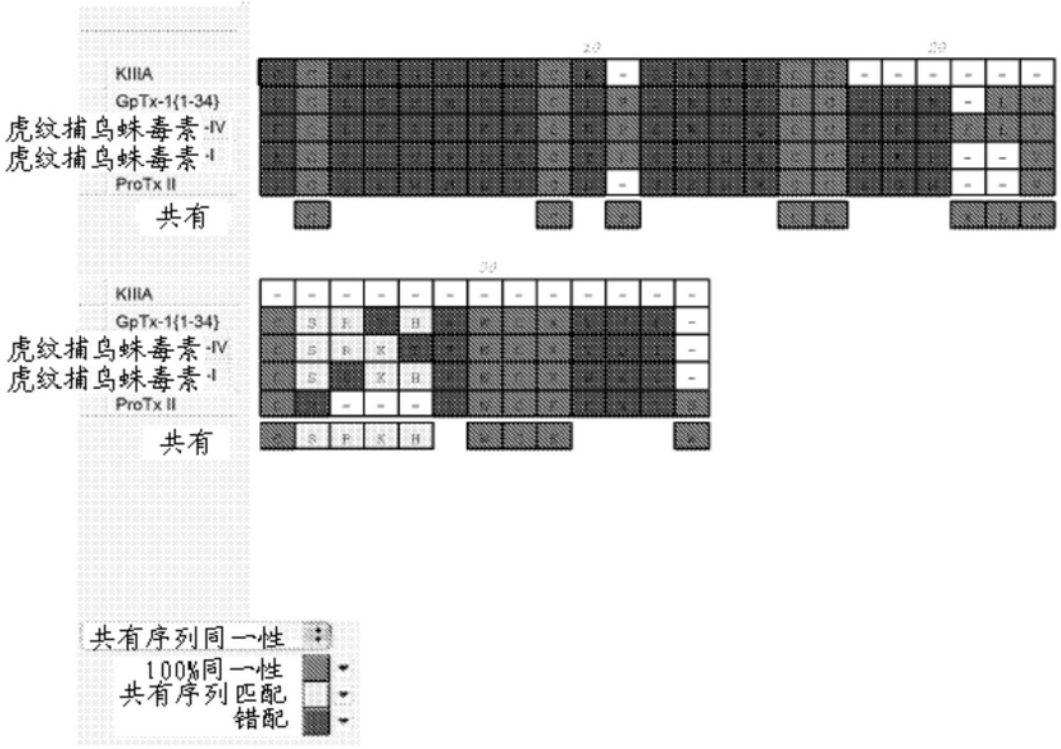

KIIIA
GpTx-1{1-34}
虎纹捕鸟蛛毒素-IV
虎纹捕鸟蛛毒素-I
ProTx II
共有
KIIIA
GpTx-1{1-34}
虎纹捕鸟蛛毒素-IV
虎纹捕鸟蛛毒素-I
ProTx II
共有
共有序列同一性
100%同一性
共有序列匹配
错配

图 15B

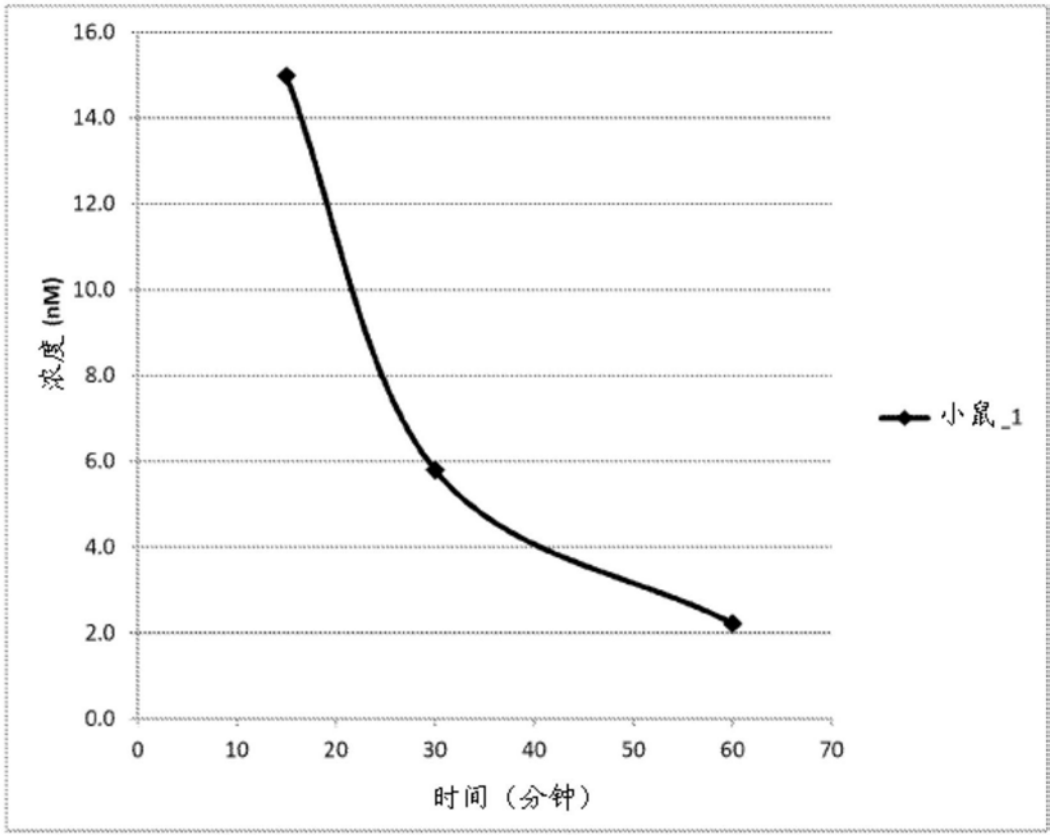

16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
浓度 (nM)
0
10
20
30
40
50
60
70
时间（分钟）
小鼠_1

图 16

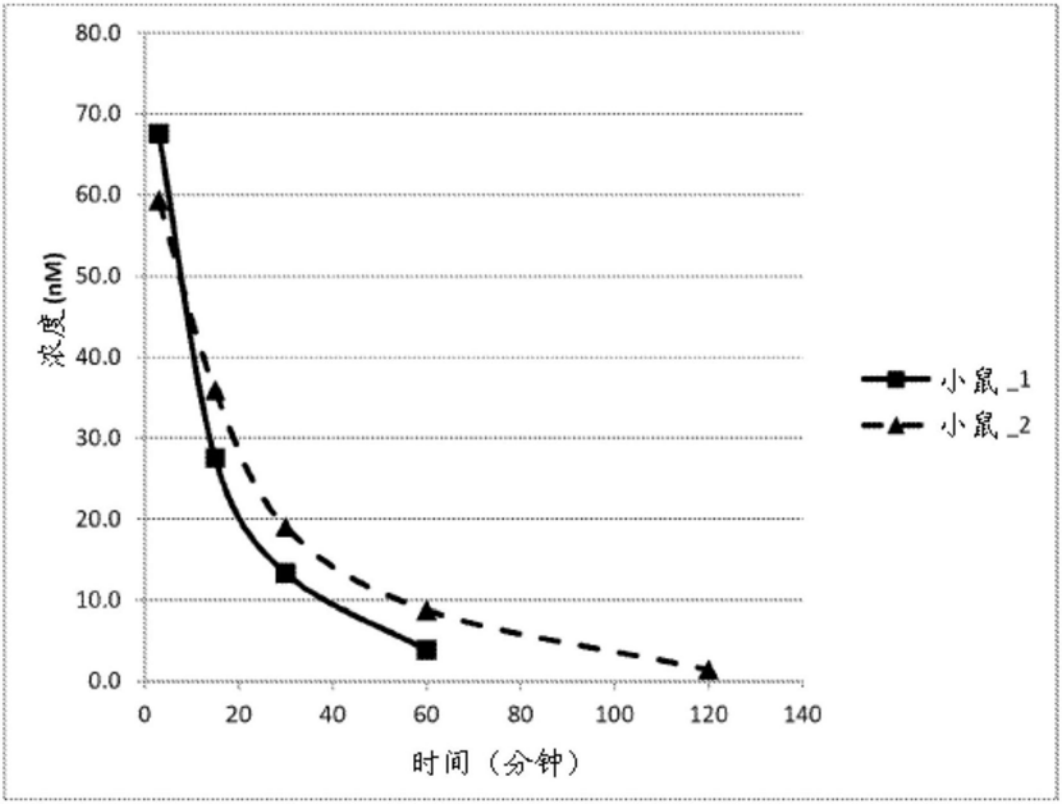

80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
浓度 (nM)
0
20
40
60
80
100
120
140
时间（分钟）
小鼠_1
小鼠_2

图 17A

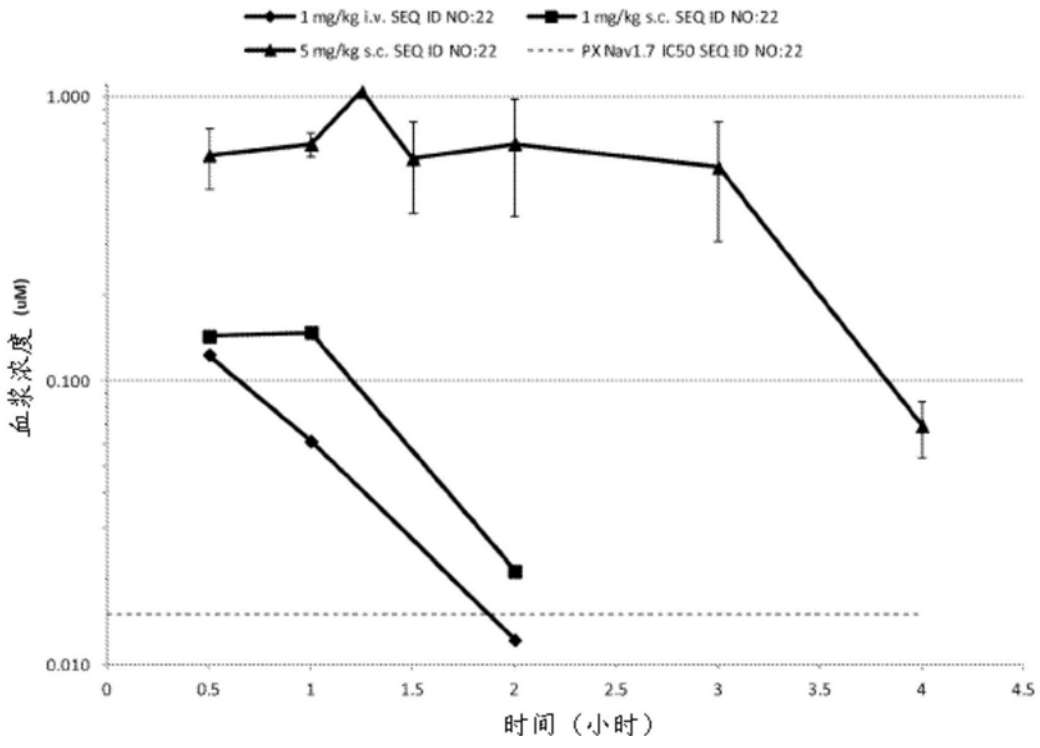

1 mg/kg i.v. SEQ ID NO:22
1 mg/kg s.c. SEQ ID NO:22
5 mg/kg s.c. SEQ ID NO:22
PX Nav1.7 IC50 SEQ ID NO:22
1.000
0.100
0.010
血浆浓度 (uM)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
时间（小时）

图 17B

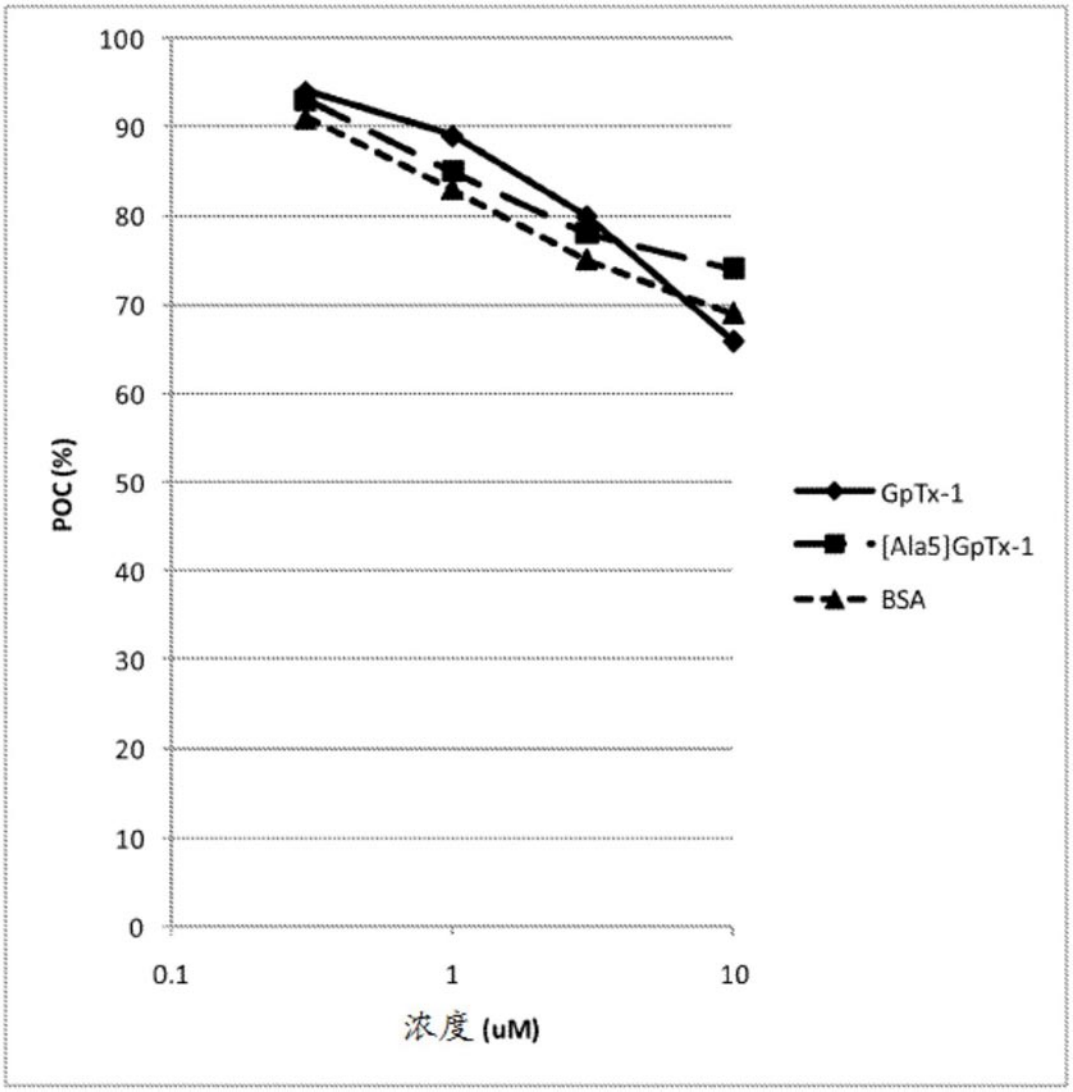

100
90
80
70
60
50
40
30
20
10
0
POC (%)
0.1
1
10
浓度 (uM)
GpTx-1
[Ala5]GpTx-1
BSA

图 18

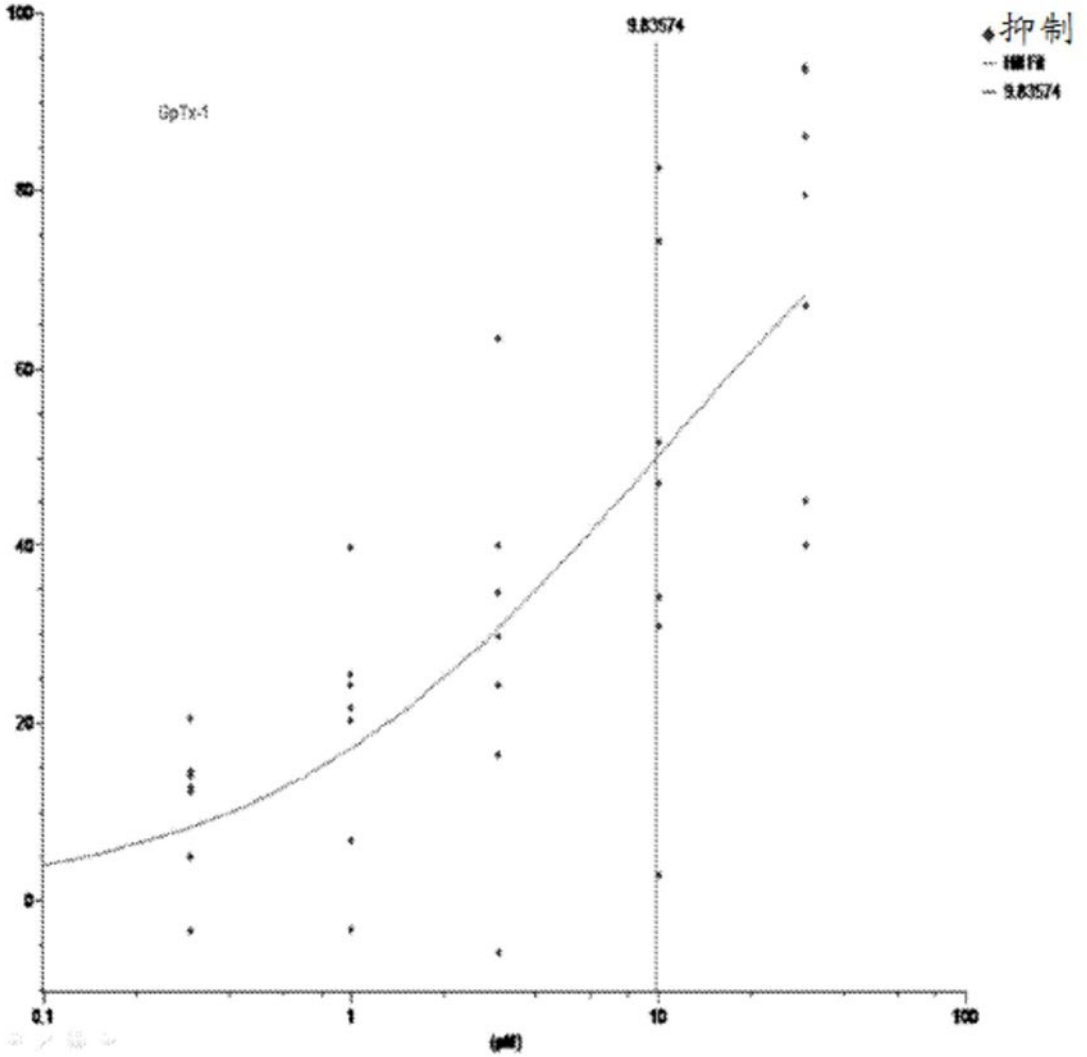


图 19A

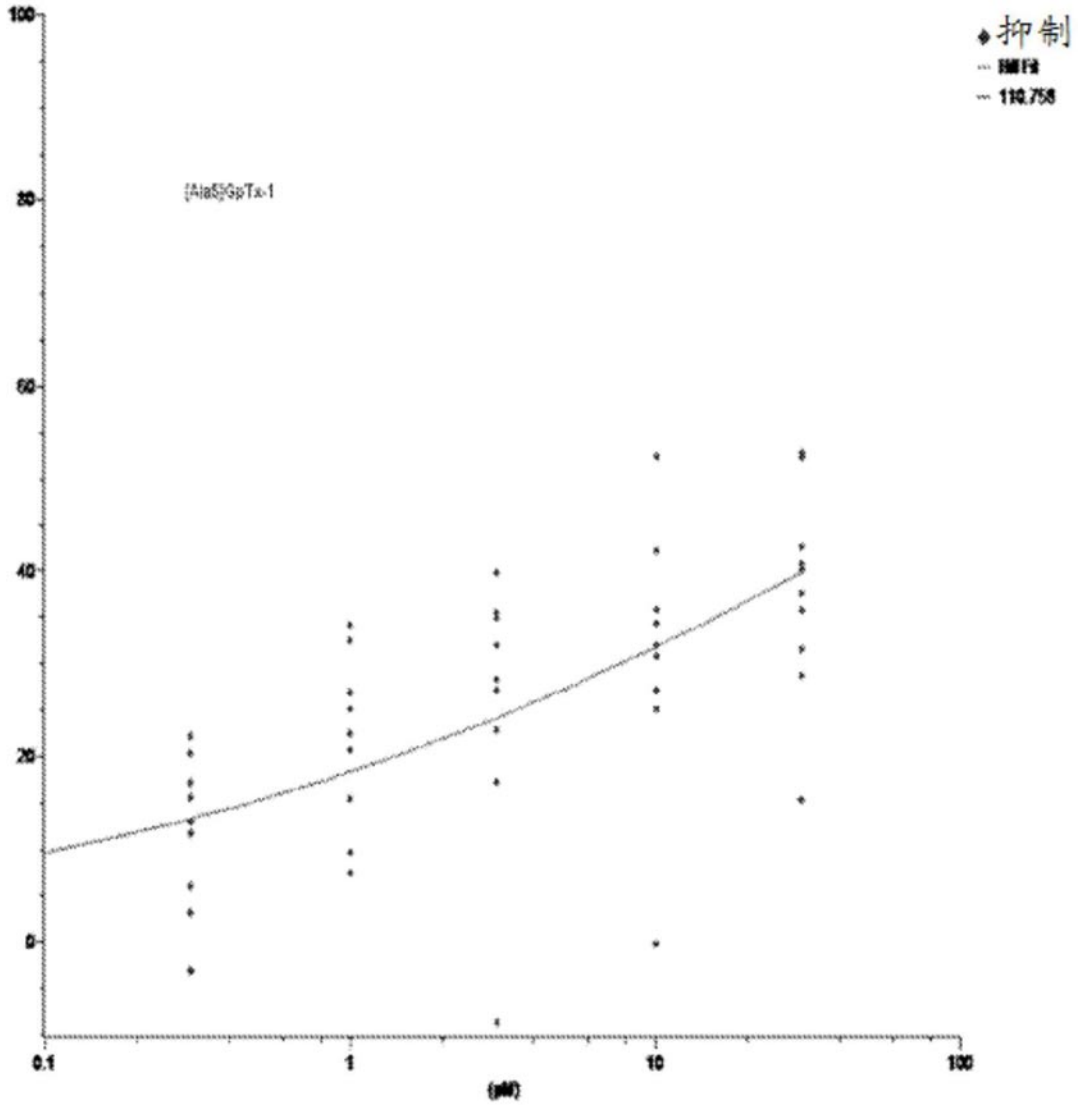


图 19B

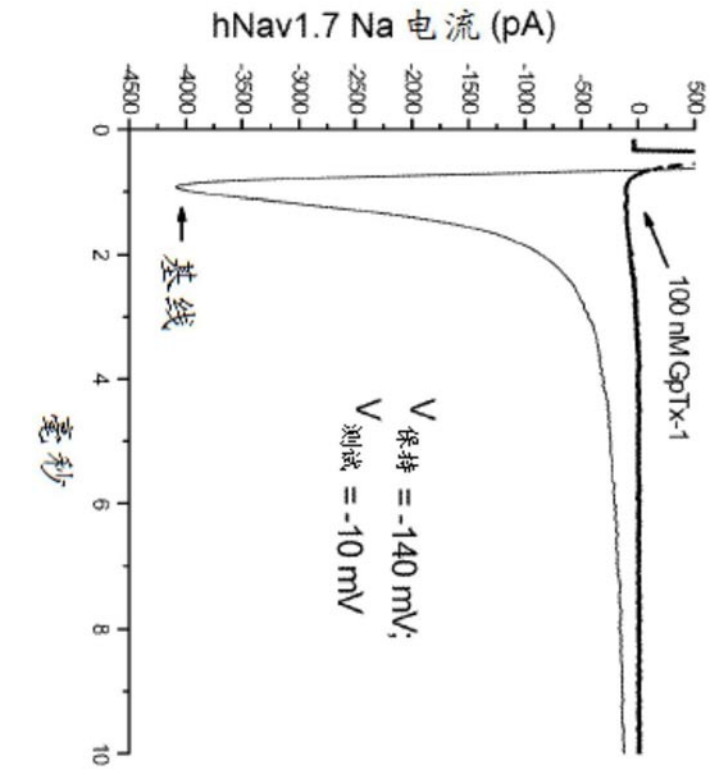

hNav1.7 Na 电流 (pA)
100 nM GpTx-1
基线
$V_{保持}$ = -140 mV;
$V_{测试}$ = -10 mV
毫秒

图 20

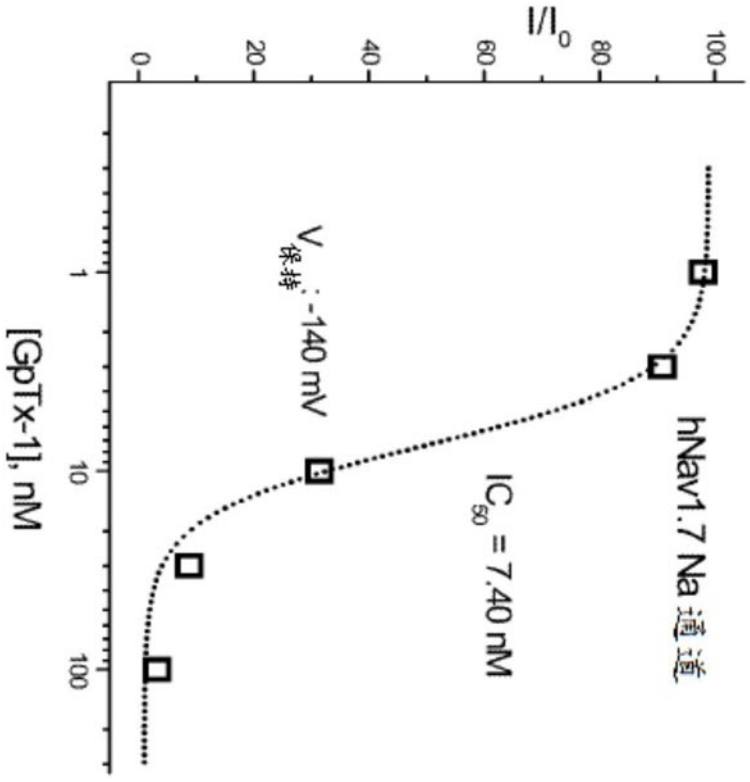

I/I0
hNav1.7 Na 通道
IC_{50} = 7.40 nM
$V_{保持}$: -140 mV
[GpTx-1], nM

图 21

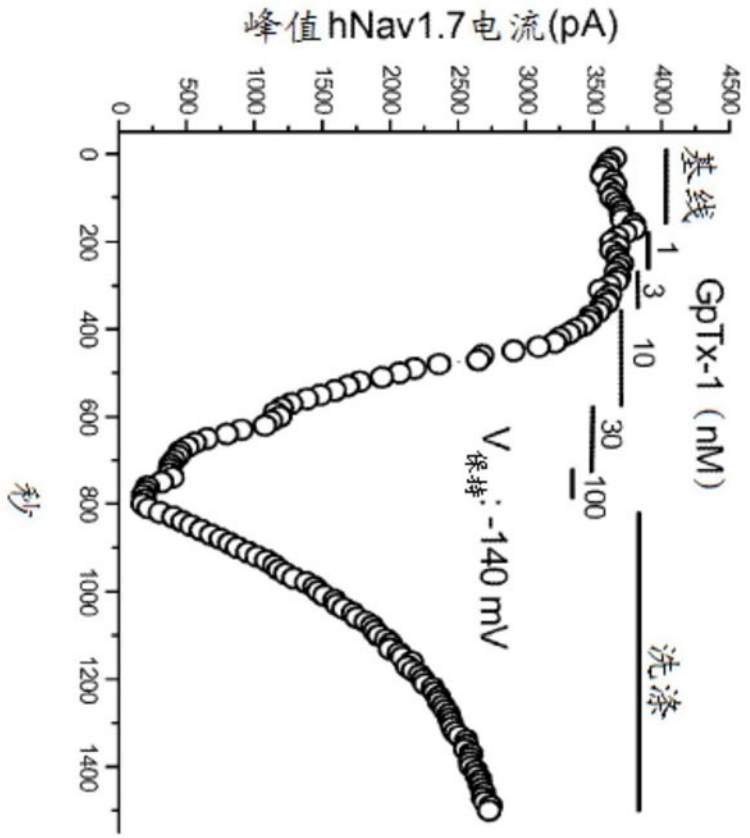

峰值hNav1.7电流(pA)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
0
200
400
600
800
1000
1200
1400
秒
基线
1
3
10
30
100
GpTx-1（nM）
洗涤
V保持: -140 mV

图 22

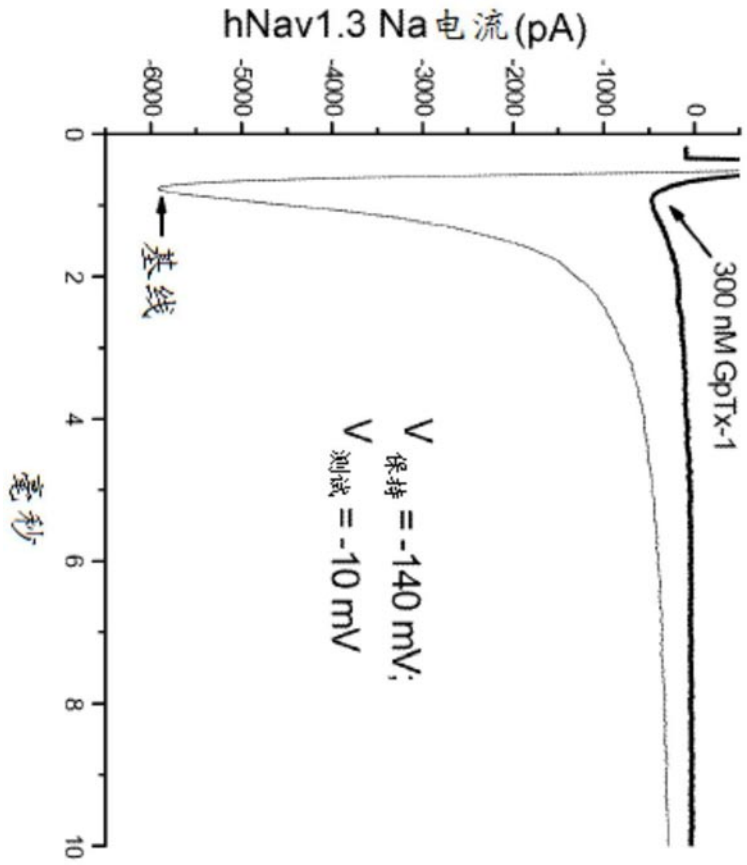

hNav1.3 Na电流(pA)
-6000
-5000
-4000
-3000
-2000
-1000
0
0
2
4
6
8
10
基线
300 nM GpTx-1
V 保持 = -140 mV;
V 测试 = -10 mV
毫秒

图 23

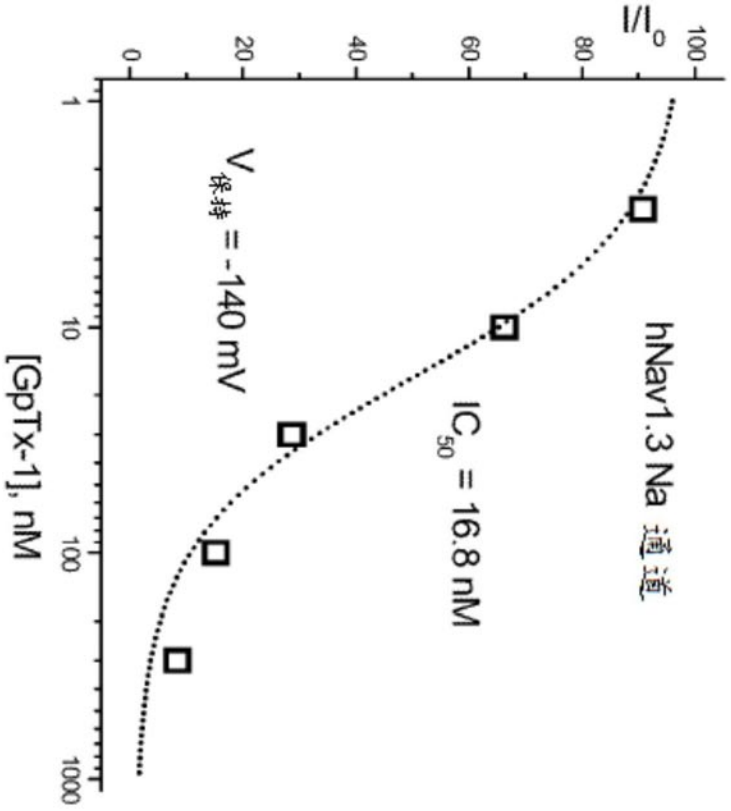

I/I0
100
80
60
40
20
0
1
10
100
1000
[GpTx-1], nM
V保持 = -140 mV
IC50 = 16.8 nM
hNav1.3 Na 通道

图 24

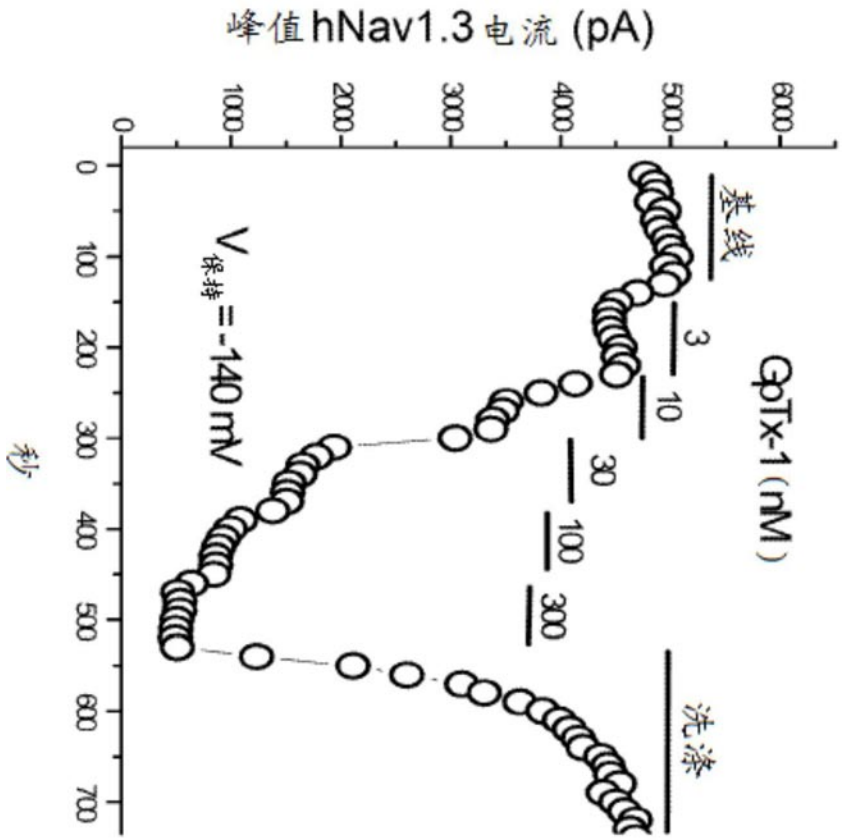

峰值hNav1.3电流 (pA)
0
1000
2000
3000
4000
5000
6000
0
100
200
300
400
500
600
700
秒
V保持=-140 mV
基线
3
10
30
100
300
GpTx-1 (nM)
洗涤

图 25

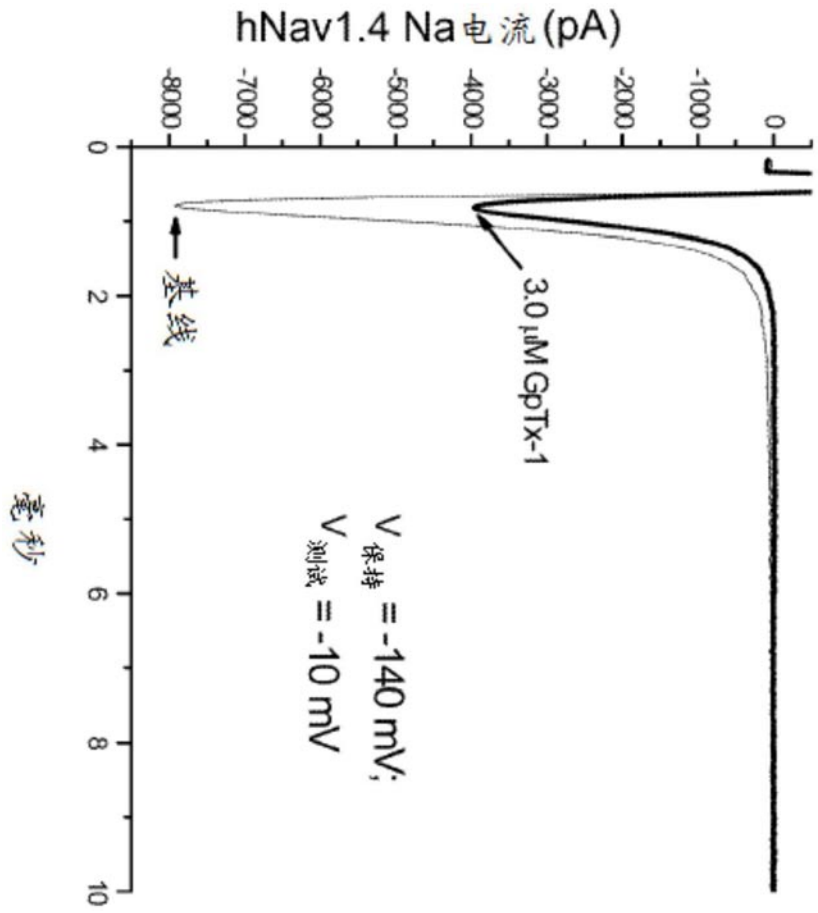

hNav1.4 Na电流(pA)
-8000
-7000
-6000
-5000
-4000
-3000
-2000
-1000
0
0
2
4
6
8
10
毫秒
基线
3.0 μM GpTx-1
V保持 = -140 mV;
V测试 = -10 mV

图 26

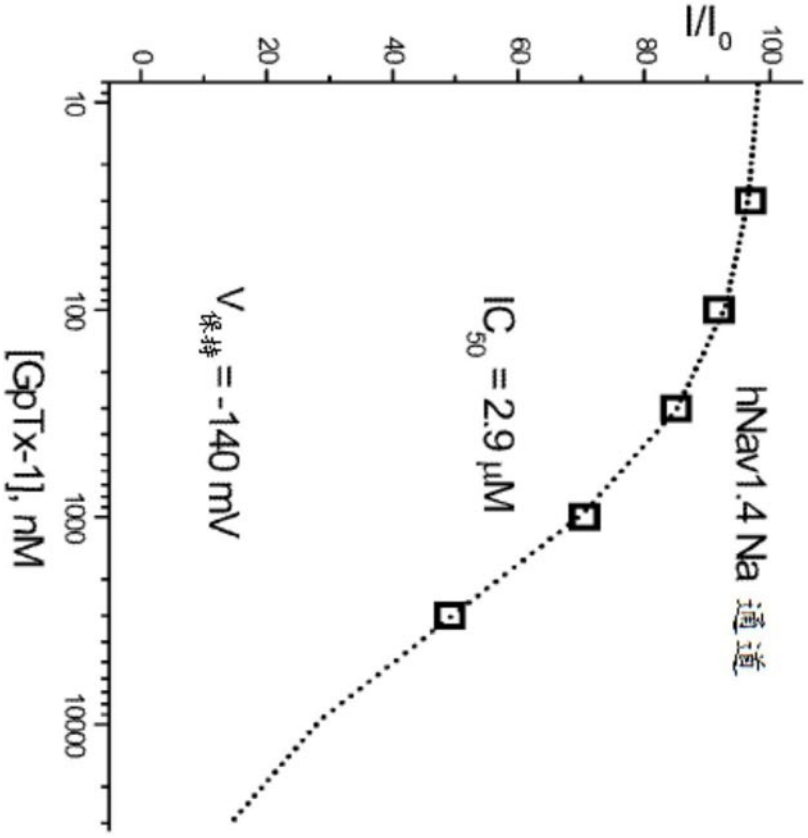

I/I0
100
80
60
40
20
0
10
100
1000
10000
[GpTx-1], nM
V保持 = -140 mV
IC50 = 2.9 μM
hNav1.4 Na 通道

图 27

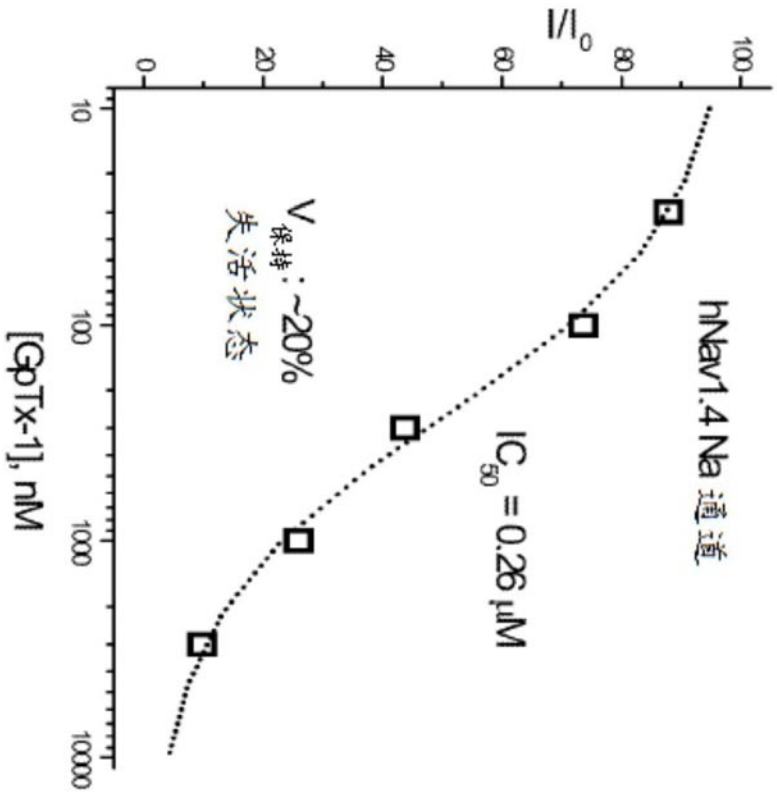

I/I0
0
20
40
60
80
100
10
100
1000
10000
[GpTx-1], nM
V保持: ~20%
失活状态
IC50 = 0.26 μM
hNav1.4 Na 通道

图 28

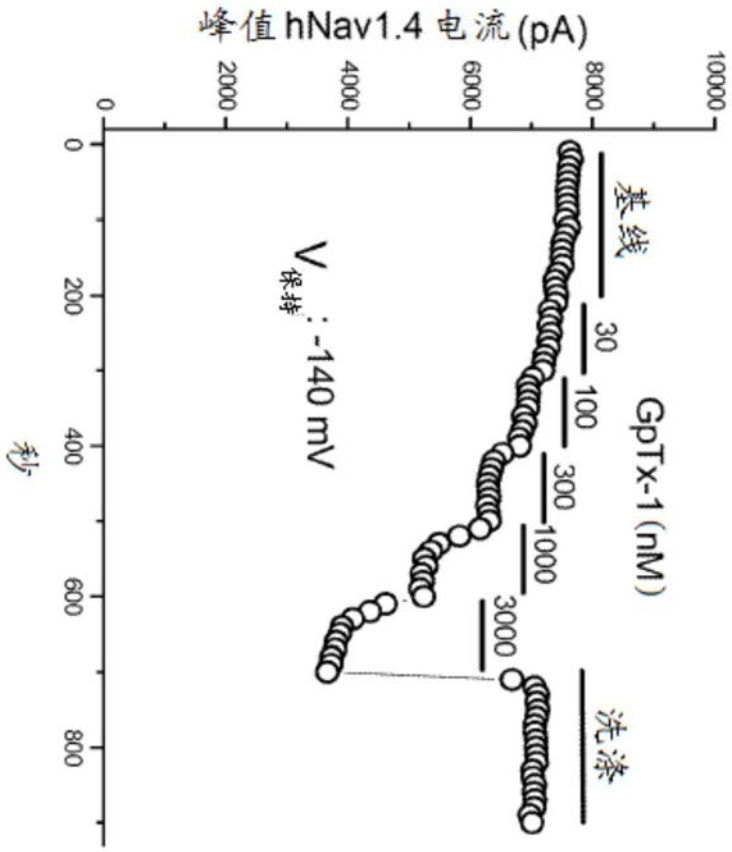

峰值 hNav1.4 电流 (pA)
0
2000
4000
6000
8000
10000
0
200
400
600
800
秒
基线
30
100
300
1000
3000
洗涤
GpTx-1 (nM)
V保持: -140 mV

图 29

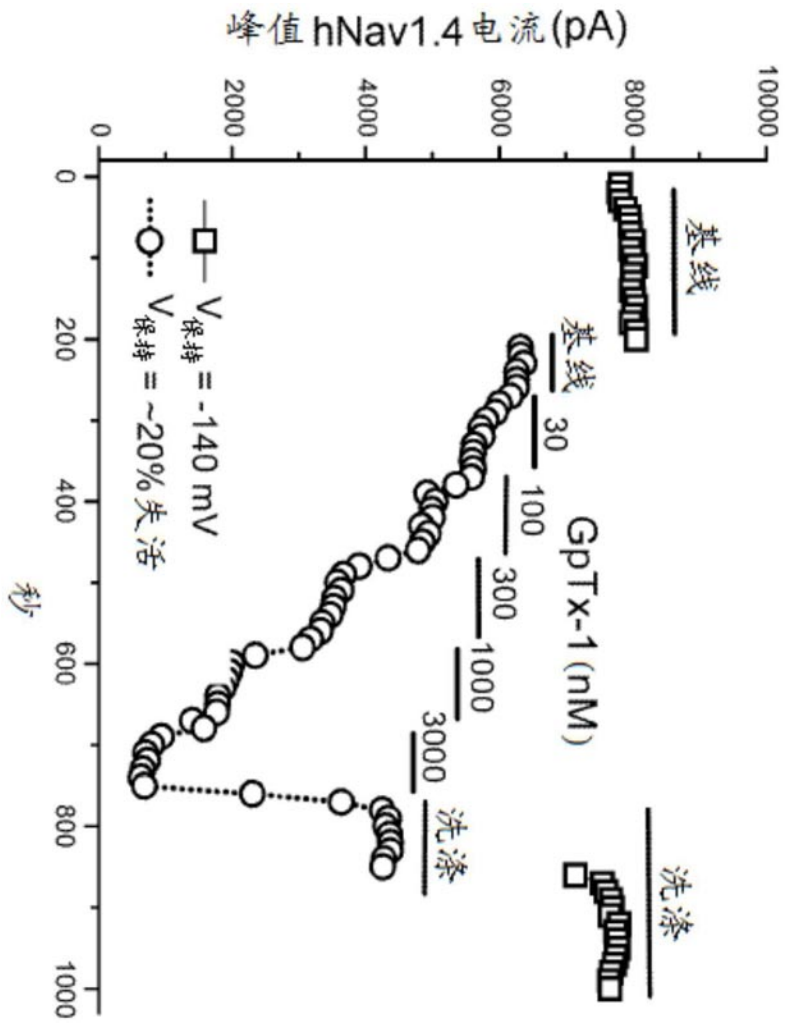

峰值 hNav1.4 电流(pA)
0
2000
4000
6000
8000
10000
0
200
400
600
800
1000
秒
基线
基线
30
100
300
1000
3000
GpTx-1 (nM)
洗涤
洗涤
V保持 = -140 mV
V保持 = ~20% 失活

图 30

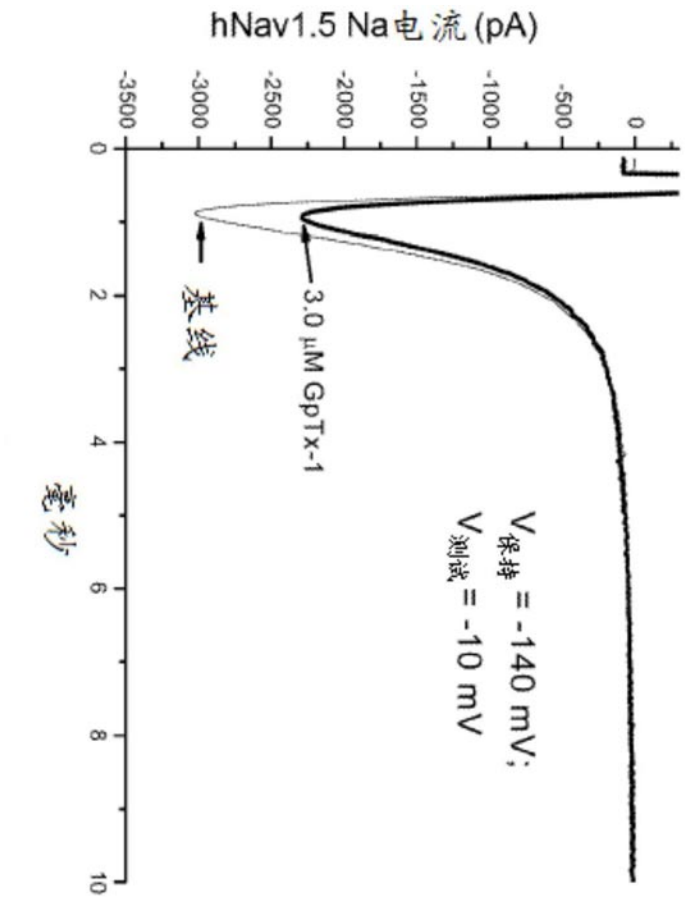

hNav1.5 Na电流 (pA)
-3500
-3000
-2500
-2000
-1500
-1000
-500
0
0
2
4
6
8
10
毫秒
基线
3.0 μM GpTx-1
V保持 = -140 mV;
V测试 = -10 mV

图 31

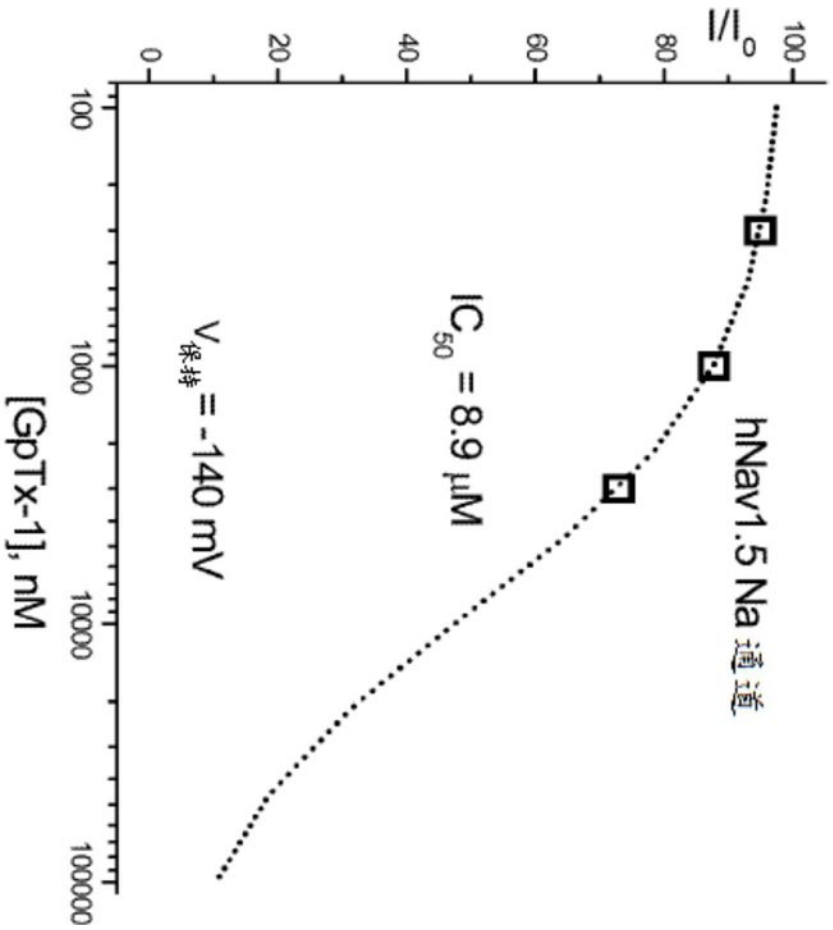

I/I0
0
20
40
60
80
100
hNav1.5 Na 通道
IC50 = 8.9 μM
V保持 = -140 mV
100
1000
10000
100000
[GpTx-1], nM

图 32

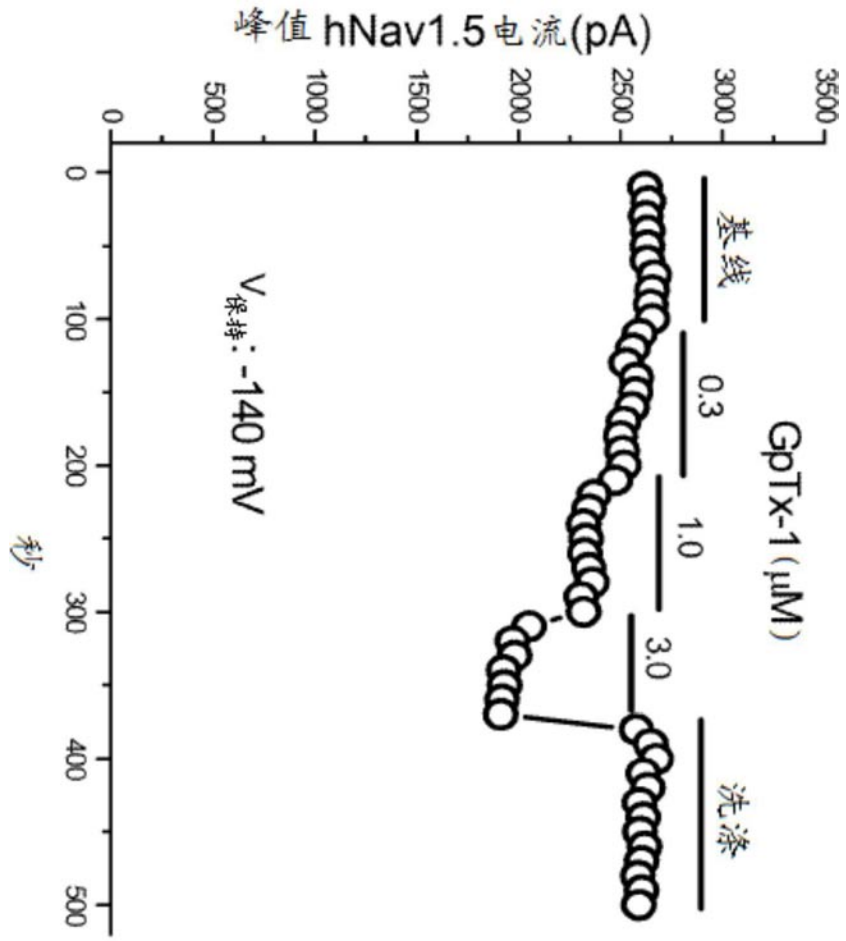

峰值 hNav1.5 电流(pA)
0
500
1000
1500
2000
2500
3000
3500
0
100
200
300
400
500
秒
V保持: -140 mV
基线
0.3
1.0
3.0
GpTx-1 (μM)
洗涤

图 33

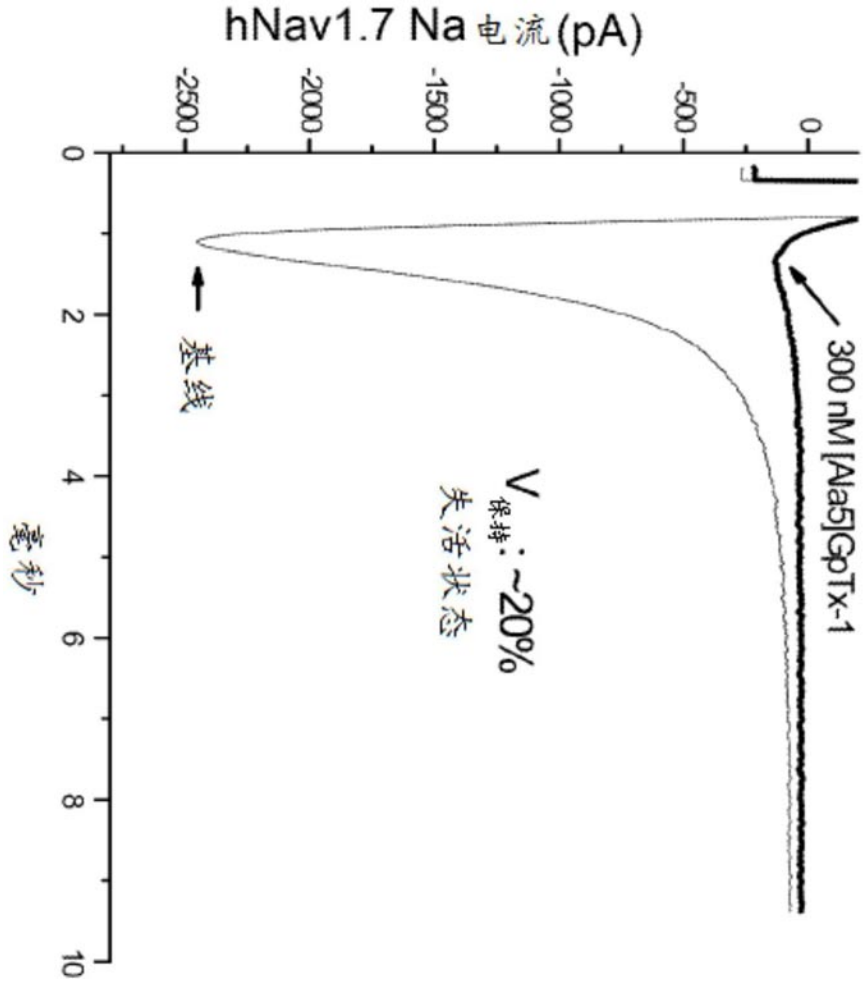

hNav1.7 Na 电流(pA)
-2500
-2000
-1500
-1000
-500
0
0
2
4
6
8
10
毫秒
基线
V保持：~20%
失活状态
300 nM [Ala5]GpTx-1

图 34

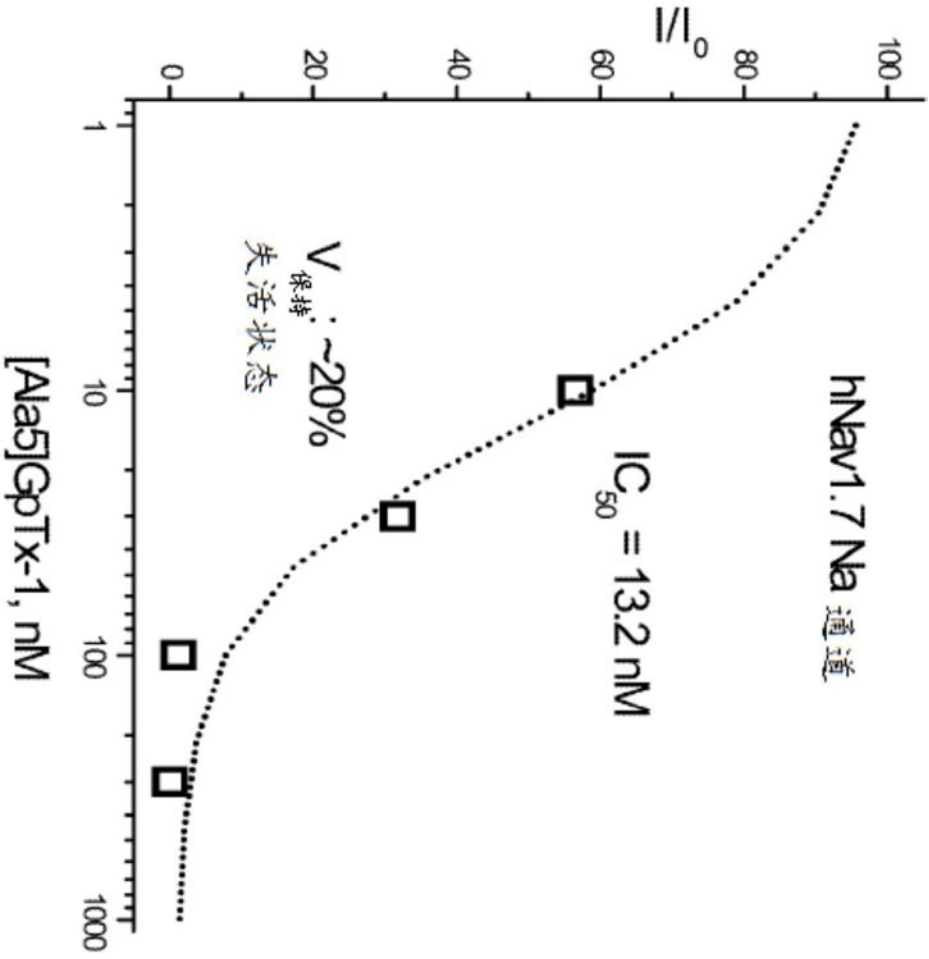

I/I0
100
80
60
40
20
0
1
10
100
1000
[Ala5]GpTx-1, nM
hNav1.7 Na 通道
IC50 = 13.2 nM
V保持: ~20%
失活状态

图 35

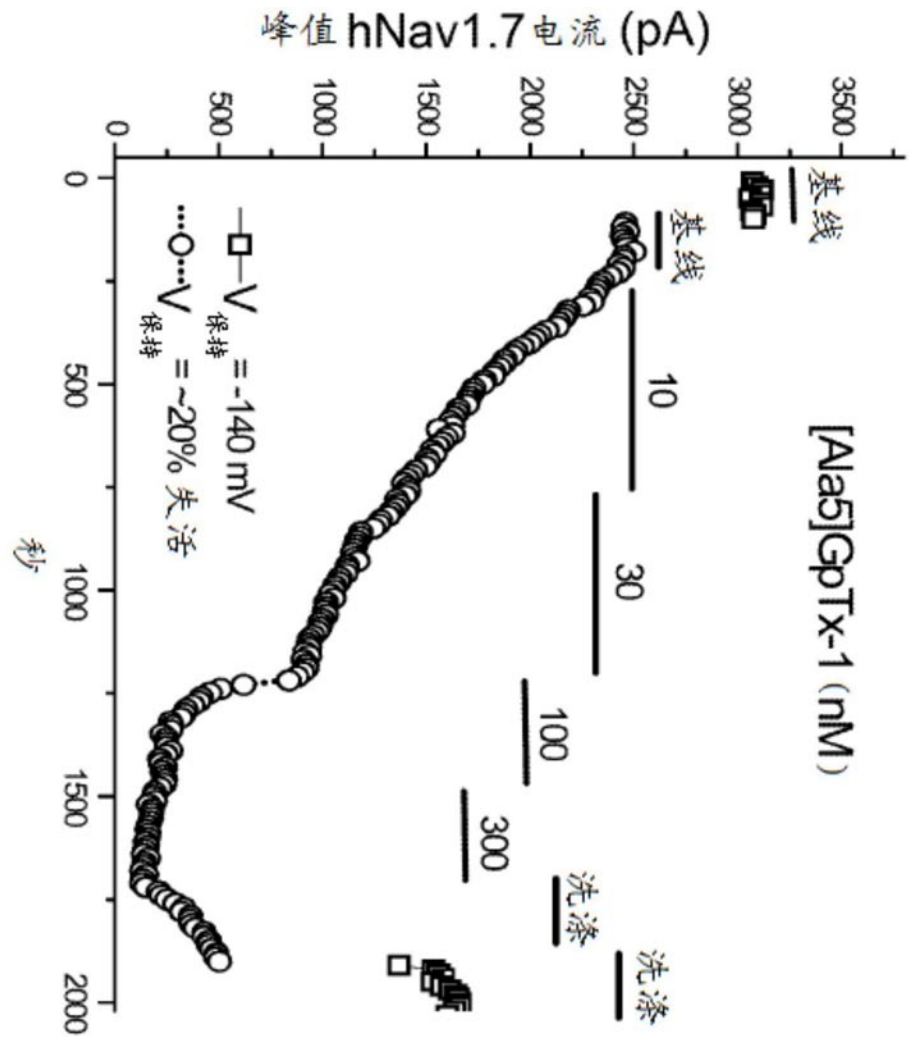

峰值 hNav1.7 电流 (pA)
0
500
1000
1500
2000
2500
3000
3500
基线
10
30
100
300
洗涤
洗涤
[Ala5]GpTx-1 (nM)
基线
V保持 = -140 mV
V保持 = ~20% 失活
0
500
1000
1500
2000
秒

图 36

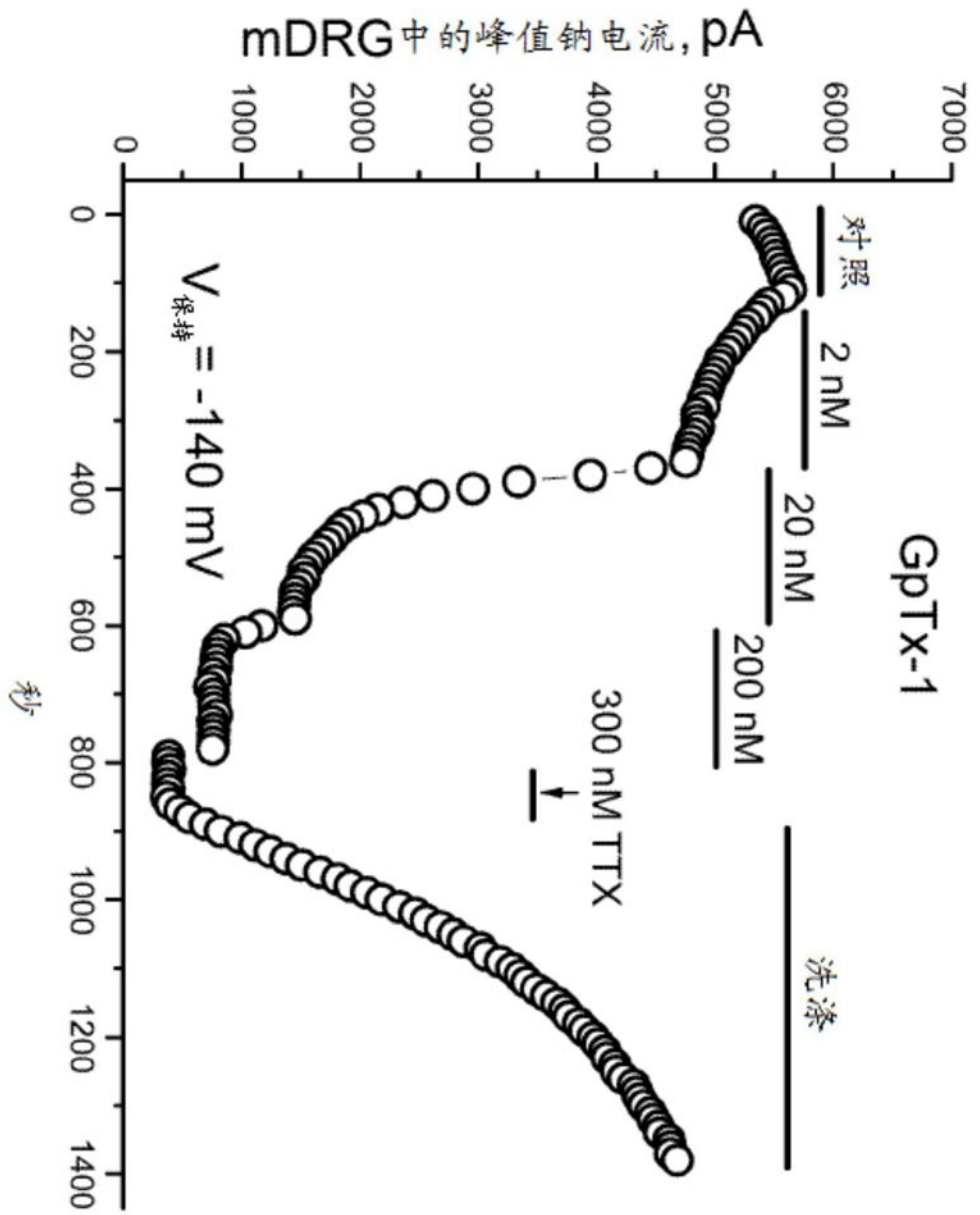

mDRG中的峰值钠电流，pA
0
1000
2000
3000
4000
5000
6000
7000
0
200
400
600
800
1000
1200
1400
秒
$V_{保持}$ = -140 mV
对照
2 nM
20 nM
200 nM
300 nM TTX
洗涤
GpTx-1

图 37

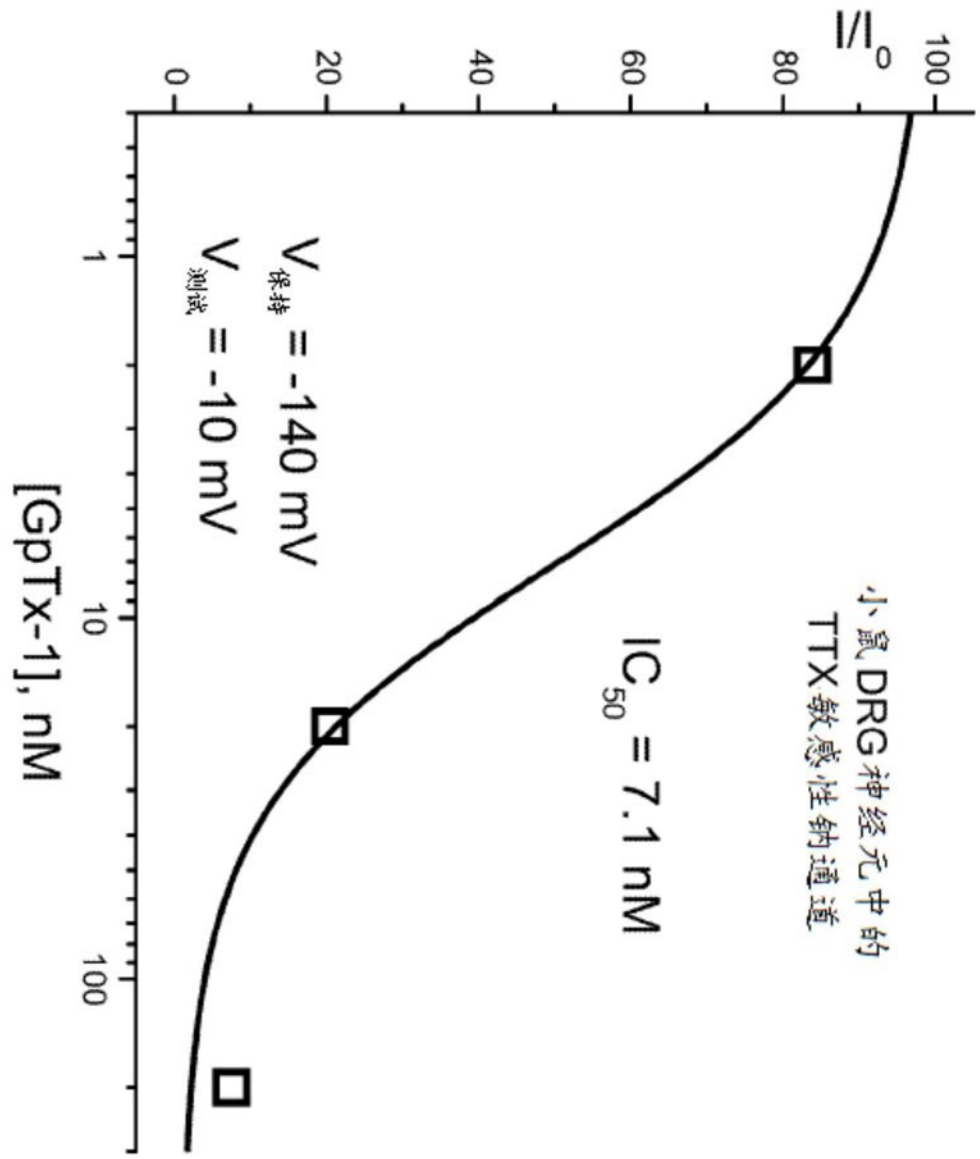

I/I0
100
80
60
40
20
0
1
10
100
[GpTx-1], nM
小鼠DRG神经元中的
TTX敏感性钠通道
IC50 = 7.1 nM
V保持 = -140 mV
V测试 = -10 mV

图 38

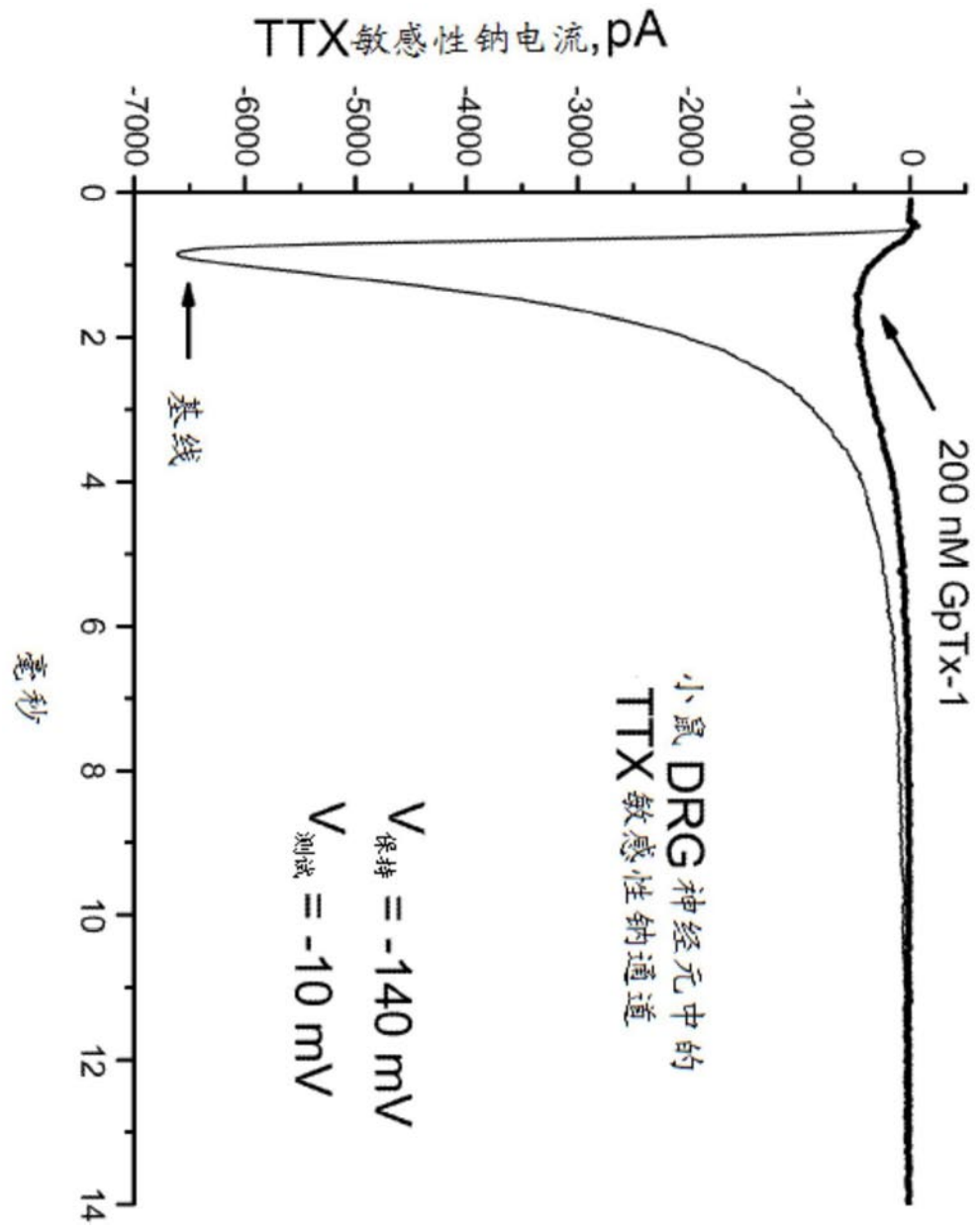

TTX敏感性钠电流,pA
-7000
-6000
-5000
-4000
-3000
-2000
-1000
0
0
2
4
6
8
10
12
14
毫秒
基线
200 nM GpTx-1
小鼠 DRG 神经元中的
TTX 敏感性钠通道
V保持 = -140 mV
V测试 = -10 mV

图 39

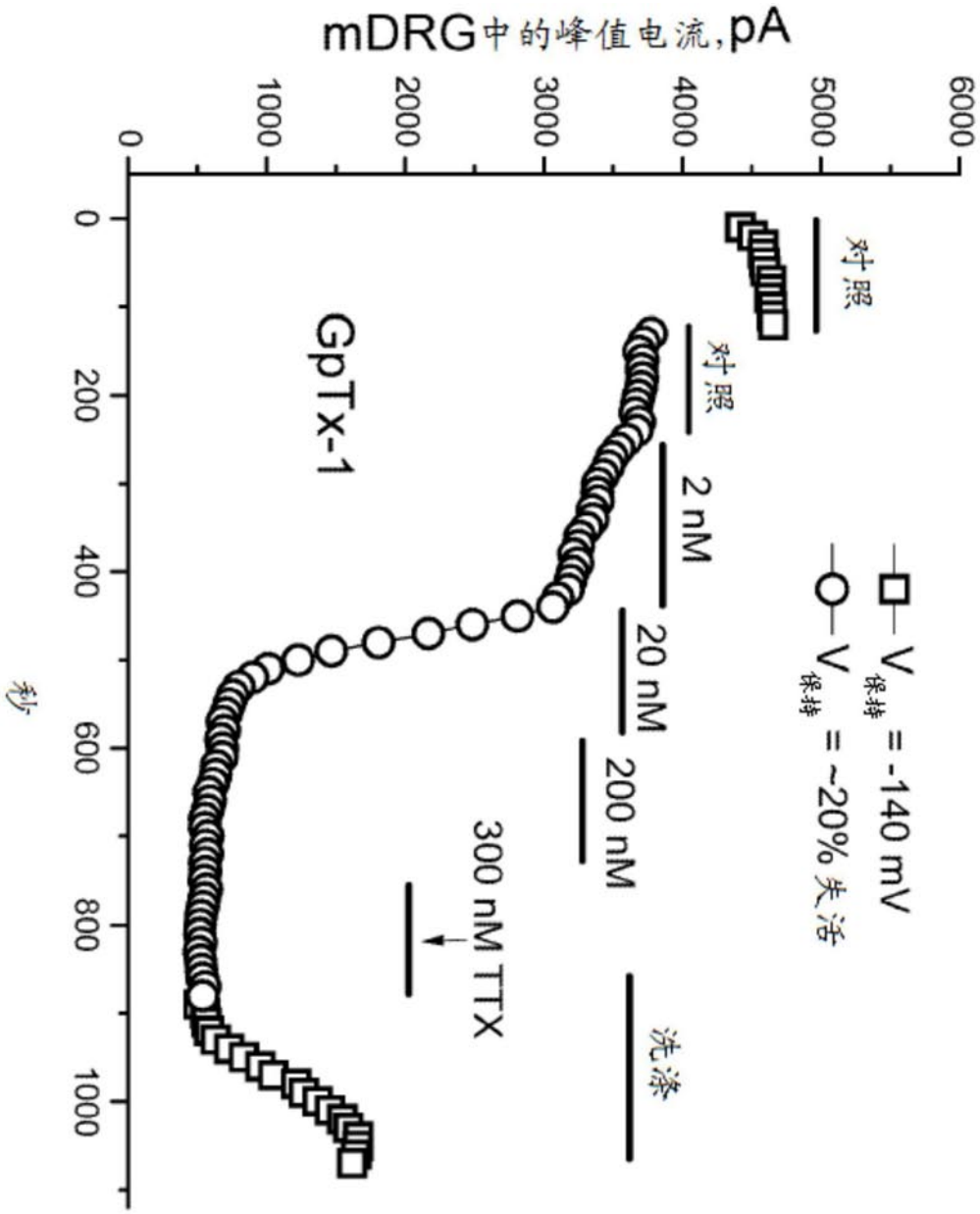

mDRG中的峰值电流,pA
0
1000
2000
3000
4000
5000
6000
0
200
400
600
800
1000
秒
对照
对照
2 nM
20 nM
200 nM
300 nM TTX
洗涤
GpTx-1
V保持 = -140 mV
V保持 = ~20% 失活

图 40

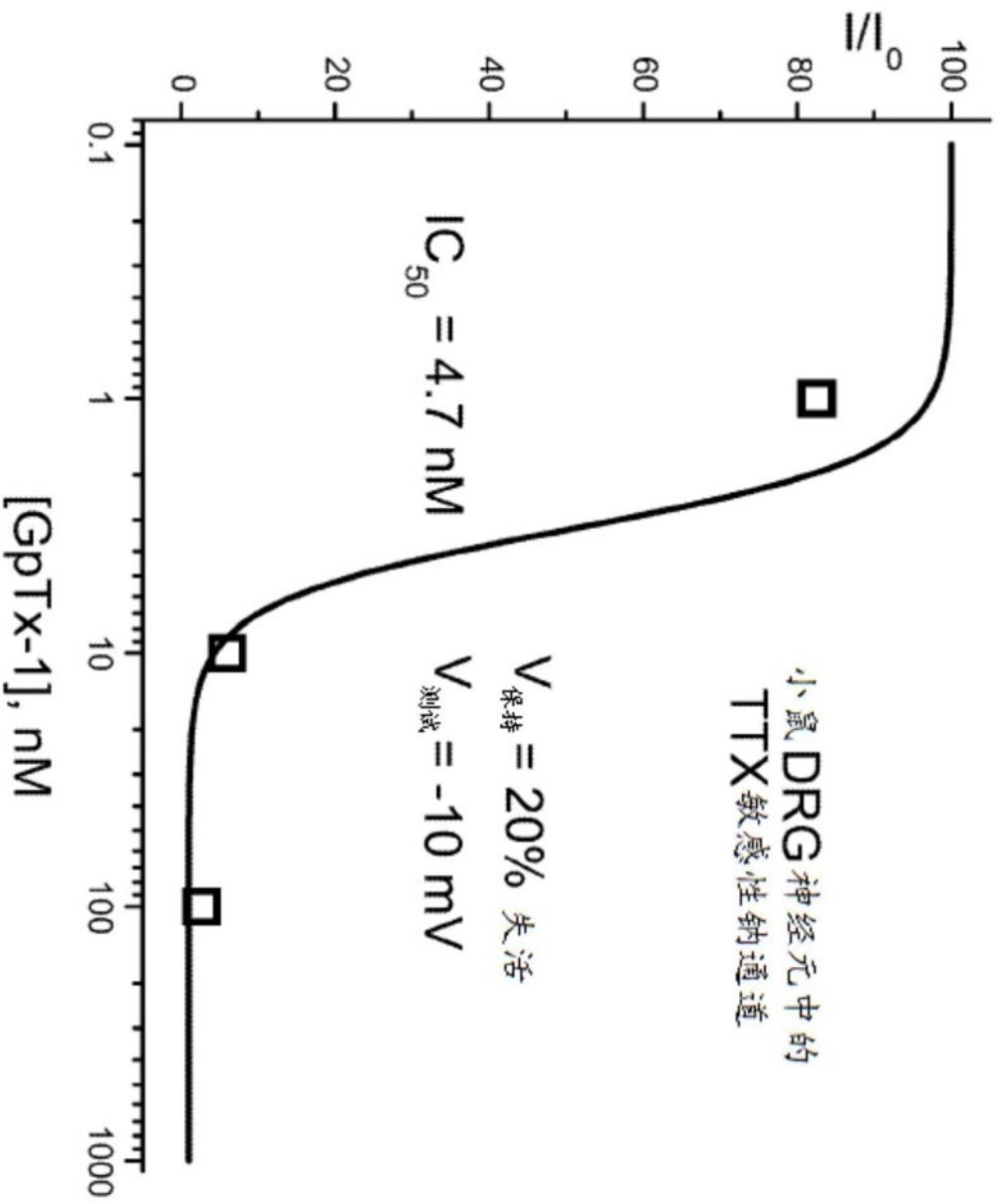

I/I0
100
80
60
40
20
0
0.1
1
10
100
1000
[GpTx-1], nM
小鼠DRG神经元中的
TTX敏感性钠通道
IC50 = 4.7 nM
V保持 = 20% 失活
V测试 = -10 mV

图 41

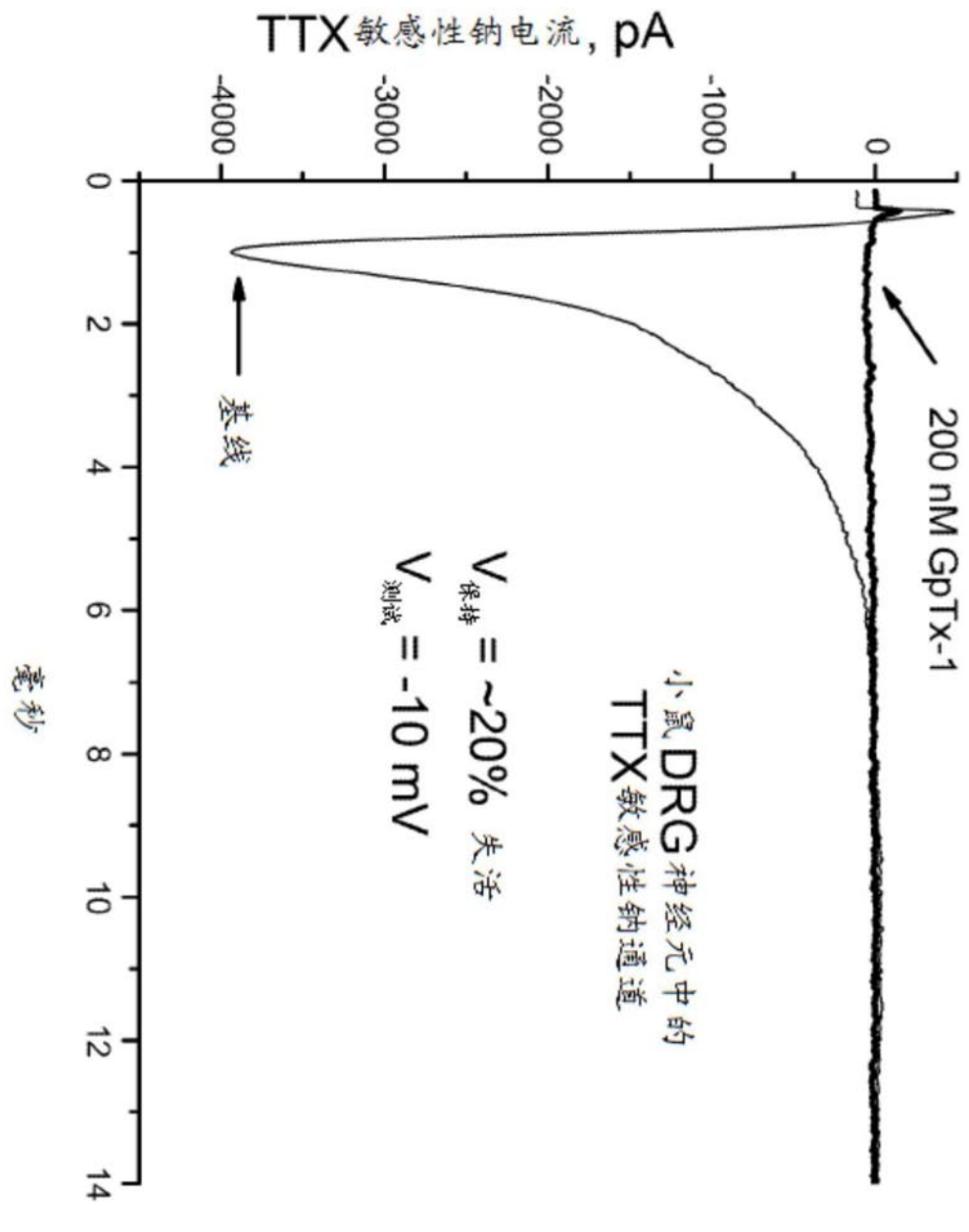

TTX敏感性钠电流, pA
-4000
-3000
-2000
-1000
0
0
2
4
6
8
10
12
14
毫秒
基线
200 nM GpTx-1
小鼠DRG神经元中的
TTX敏感性钠通道
V保持 = ~20% 失活
V测试 = -10 mV

图 42

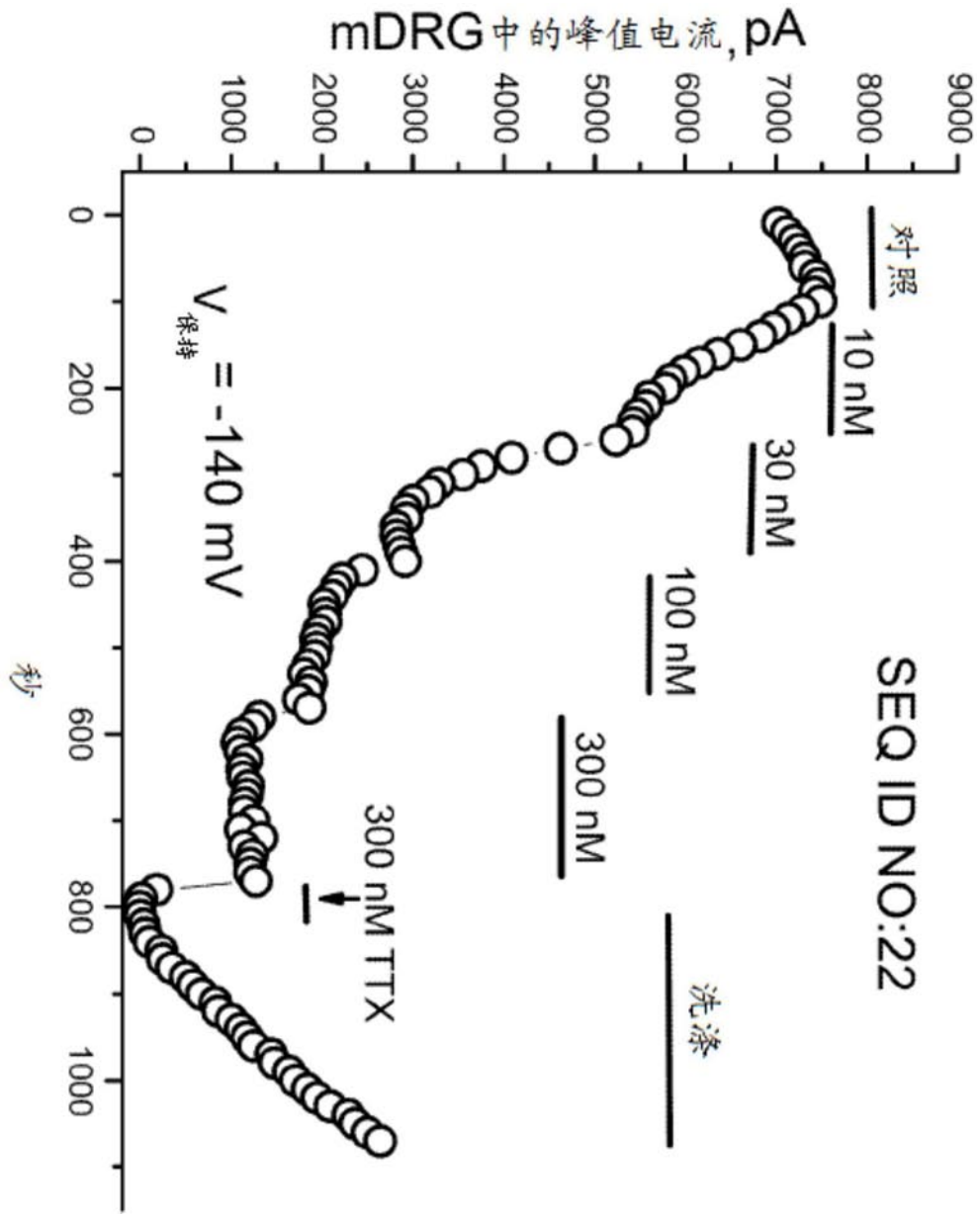

mDRG中的峰值电流,pA
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
0
200
400
600
800
1000
秒
$V_{保持}$ = -140 mV
对照
10 nM
30 nM
100 nM
300 nM
300 nM TTX
洗涤
SEQ ID NO:22

图 43

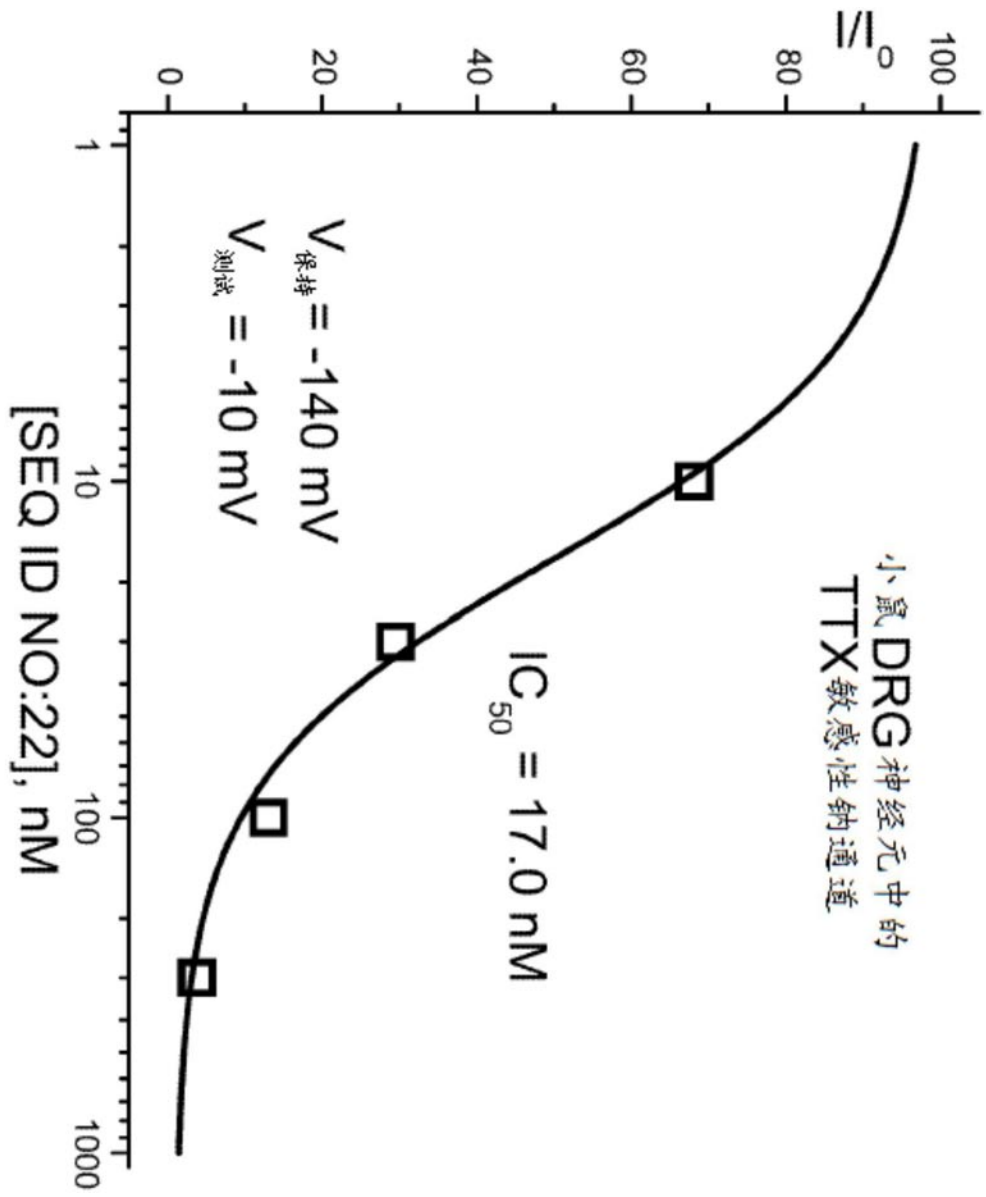

I/I0
100
80
60
40
20
0
1
10
100
1000
[SEQ ID NO:22], nM
V保持 = -140 mV
V测试 = -10 mV
IC50 = 17.0 nM
小鼠DRG神经元中的
TTX敏感性钠通道

图 44

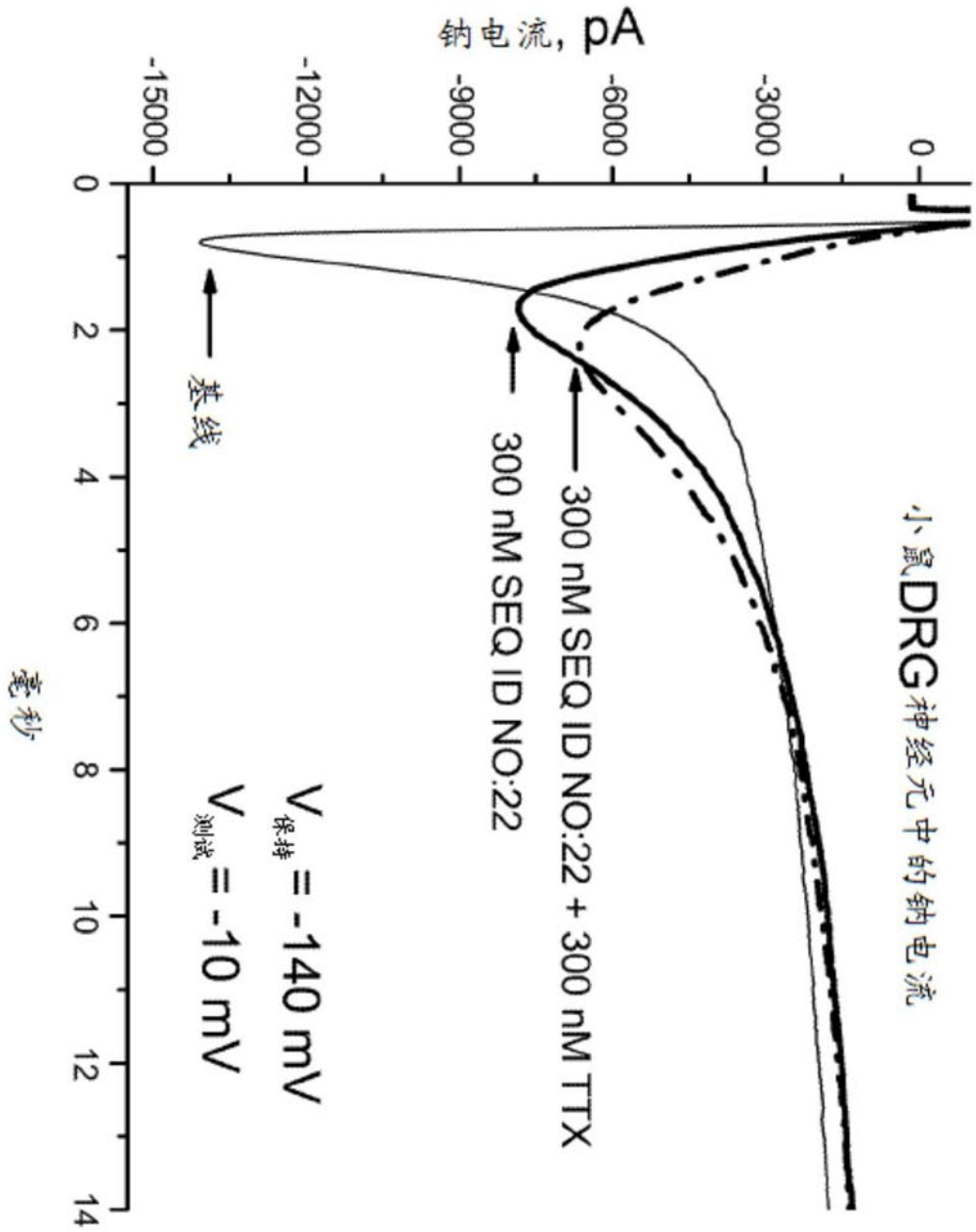

钠电流, pA
0
-3000
-6000
-9000
-12000
-15000
0
2
4
6
8
10
12
14
毫秒
小鼠DRG神经元中的钠电流
300 nM SEQ ID NO:22 + 300 nM TTX
300 nM SEQ ID NO:22
基线
V保持 = -140 mV
V测试 = -10 mV

图 45

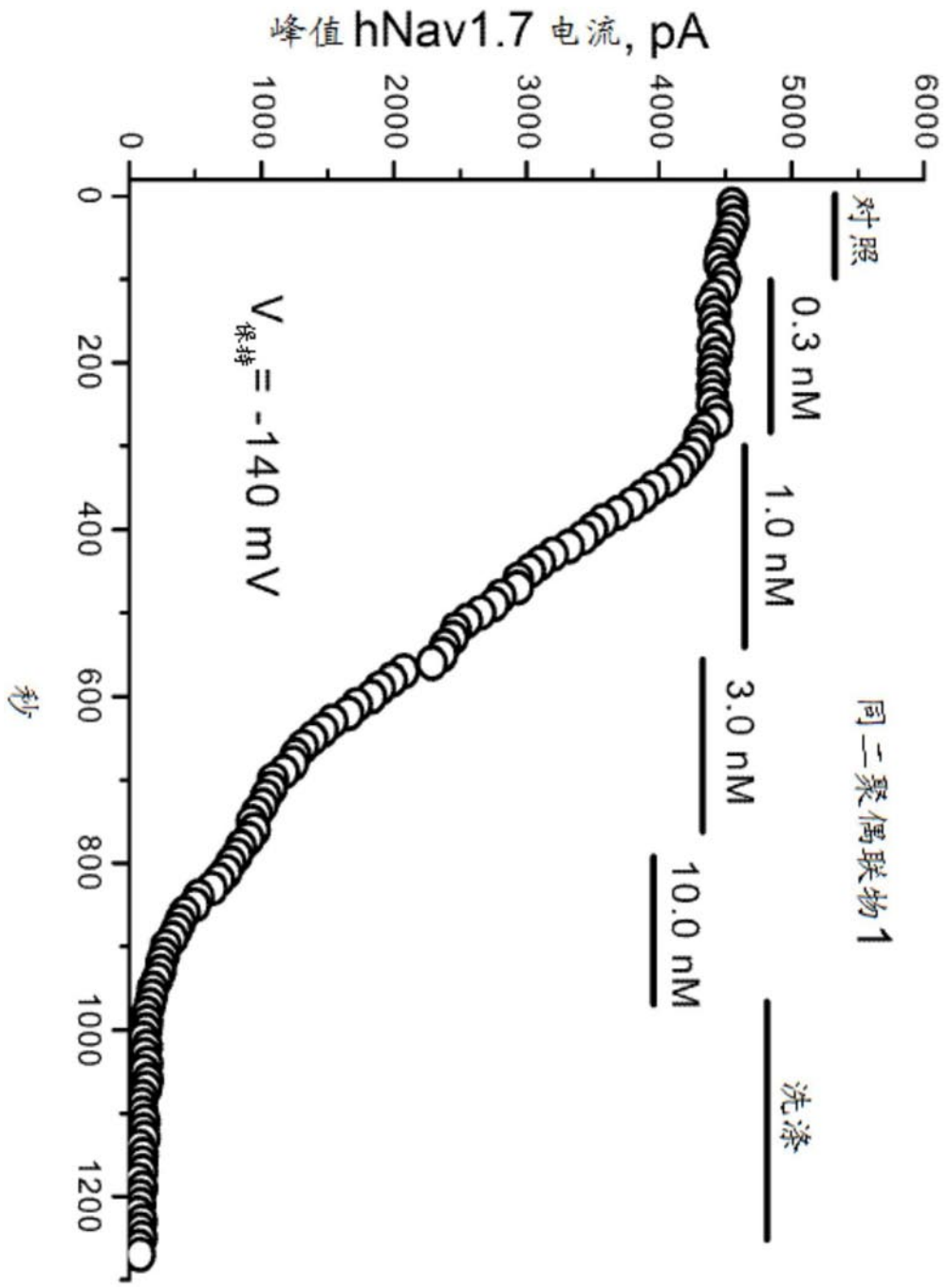

峰值 hNav1.7 电流, pA
0
1000
2000
3000
4000
5000
6000
0
200
400
600
800
1000
1200
秒
$V_{保持}$ = -140 mV
对照
0.3 nM
1.0 nM
3.0 nM
10.0 nM
洗涤
同一聚偶联物 1

图 46

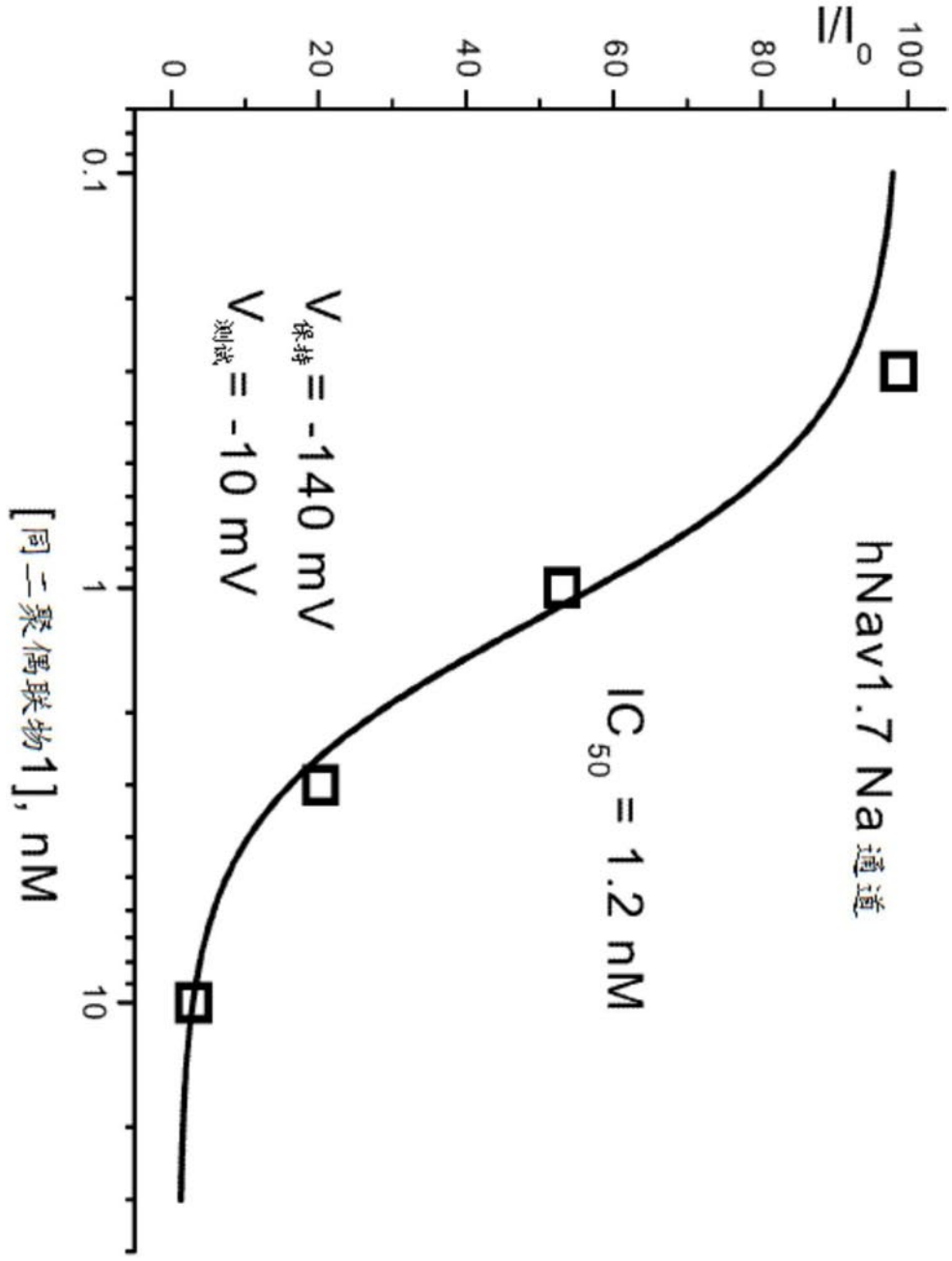

I/I0
100
80
60
40
20
0
0.1
1
10
[同二聚偶联物1], nM
hNav1.7 Na通道
IC50 = 1.2 nM
V保持 = -140 mV
V测试 = -10 mV

图 47

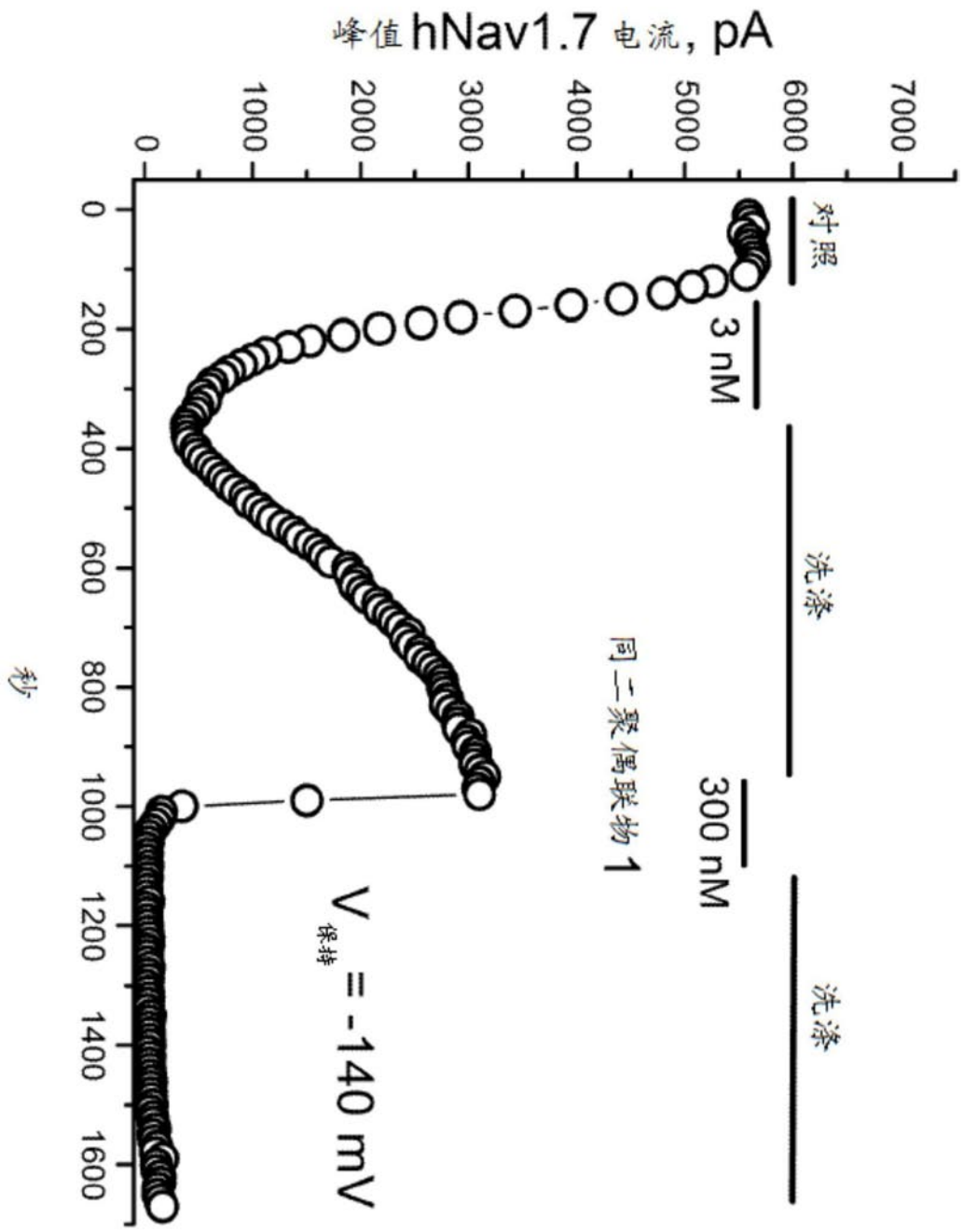

峰值 hNav1.7 电流, pA
0
1000
2000
3000
4000
5000
6000
7000
对照
3 nM
洗涤
300 nM
洗涤
同一聚偶联物 1
V 保持 = -140 mV
0
200
400
600
800
1000
1200
1400
1600
秒

图 48

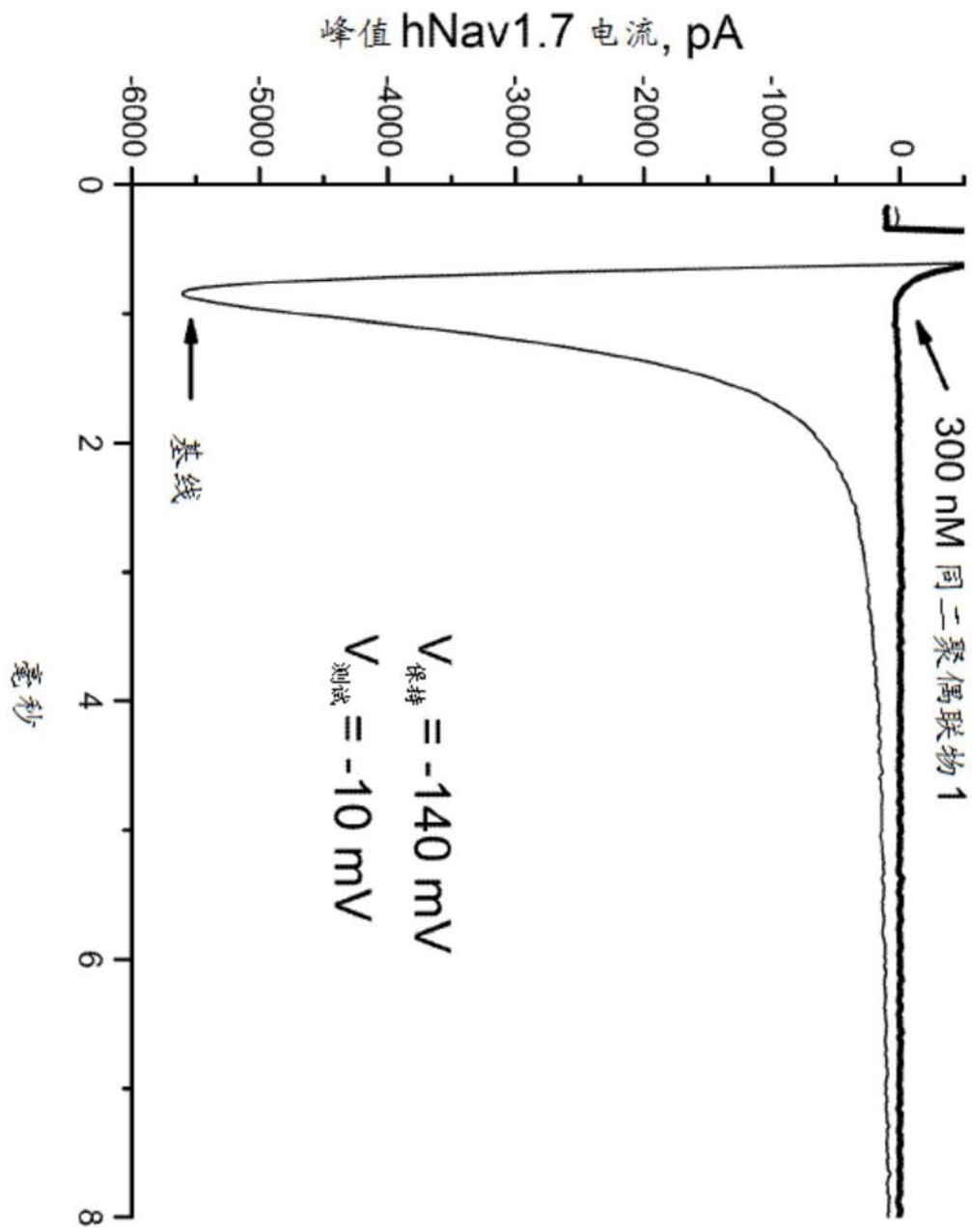

峰值 hNav1.7 电流, pA
-6000
-5000
-4000
-3000
-2000
-1000
0
0
2
4
6
8
毫秒
基线
300 nM 同二聚偶联物 1
V保持 = -140 mV
V测试 = -10 mV

图 49

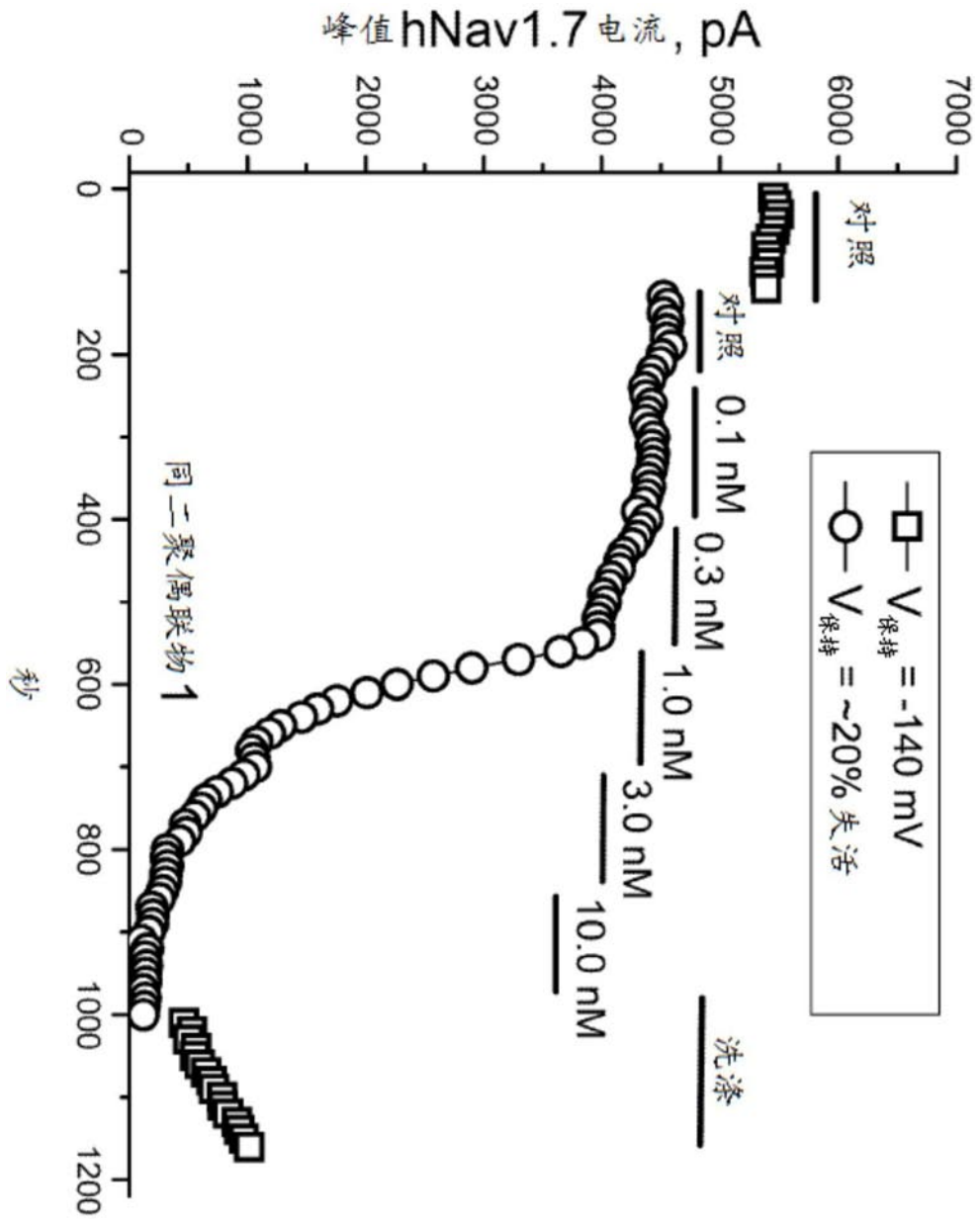

峰值hNav1.7电流, pA
0
1000
2000
3000
4000
5000
6000
7000
0
200
400
600
800
1000
1200
秒
对照
对照
0.1 nM
0.3 nM
1.0 nM
3.0 nM
10.0 nM
洗涤
同二聚偶联物 1
V保持 = -140 mV
V保持 = ~20% 失活

图 50

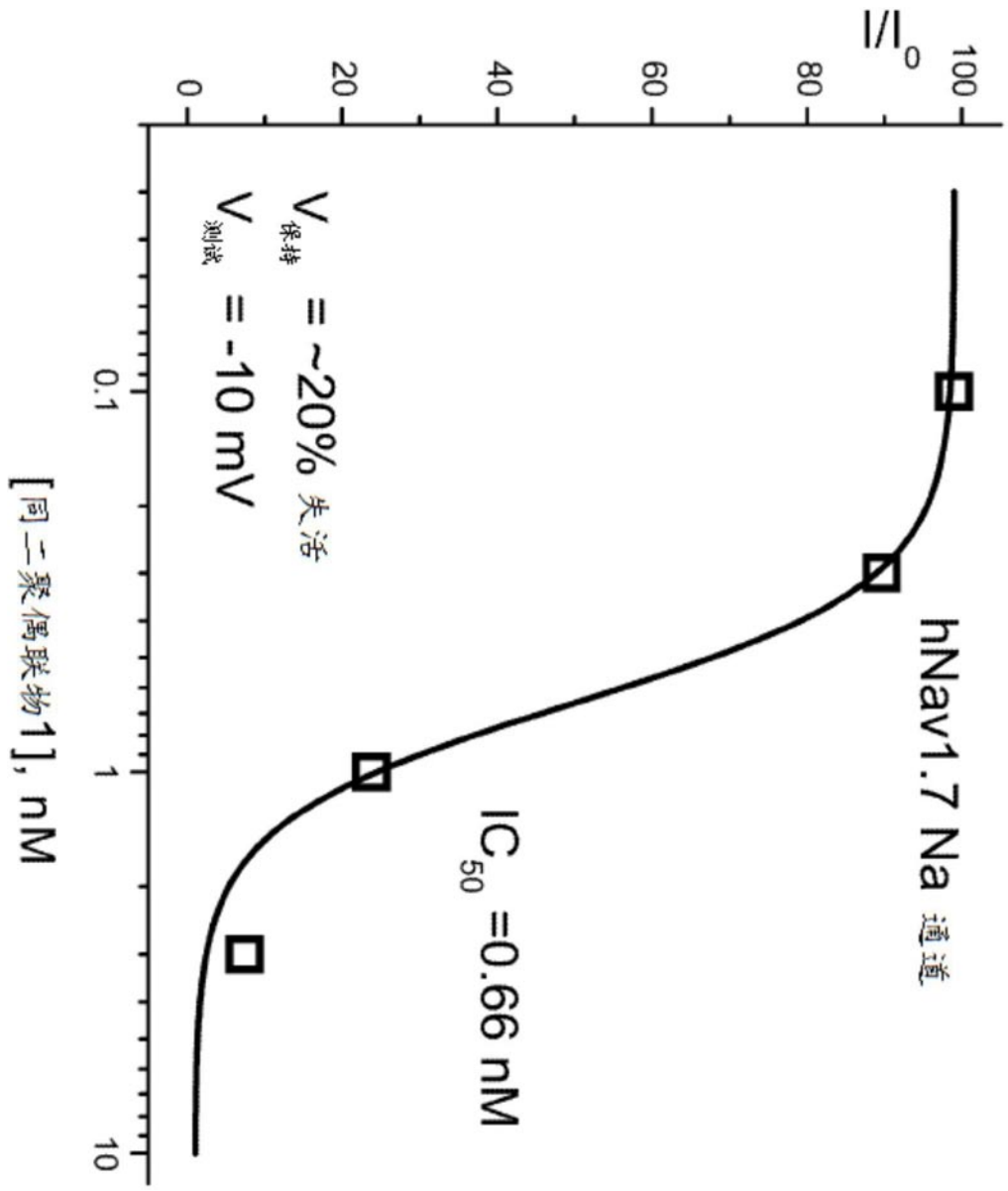

I/I0
100
80
60
40
20
0
0.1
1
10
[同二聚偶联物1], nM
V保持 = ~20% 失活
V测试 = -10 mV
hNav1.7 Na 通道
IC50 =0.66 nM

图 51

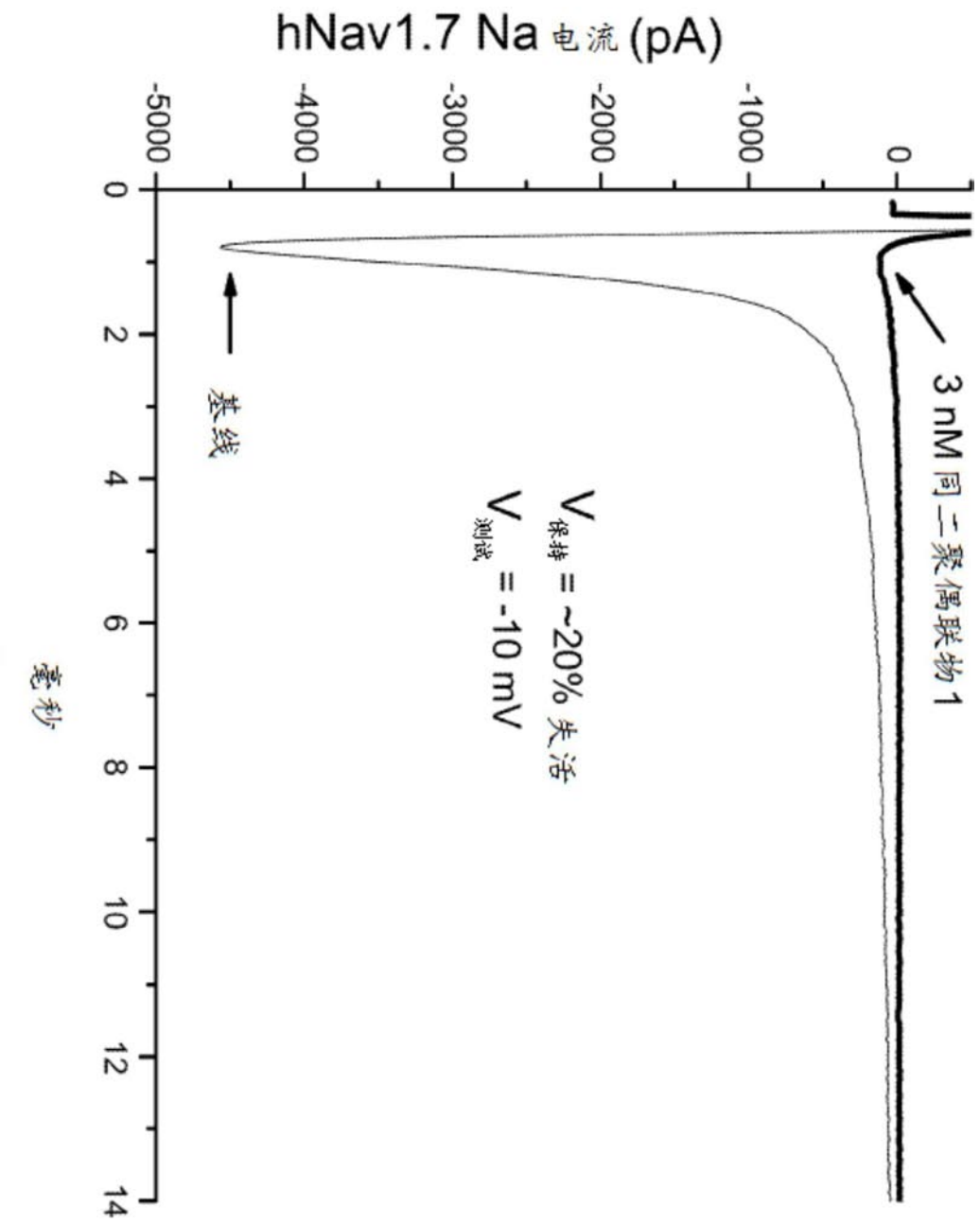

hNav1.7 Na 电流 (pA)
-5000
-4000
-3000
-2000
-1000
0
0
2
4
6
8
10
12
14
毫秒
基线
3 nM 同二聚偶联物 1
V保持 = ~20% 失活
V测试 = -10 mV

图 52

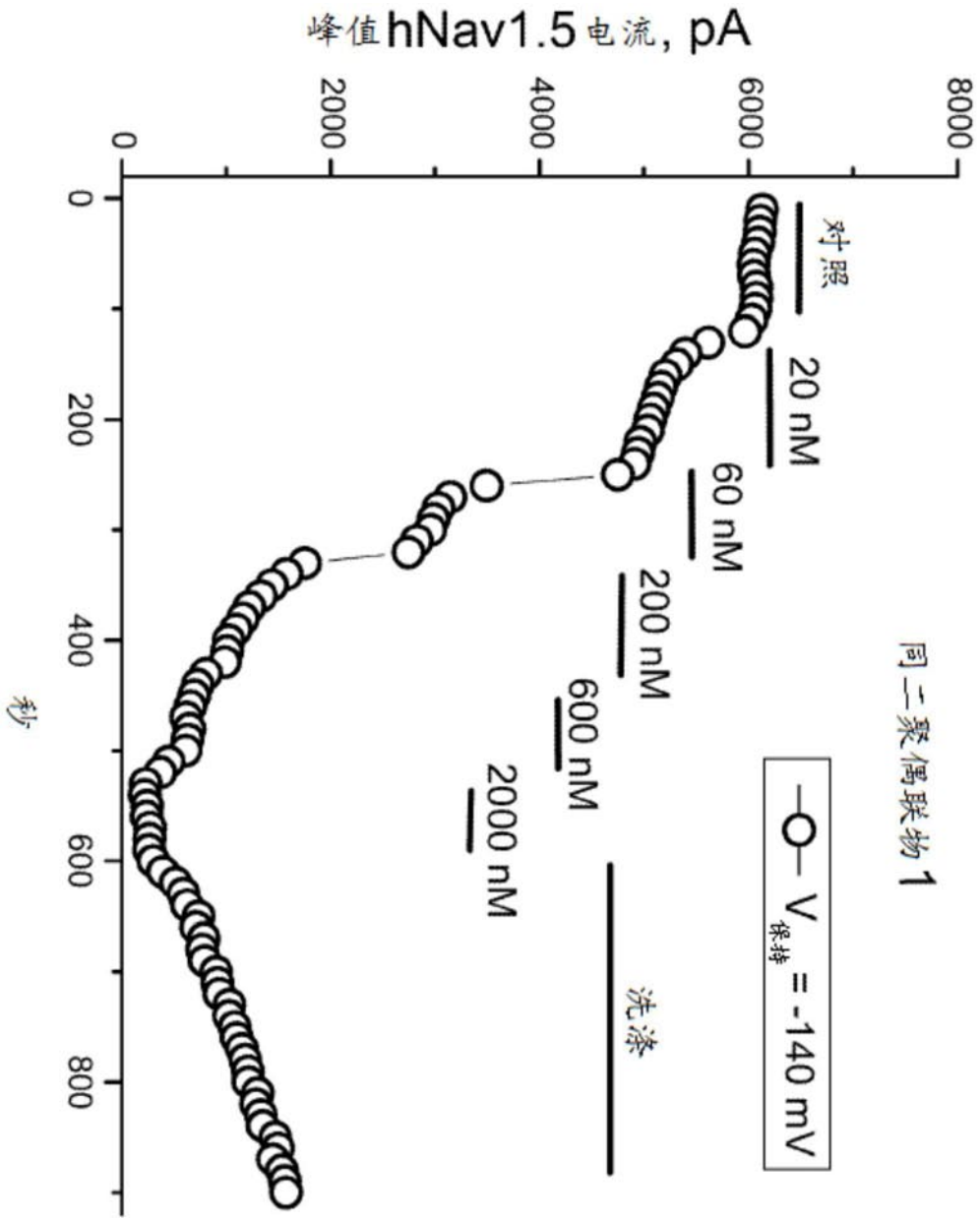

峰值hNav1.5电流, pA
0
2000
4000
6000
8000
0
200
400
600
800
秒
对照
20 nM
60 nM
200 nM
600 nM
2000 nM
洗涤
同二聚偶联物1
V保持 = -140 mV

图 53

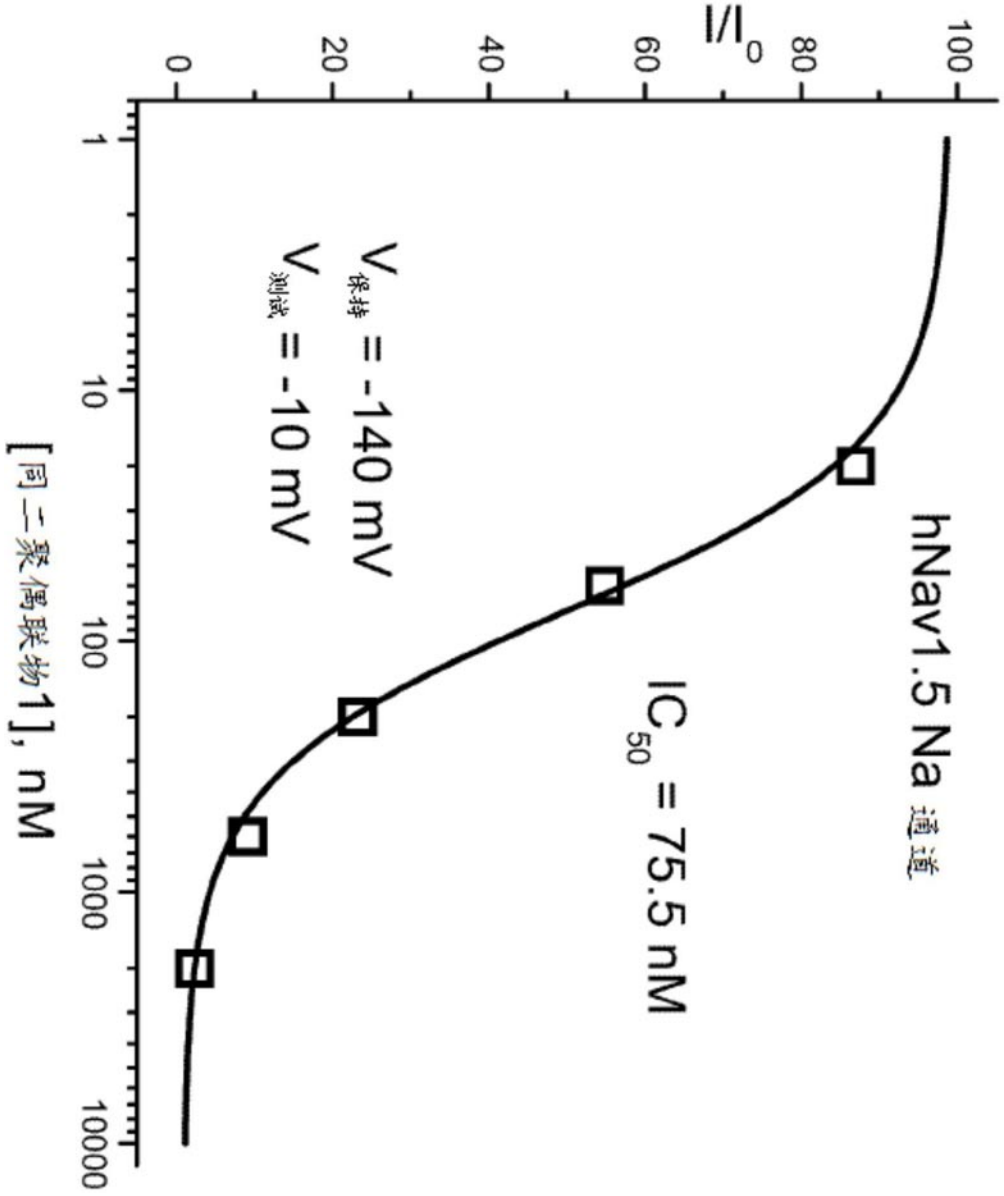

100
80
60
40
20
0
I/I0
hNav1.5 Na 通道
IC50 = 75.5 nM
V保持 = -140 mV
V测试 = -10 mV
1
10
100
1000
10000
[同二聚偶联物1], nM

图 54

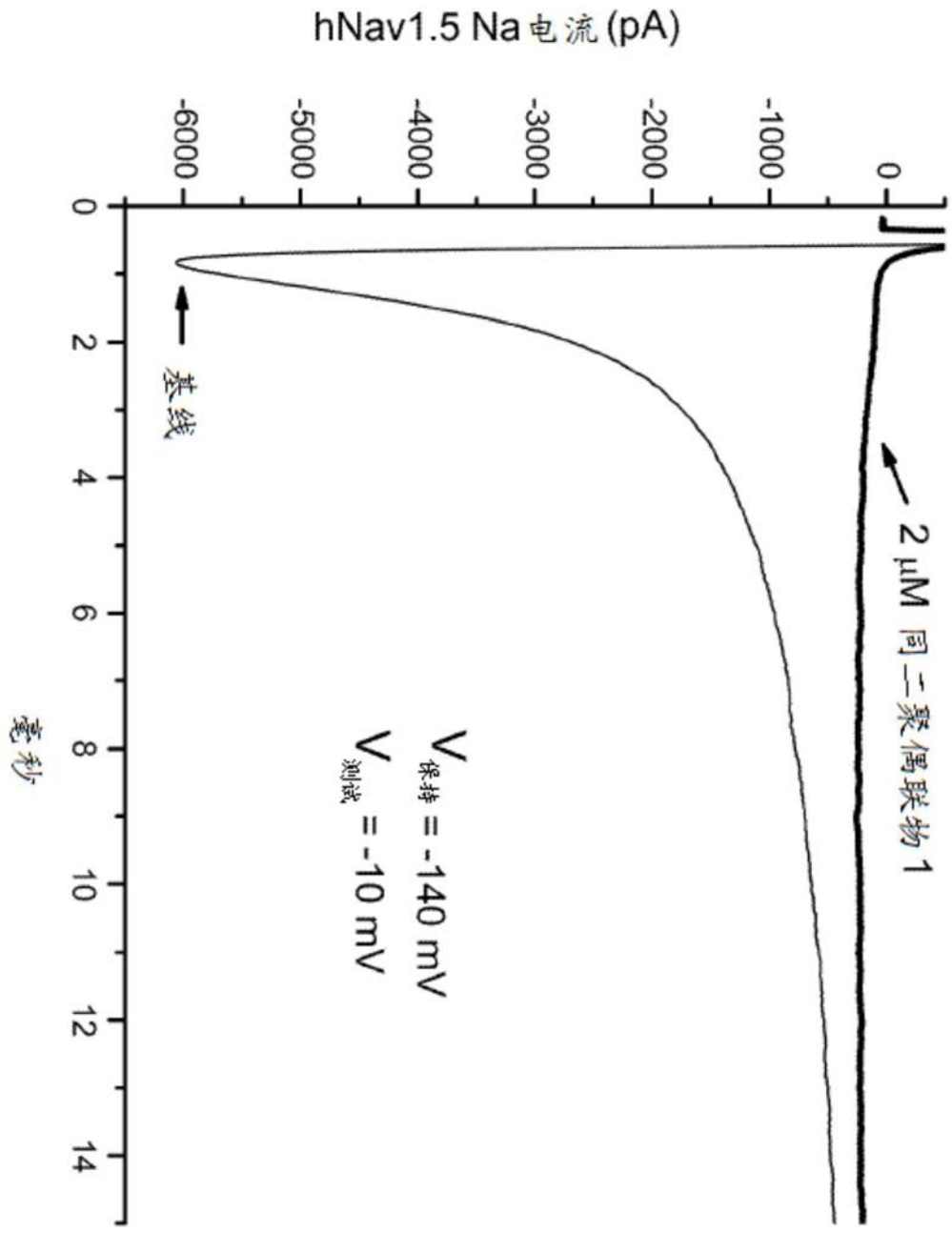

hNav1.5 Na 电流 (pA)
-6000
-5000
-4000
-3000
-2000
-1000
0
0
2
4
6
8
10
12
14
毫秒
基线
2 μM 同二聚偶联物 1
V 保持 = -140 mV
V 测试 = -10 mV

图 55

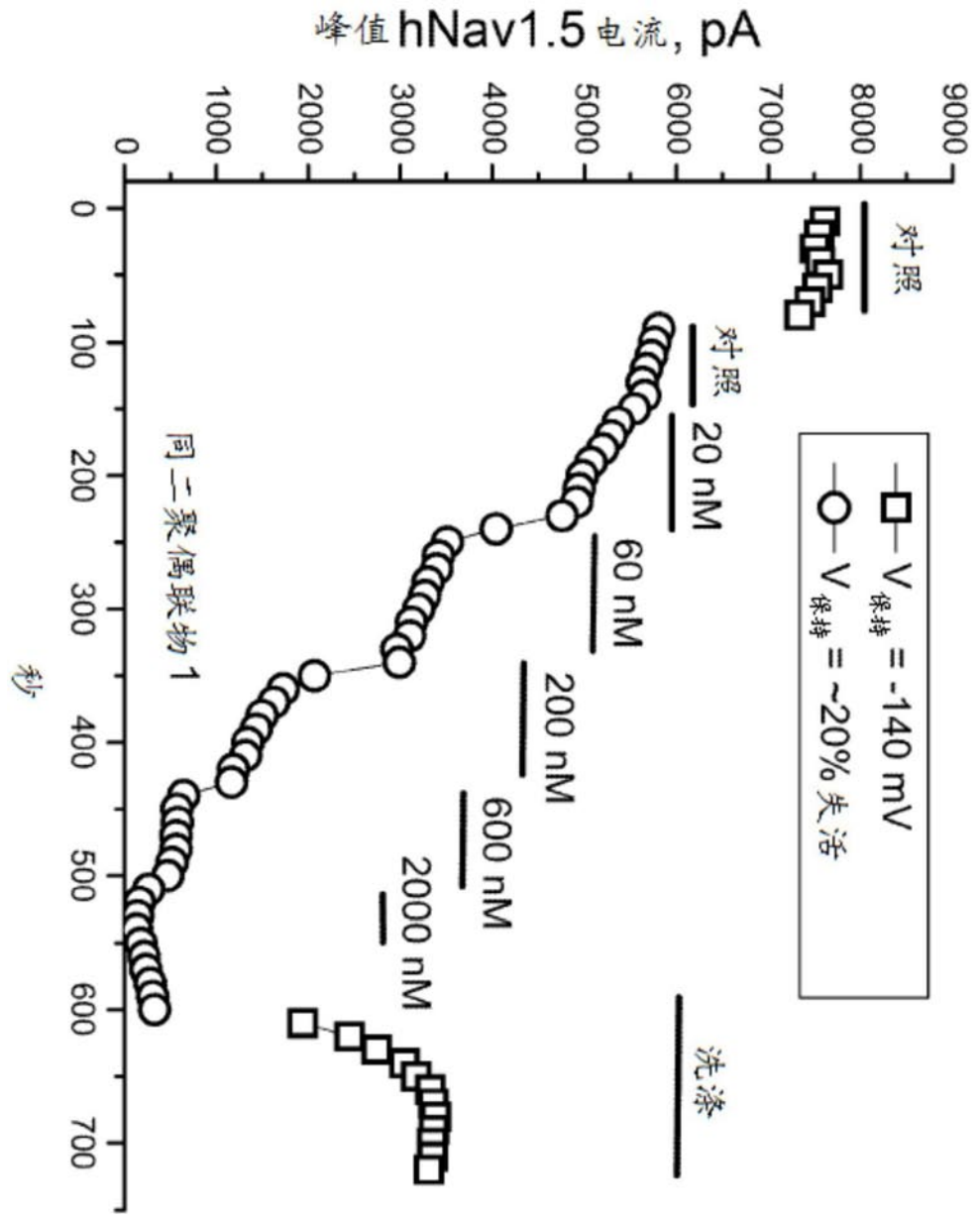

峰值 hNav1.5 电流, pA
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
0
100
200
300
400
500
600
700
秒
对照
对照
20 nM
60 nM
200 nM
600 nM
2000 nM
洗涤
同二聚偶联物 1
V 保持 = -140 mV
V 保持 = ~20% 失活

图 56

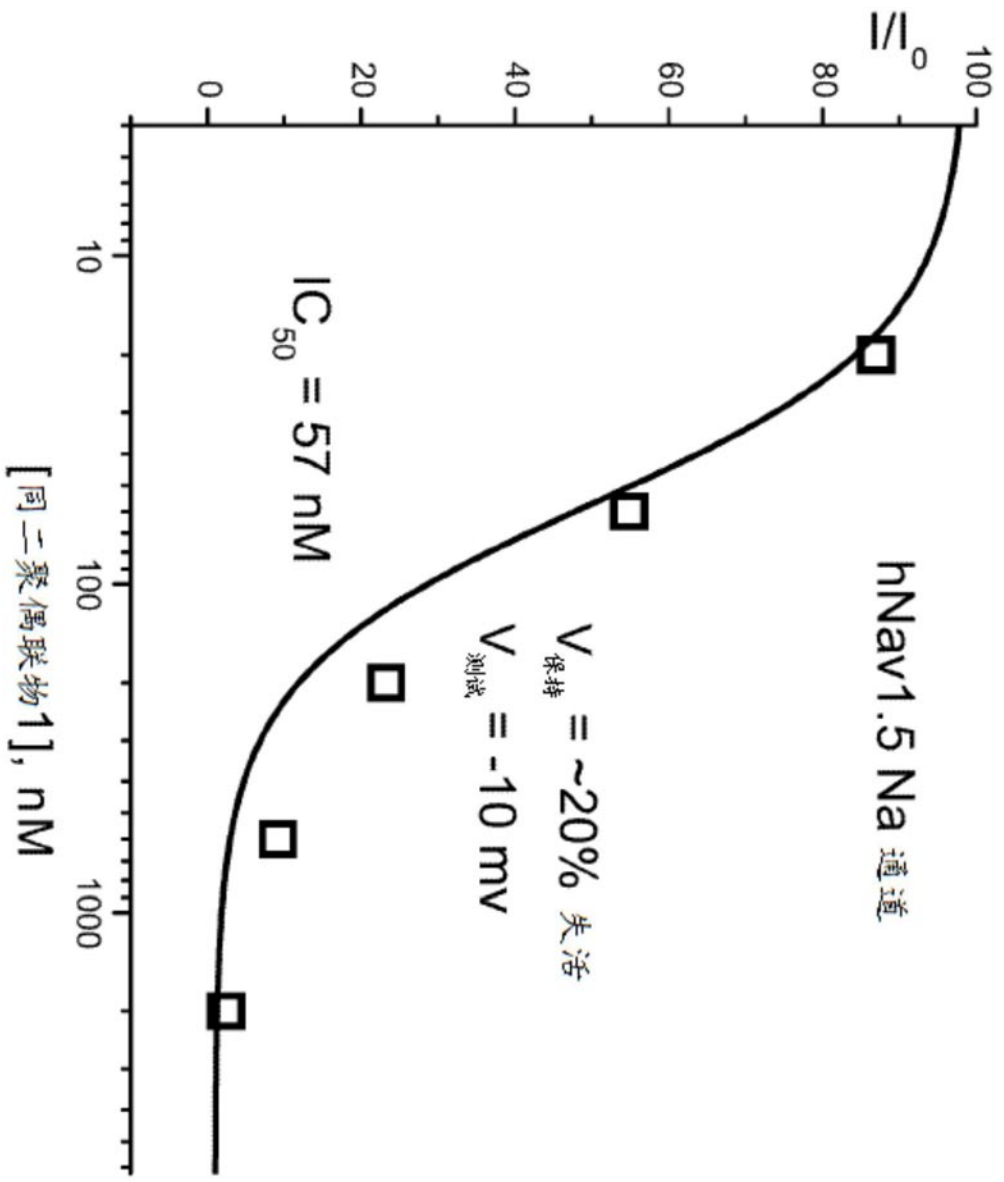

I/I0
100
80
60
40
20
0
10
100
1000
[同二聚偶联物1], nM
IC50 = 57 nM
V保持 = ~20% 失活
V测试 = -10 mv
hNav1.5 Na 通道

图 57

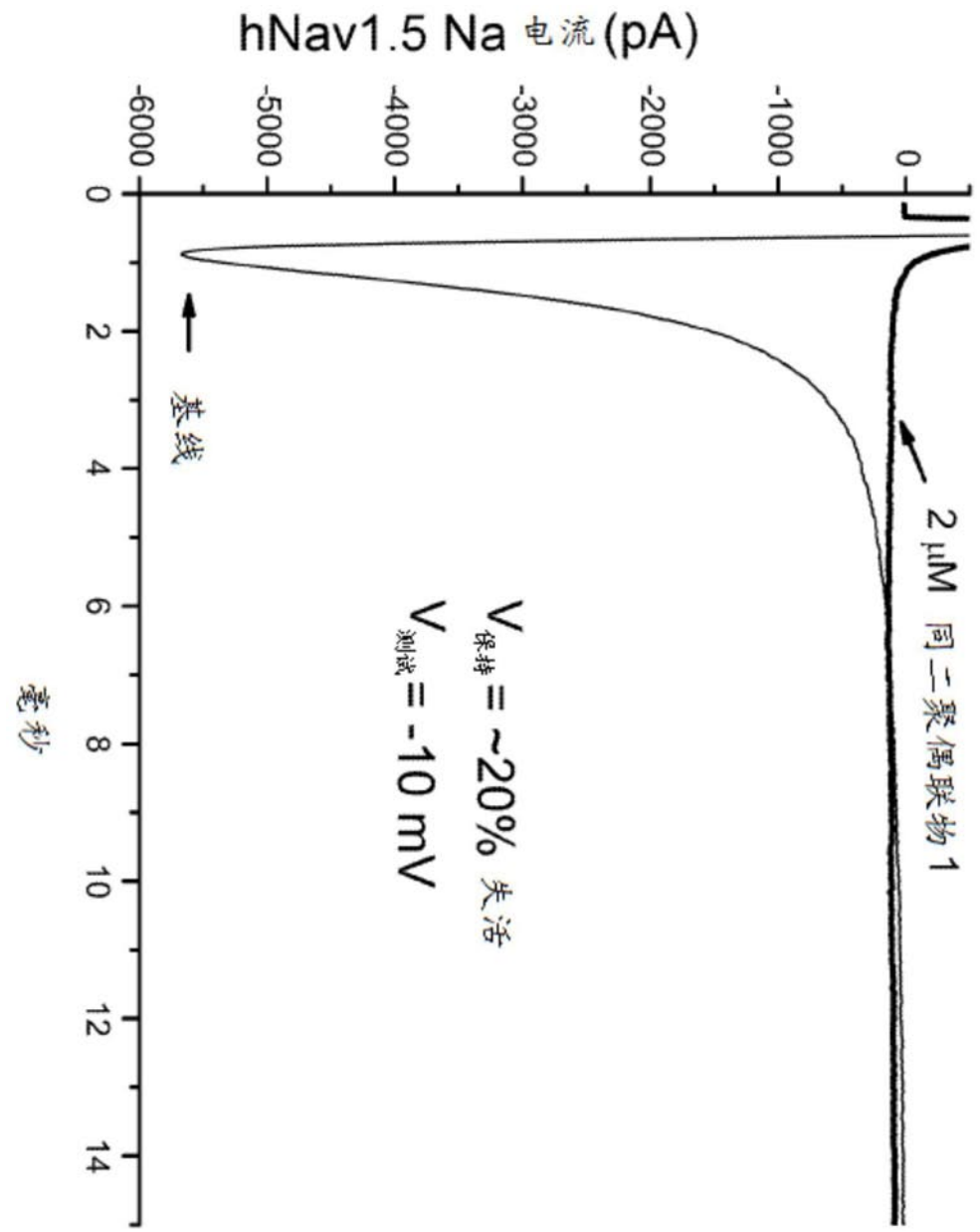

hNav1.5 Na 电流 (pA)
-6000
-5000
-4000
-3000
-2000
-1000
0
0
2
4
6
8
10
12
14
毫秒
基线
2 μM 同二聚偶联物 1
V保持 = ~20% 失活
V测试 = -10 mV

图 58

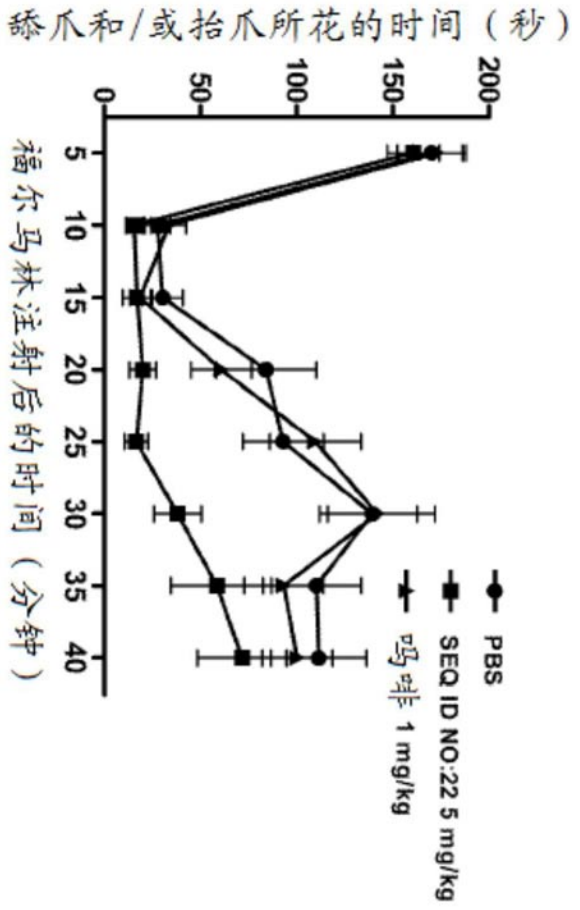

舔爪和/或抬爪所花的时间（秒）
0
50
100
150
200
5
10
15
20
25
30
35
40
福尔马林注射后的时间（分钟）
PBS
SEQ ID NO:22 5 mg/kg
吗啡 1 mg/kg

图 59

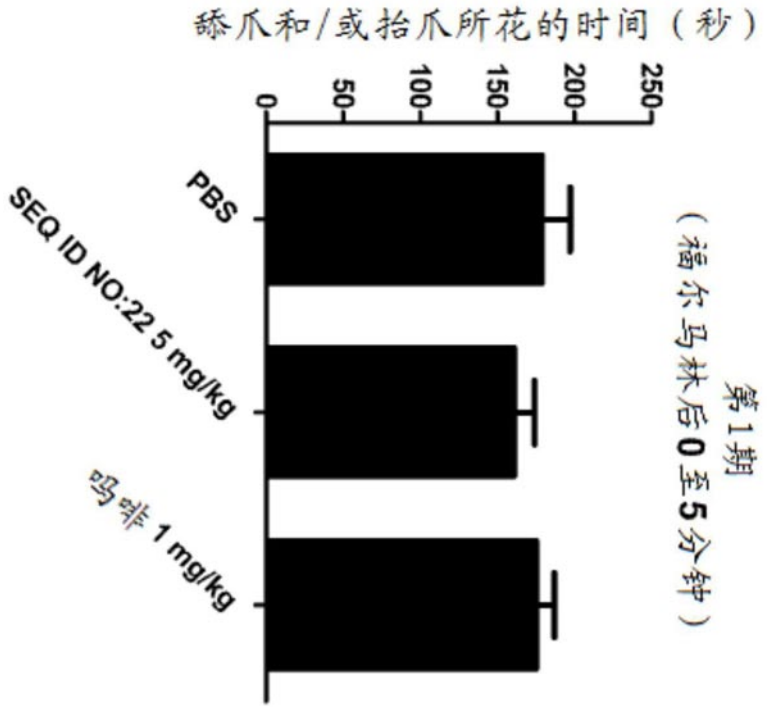

舔爪和/或抬爪所花的时间（秒）
0
50
100
150
200
250
PBS
SEQ ID NO:22 5 mg/kg
吗啡 1 mg/kg
第 1 期
（福尔马林后 0 至 5 分钟）

图 60

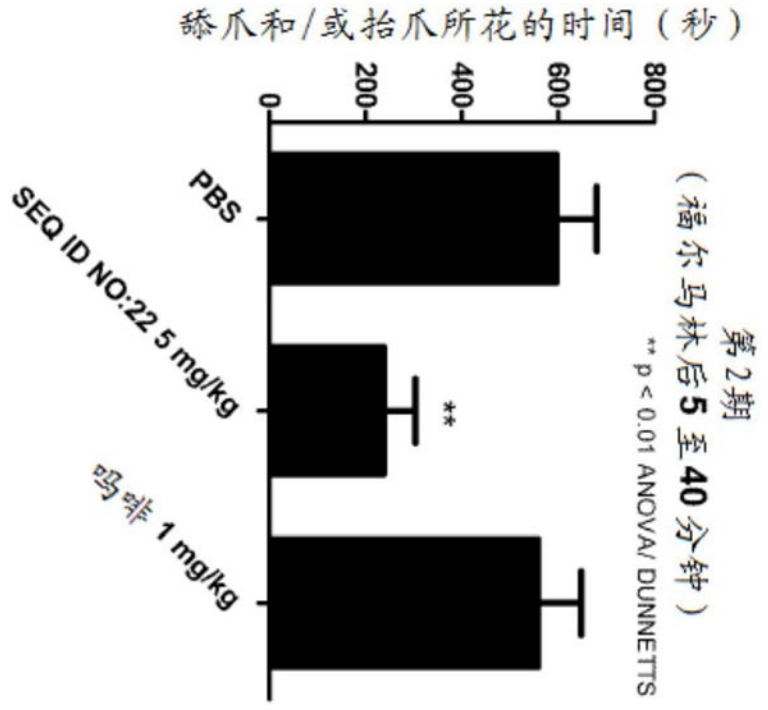

舔爪和/或抬爪所花的时间（秒）
0
200
400
600
800
PBS
SEQ ID NO:22 5 mg/kg
吗啡 1 mg/kg
**
第 2 期
（福尔马林后 5 至 40 分钟）
** p < 0.01 ANOVA/ DUNNETTS

图 61

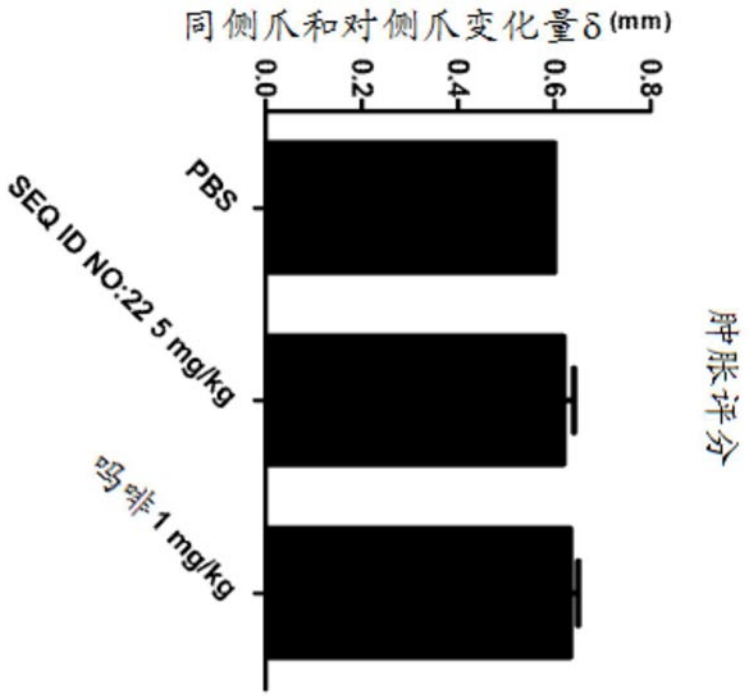

同侧爪和对侧爪变化量δ(mm)
0.0
0.2
0.4
0.6
0.8
PBS
SEQ ID NO:22 5 mg/kg
吗啡1 mg/kg
肿胀评分

图 62

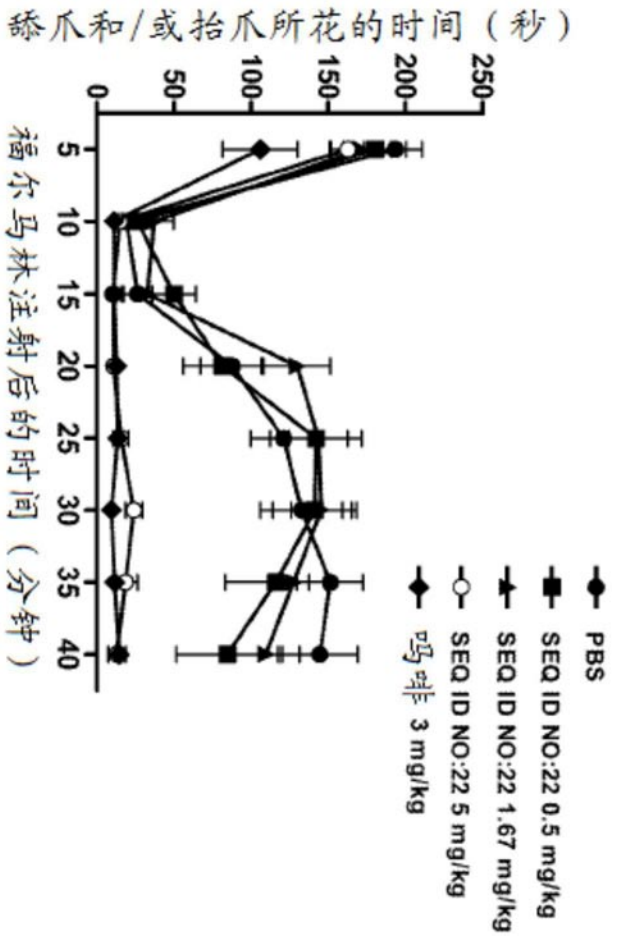

舔爪和/或抬爪所花的时间（秒）
0
50
100
150
200
250
5
10
15
20
25
30
35
40
福尔马林注射后的时间（分钟）
PBS
SEQ ID NO:22 0.5 mg/kg
SEQ ID NO:22 1.67 mg/kg
SEQ ID NO:22 5 mg/kg
吗啡 3 mg/kg

图 63

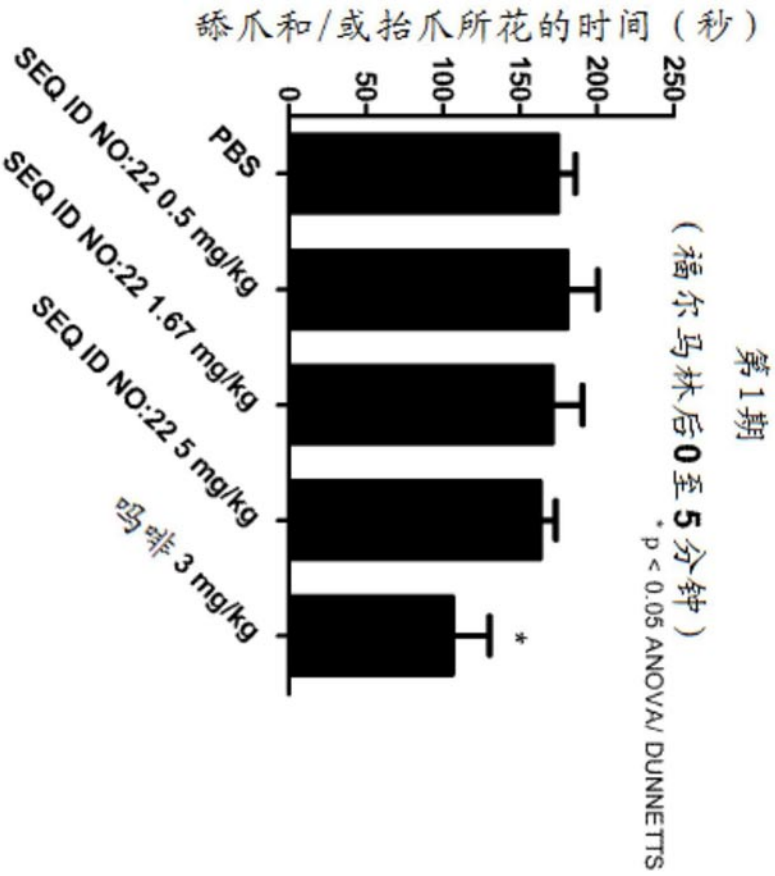

舔爪和/或抬爪所花的时间（秒）
0
50
100
150
200
250
PBS
SEQ ID NO:22 0.5 mg/kg
SEQ ID NO:22 1.67 mg/kg
SEQ ID NO:22 5 mg/kg
吗啡 3 mg/kg
*
第 1 期
（福尔马林后 0 至 5 分钟）
* p < 0.05 ANOVA/ DUNNETTS

图 64

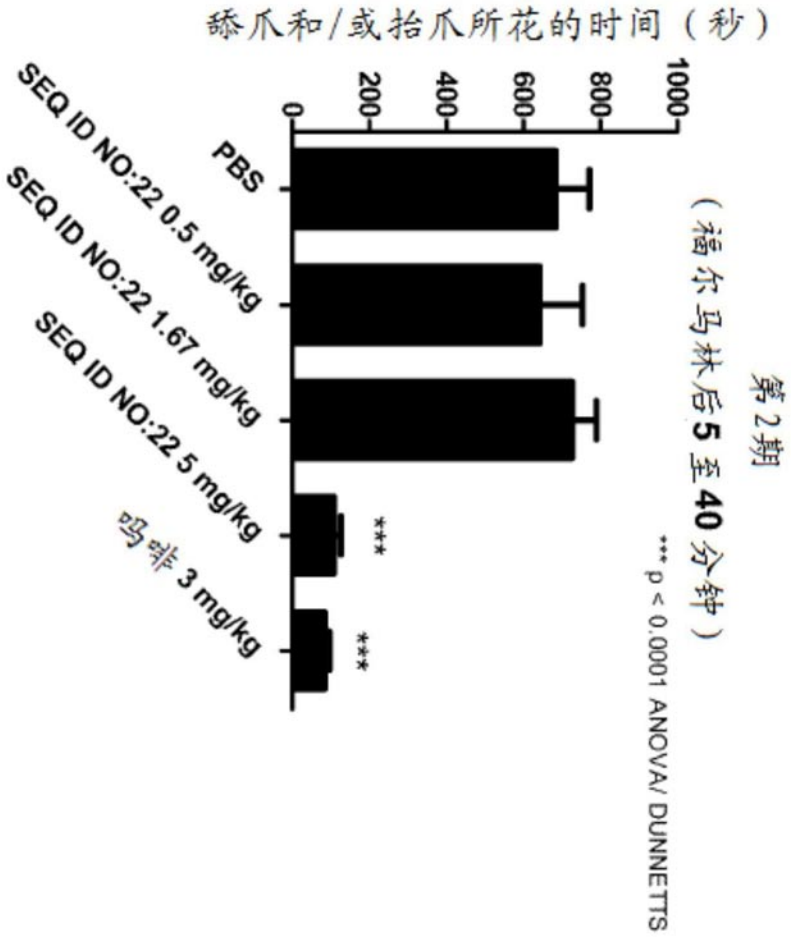

舔爪和/或抬爪所花的时间（秒）
0
200
400
600
800
1000
PBS
SEQ ID NO:22 0.5 mg/kg
SEQ ID NO:22 1.67 mg/kg
SEQ ID NO:22 5 mg/kg
吗啡 3 mg/kg
***
***
第 2 期
（福尔马林后 5 至 40 分钟）
*** p < 0.0001 ANOVA/ DUNNETTS

图 65

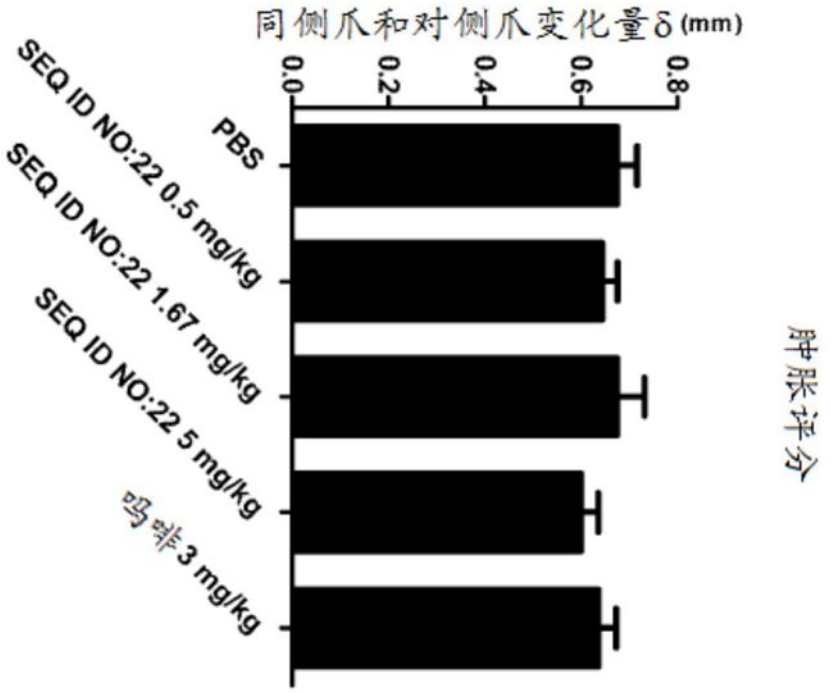

同侧爪和对侧爪变化量δ(mm)
0.0
0.2
0.4
0.6
0.8
PBS
SEQ ID NO:22 0.5 mg/kg
SEQ ID NO:22 1.67 mg/kg
SEQ ID NO:22 5 mg/kg
吗啡3 mg/kg
肿胀评分

图 66

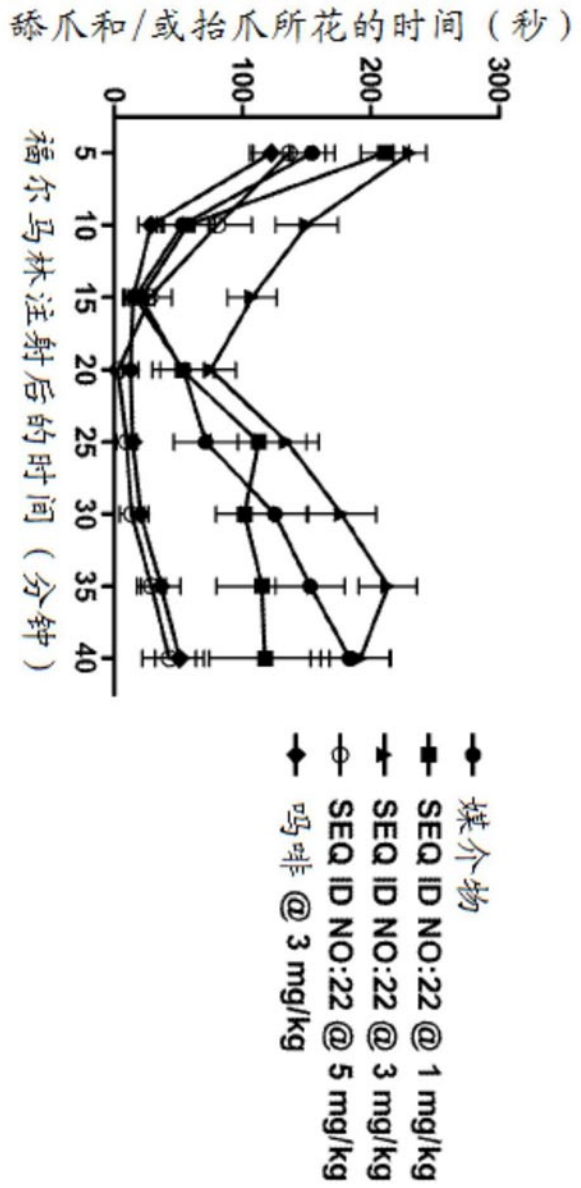

舔爪和/或抬爪所花的时间（秒）
0
100
200
300
福尔马林注射后的时间（分钟）
5
10
15
20
25
30
35
40
媒介物
SEQ ID NO:22 @ 1 mg/kg
SEQ ID NO:22 @ 3 mg/kg
SEQ ID NO:22 @ 5 mg/kg
吗啡 @ 3 mg/kg

图 67

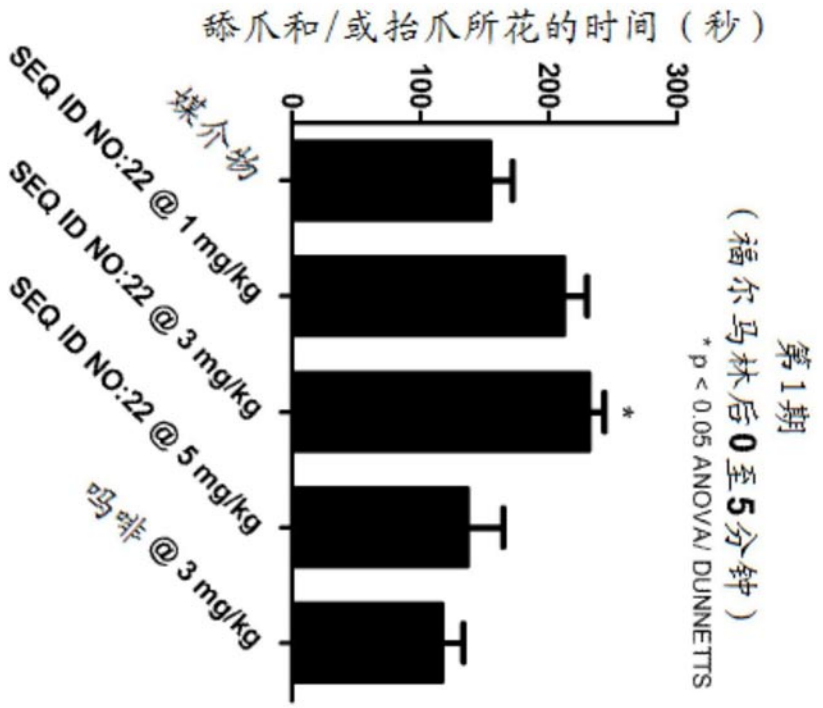

舔爪和/或抬爪所花的时间（秒）
0
100
200
300
媒介物
SEQ ID NO:22 @ 1 mg/kg
SEQ ID NO:22 @ 3 mg/kg
SEQ ID NO:22 @ 5 mg/kg
吗啡 @ 3 mg/kg
*
第 1 期
（福尔马林后 0 至 5 分钟）
* p < 0.05 ANOVA/ DUNNETTS

图 68

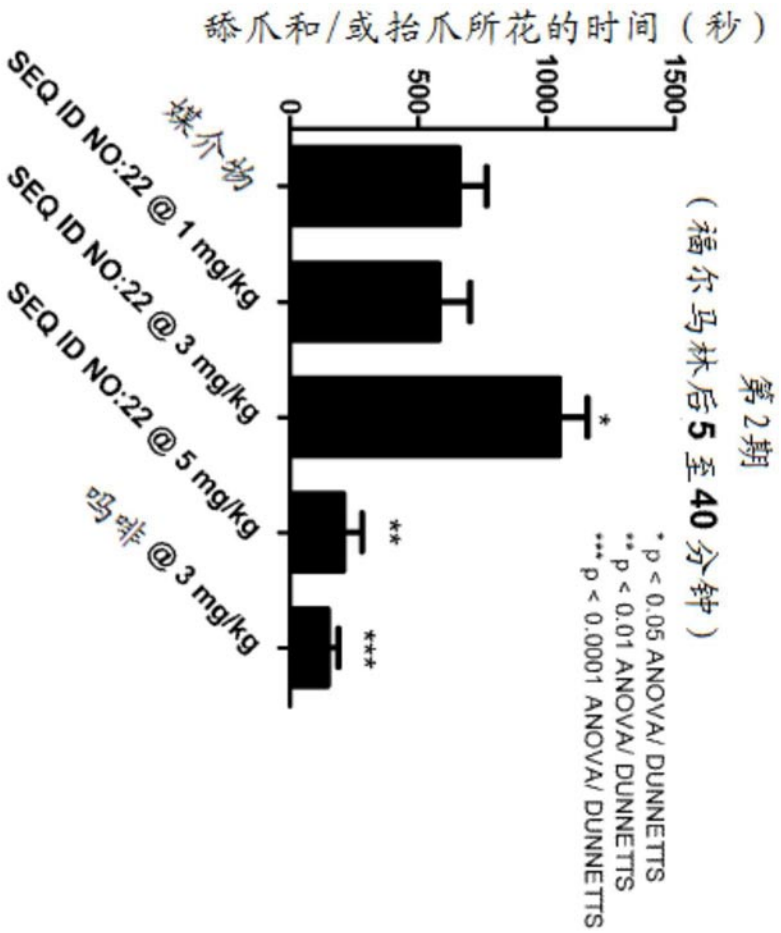

舔爪和/或抬爪所花的时间（秒）
0
500
1000
1500
媒介物
SEQ ID NO:22 @ 1 mg/kg
SEQ ID NO:22 @ 3 mg/kg
SEQ ID NO:22 @ 5 mg/kg
吗啡 @ 3 mg/kg
*
**
***
第 2 期
（福尔马林后 5 至 40 分钟）
* p < 0.05 ANOVA/ DUNNETTS
** p < 0.01 ANOVA/ DUNNETTS
*** p < 0.0001 ANOVA/ DUNNETTS

图 69

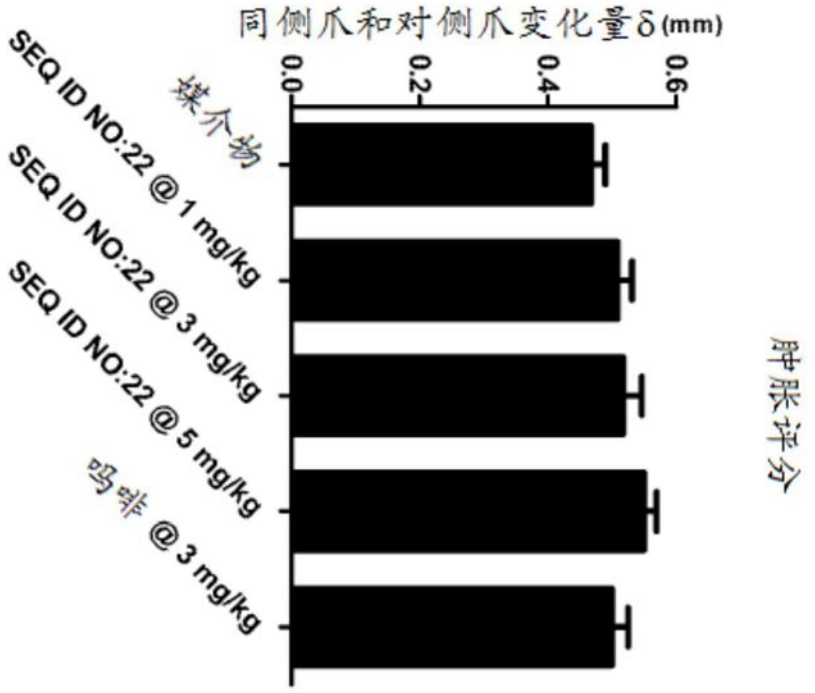

同侧爪和对侧爪变化量δ(mm)
0.0
0.2
0.4
0.6
媒介物
SEQ ID NO:22 @ 1 mg/kg
SEQ ID NO:22 @ 3 mg/kg
SEQ ID NO:22 @ 5 mg/kg
吗啡 @ 3 mg/kg
肿胀评分

图 70

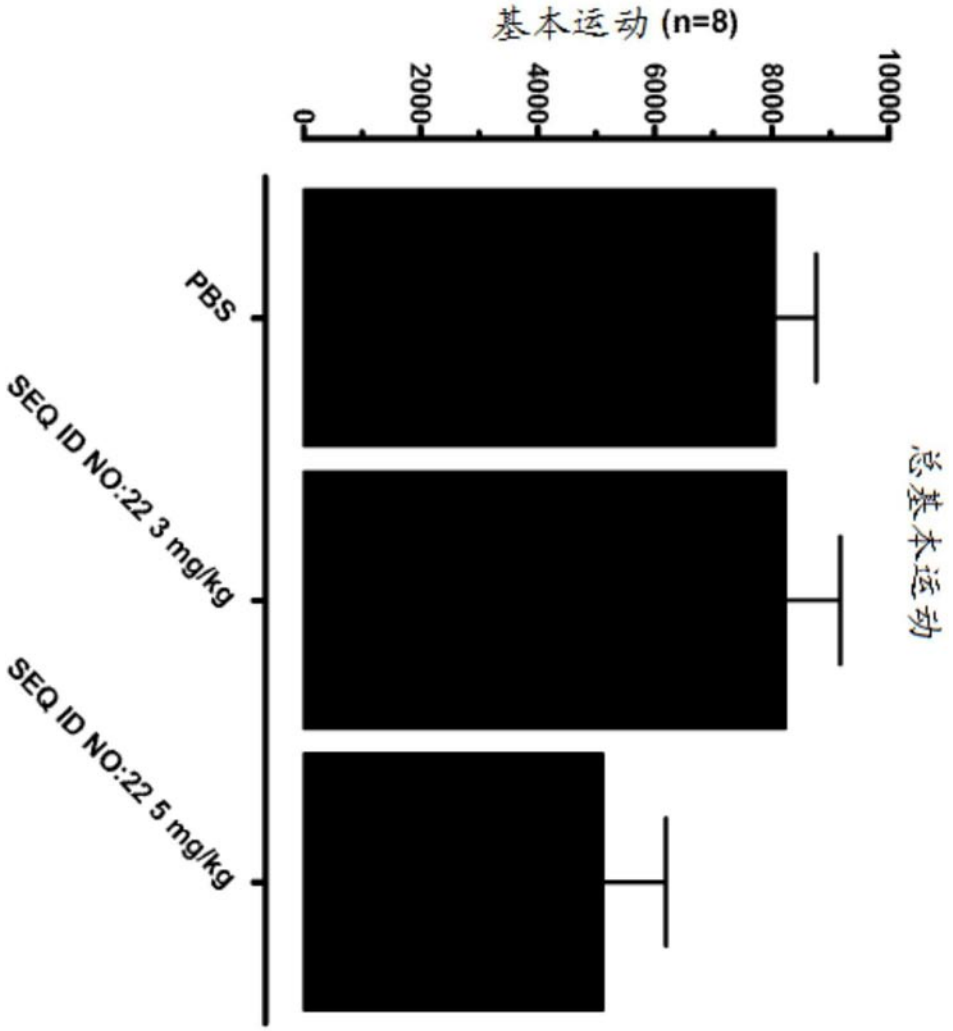

基本运动 (n=8)
0
2000
4000
6000
8000
10000
PBS
SEQ ID NO:22 3 mg/kg
SEQ ID NO:22 5 mg/kg
总基本运动

图 71

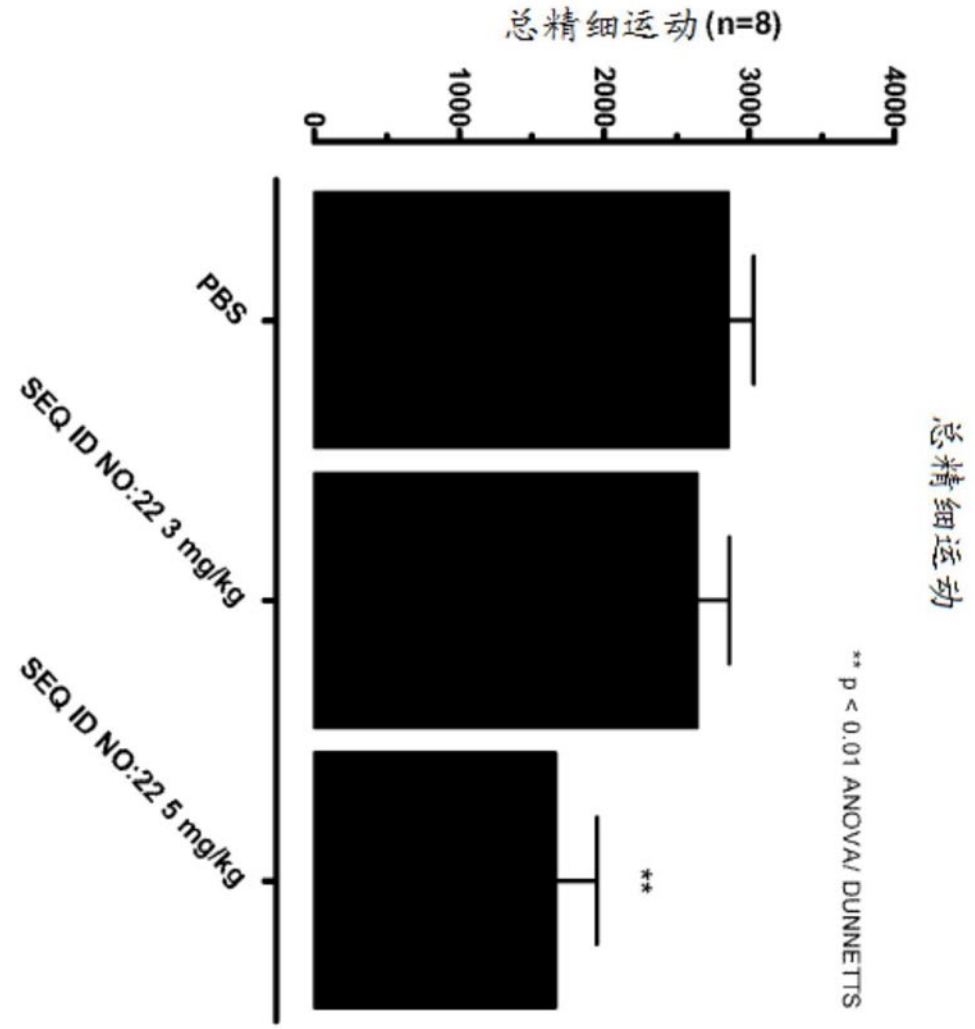

总精细运动(n=8)
0
1000
2000
3000
4000
PBS
SEQ ID NO:22 3 mg/kg
SEQ ID NO:22 5 mg/kg
**
总精细运动
** p < 0.01 ANOVA/ DUNNETTS

图 72

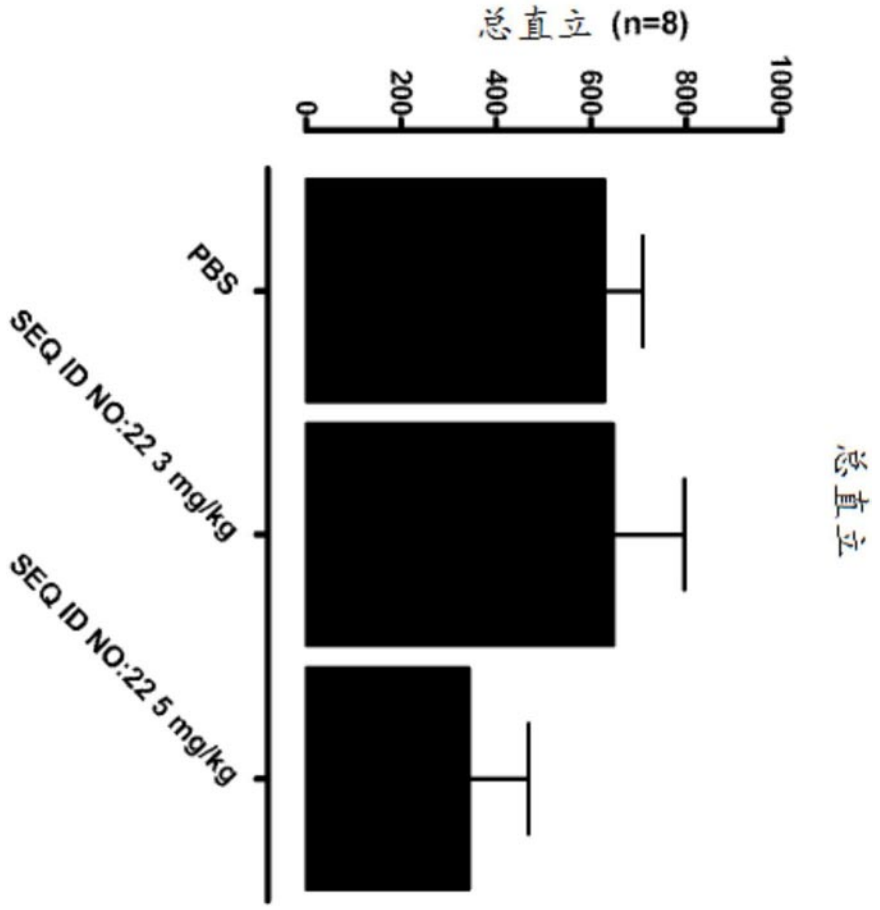

总直立 (n=8)
0
200
400
600
800
1000
PBS
SEQ ID NO:22 3 mg/kg
SEQ ID NO:22 5 mg/kg
总直立

图 73

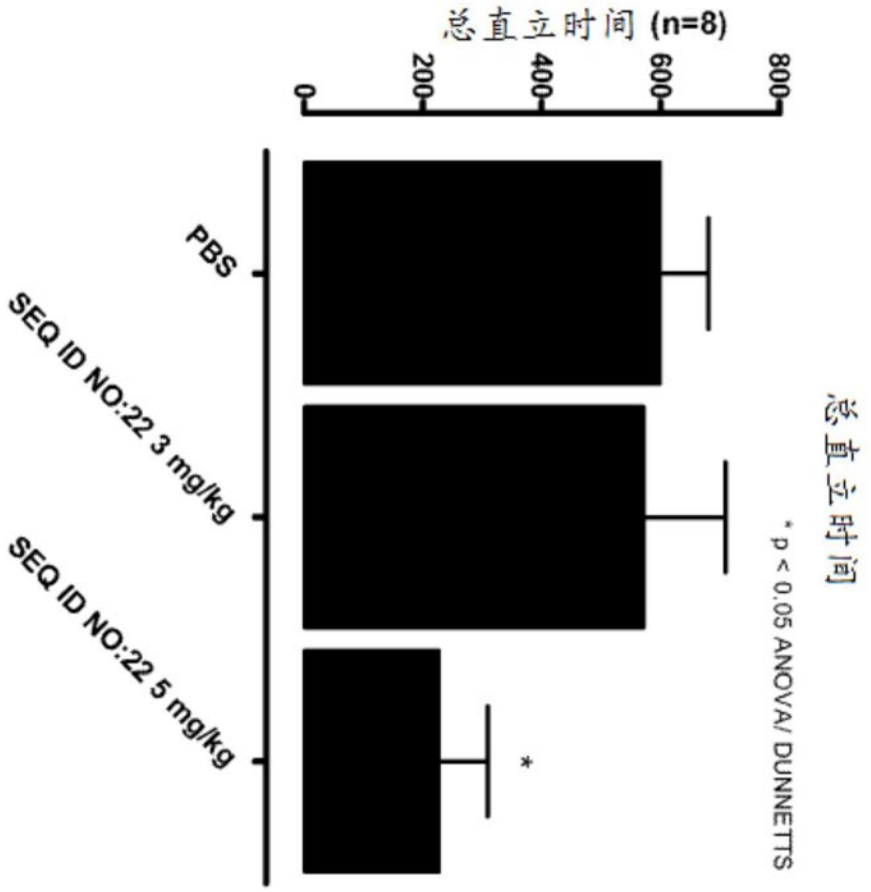

总直立时间 (n=8)
0
200
400
600
800
PBS
SEQ ID NO:22 3 mg/kg
SEQ ID NO:22 5 mg/kg
*
总直立时间
* p < 0.05 ANOVA/ DUNNETTS

图 74

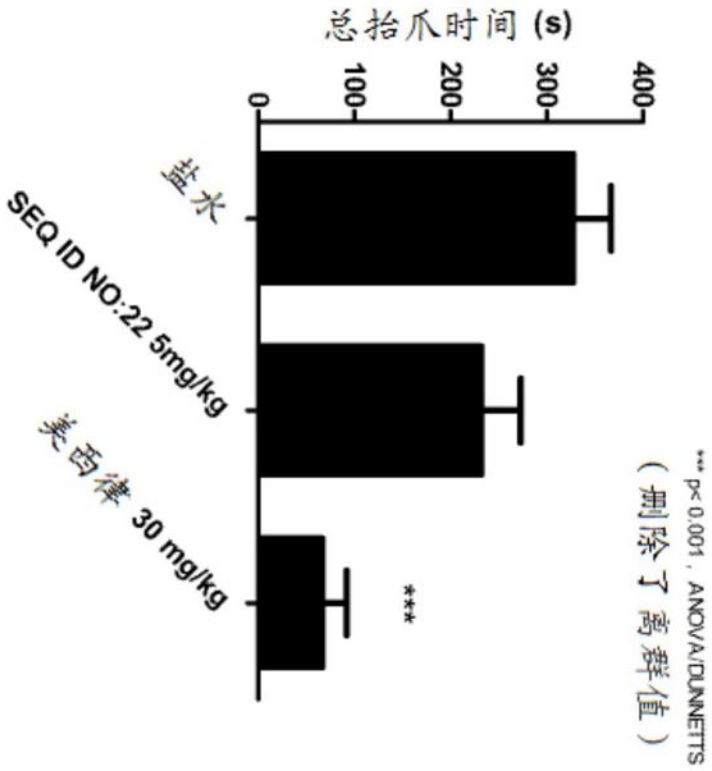

总抬爪时间 (s)
0
100
200
300
400
盐水
SEQ ID NO:22 5mg/kg
美西律 30 mg/kg
***
*** p< 0.001, ANOVA/DUNNETTS
(删除了离群值)

图 75

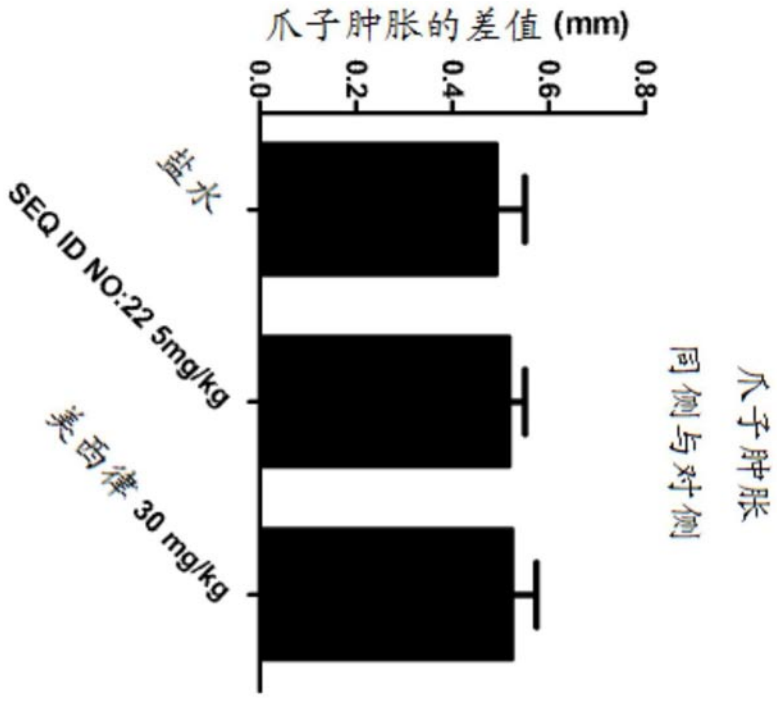

爪子肿胀的差值 (mm)
0.0
0.2
0.4
0.6
0.8
盐水
SEQ ID NO:22 5mg/kg
美西律 30 mg/kg
爪子肿胀
同侧与对侧

图 76

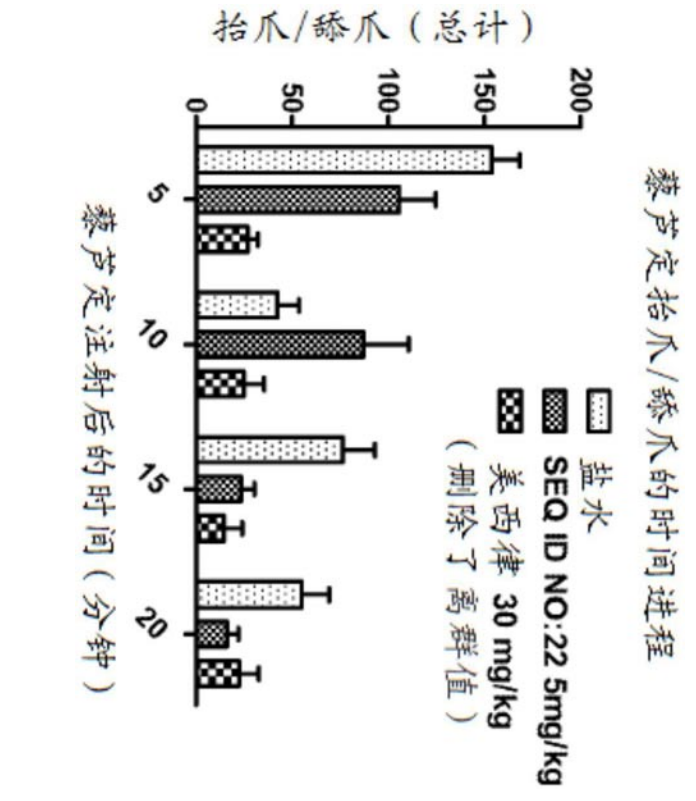

抬爪/舔爪（总计）
0
50
100
150
200
5
10
15
20
蒽芦定注射后的时间（分钟）
蒽芦定抬爪/舔爪的时间进程
盐水
SEQ ID NO:22 5mg/kg
美西律 30 mg/kg
（删除了离群值）

图 77

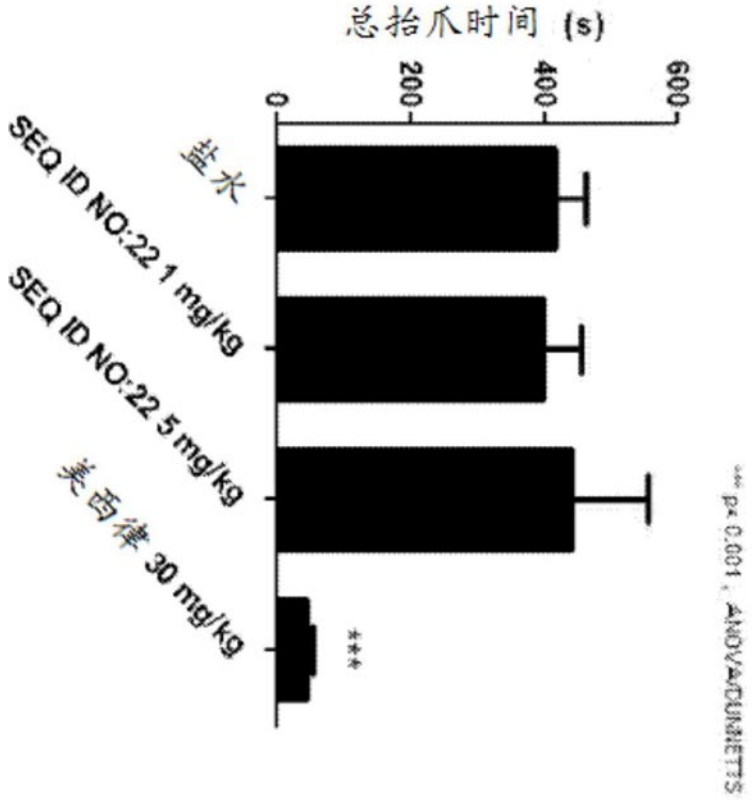

总抬爪时间 (s)
0
200
400
600
盐水
SEQ ID NO:22 1 mg/kg
SEQ ID NO:22 5 mg/kg
美西律 30 mg/kg
***
*** p< 0.001, ANOVA/DUNNETTS

图 78

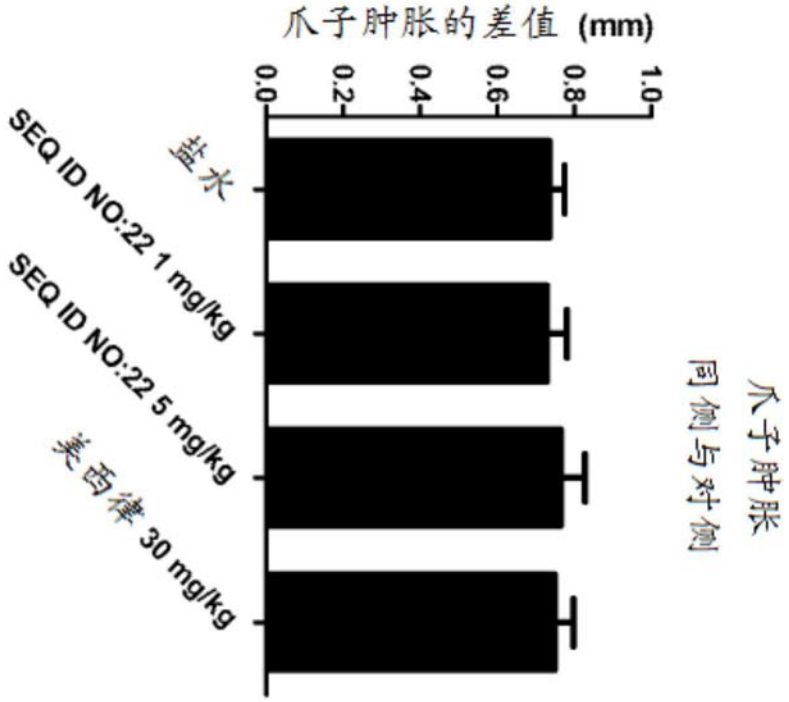

爪子肿胀的差值 (mm)
0.0
0.2
0.4
0.6
0.8
1.0
盐水
SEQ ID NO:22 1 mg/kg
SEQ ID NO:22 5 mg/kg
美西律 30 mg/kg
爪子肿胀
同侧与对侧

图 79

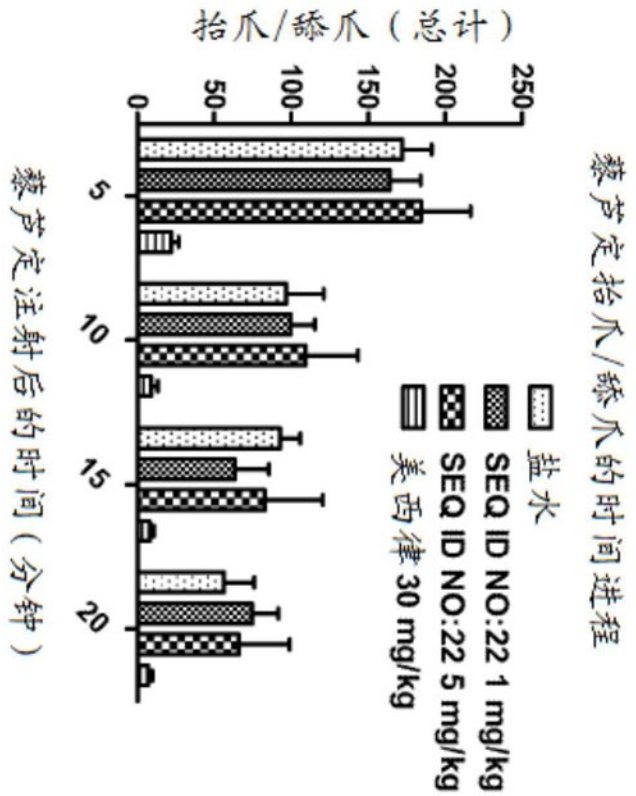

抬爪/舔爪（总计）
0
50
100
150
200
250
5
10
15
20
藜芦定注射后的时间（分钟）
藜芦定抬爪/舔爪的时间进程
盐水
SEQ ID NO:22 1 mg/kg
SEQ ID NO:22 5 mg/kg
美西律 30 mg/kg

图 80

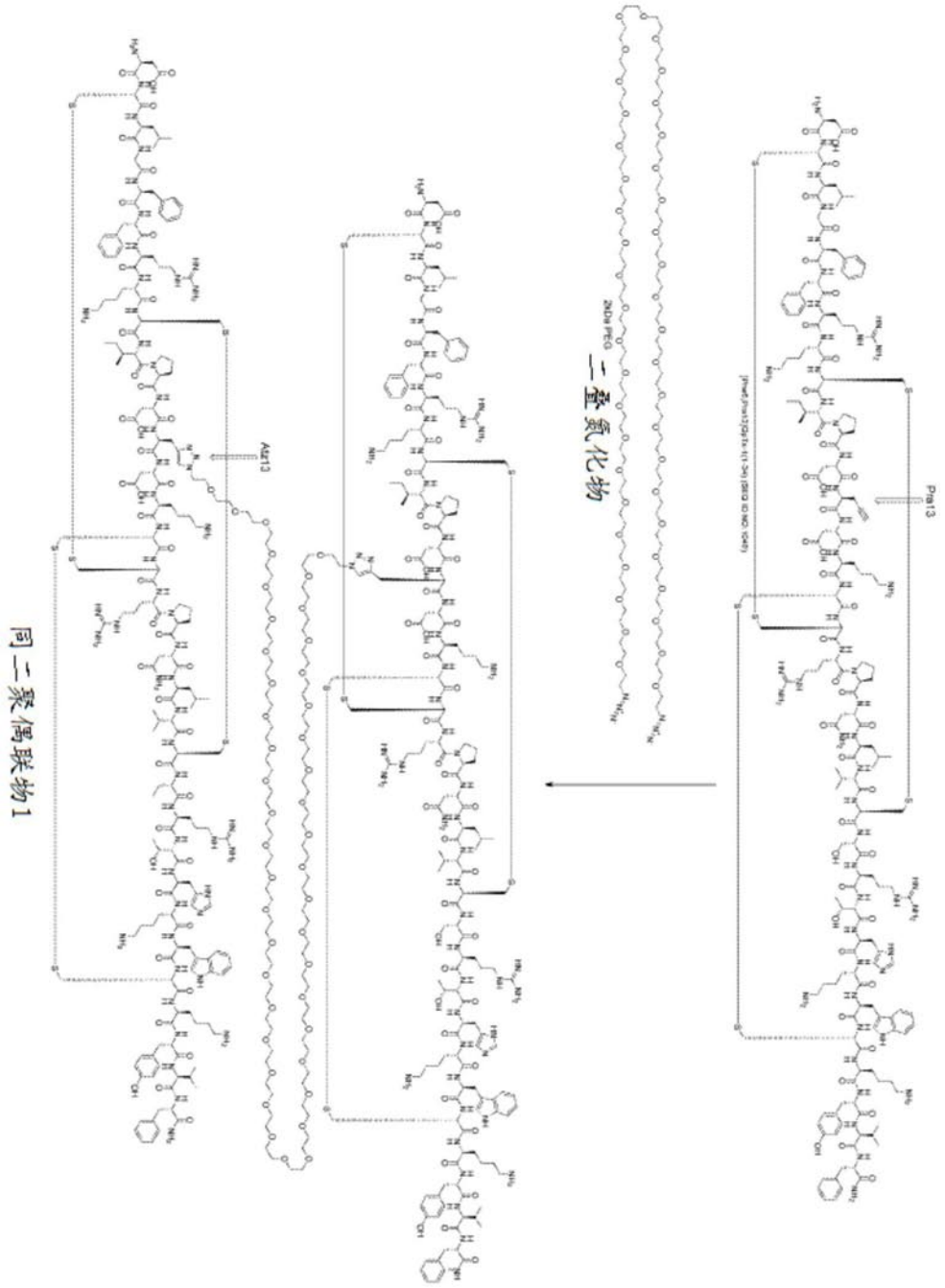


图 81A

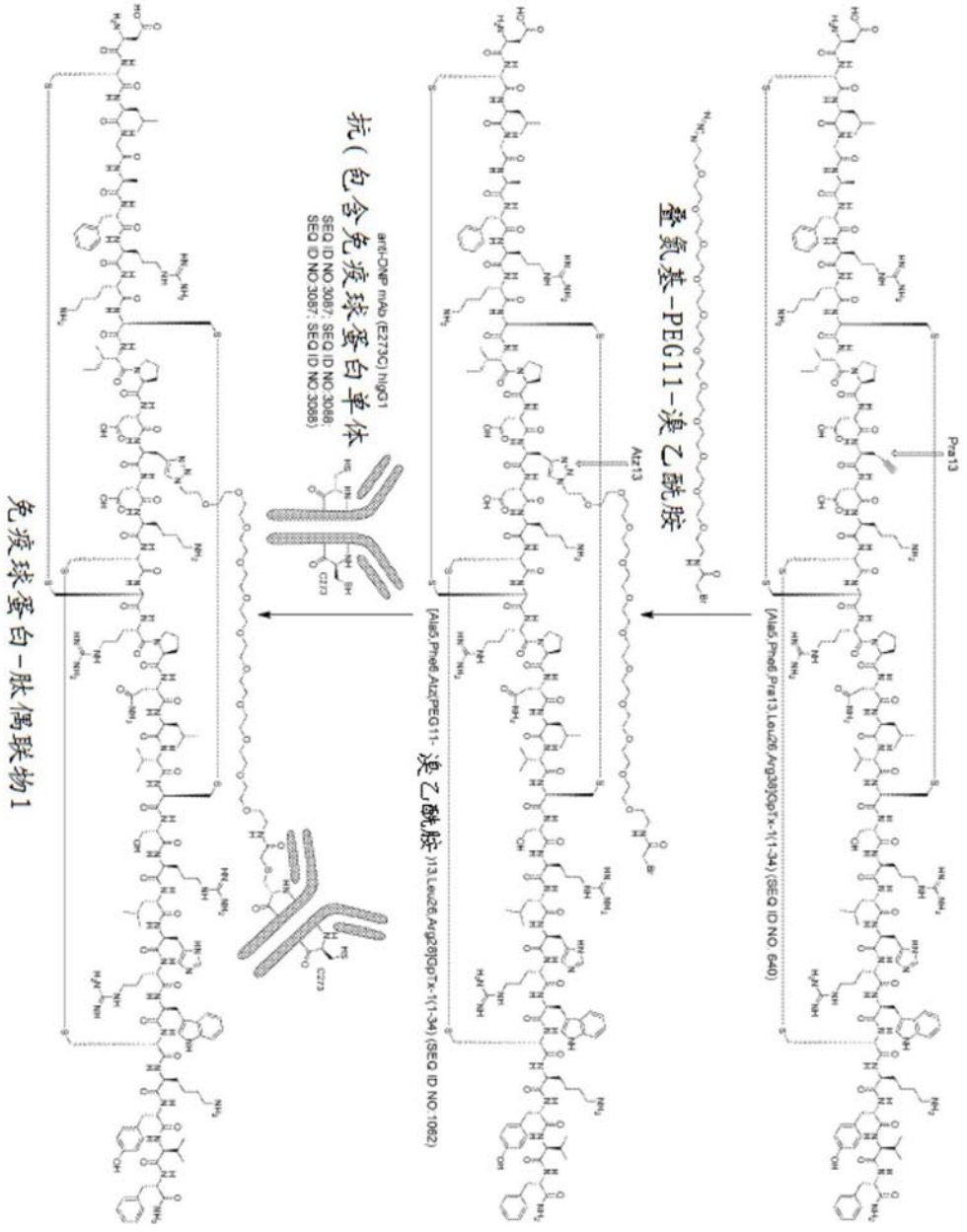

anti-DNP mAb (E273C) hIgG1
SEQ ID NO:3087; SEQ ID NO:3088;
SEQ ID NO:3087; SEQ ID NO:3088)
抗(包含免疫球蛋白单体
C273
叠氮基-PEG11-溴乙酰胺
Aza13
Pra13
[Ala5,Phe8,Pra13,Leu26,Arg38]GpTx-1(1-34) (SEQ ID NO: 640)
[Ala5,Phe8,Aza13]PEG11-溴乙酰胺)13,Leu26,Arg28]GpTx-1(1-34) (SEQ ID NO: 1062)
免疫球蛋白-肽偶联物1

图 81B

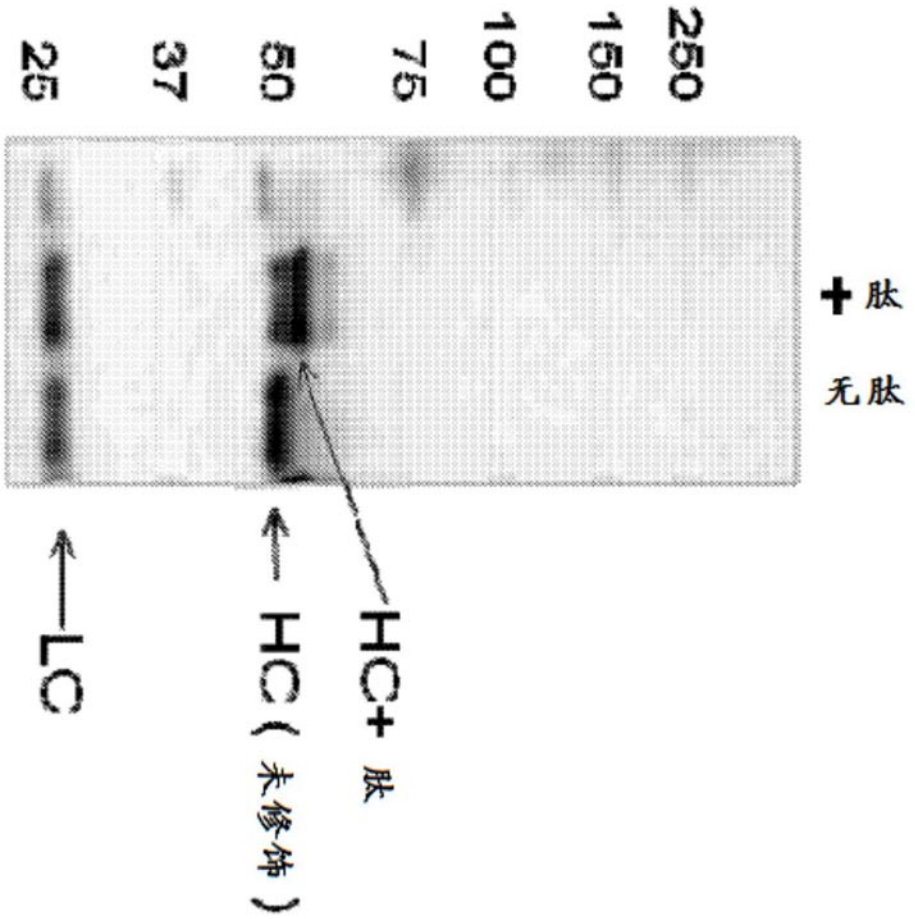


图 82

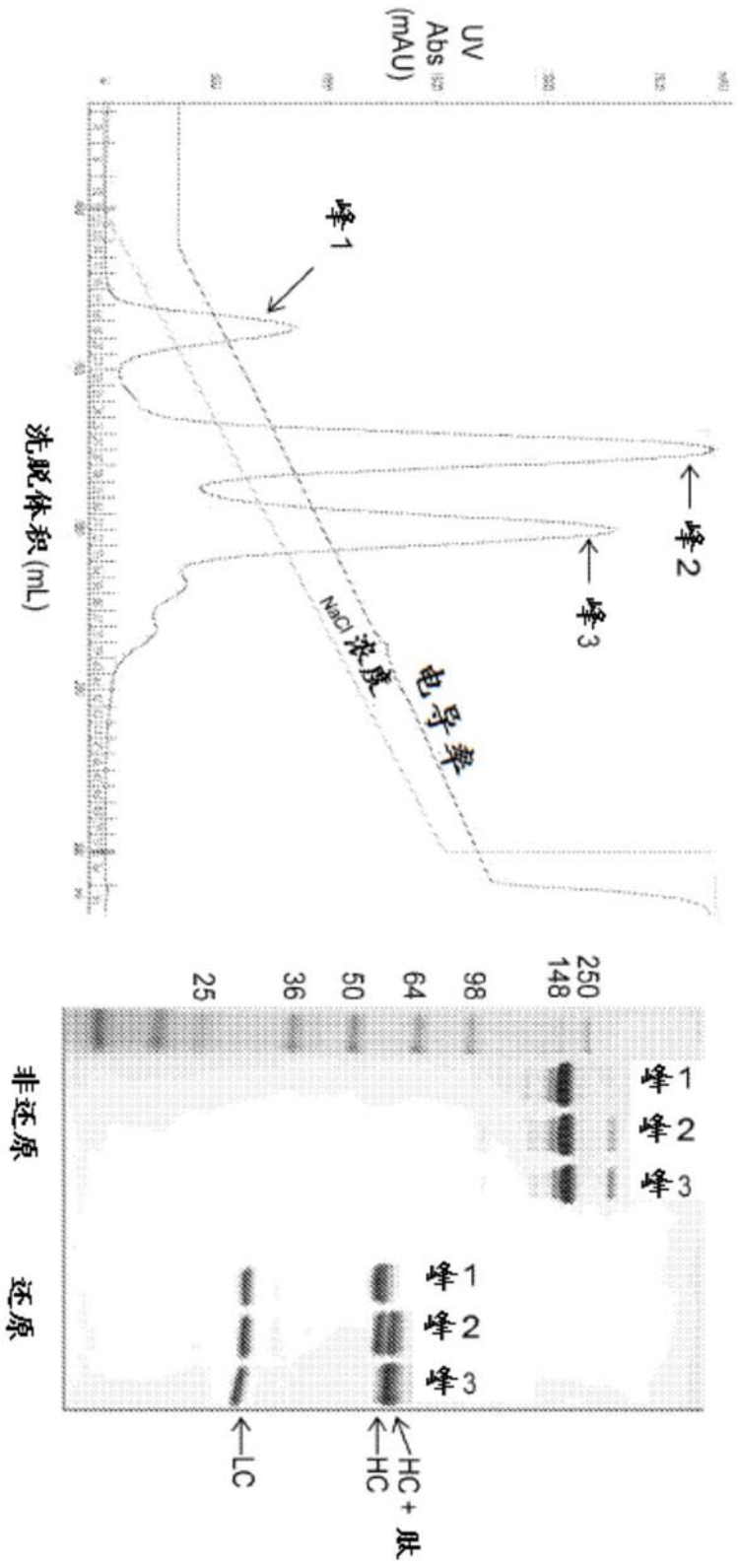

UV
Abs
(mAU)
峰1
峰2
峰3
洗脱体积(mL)
NaCl 浓度
电导率
250
148
98
64
50
36
25
非还原
还原
峰1
峰2
峰3
峰1
峰2
峰3
LC
HC
HC + 肽

图 83

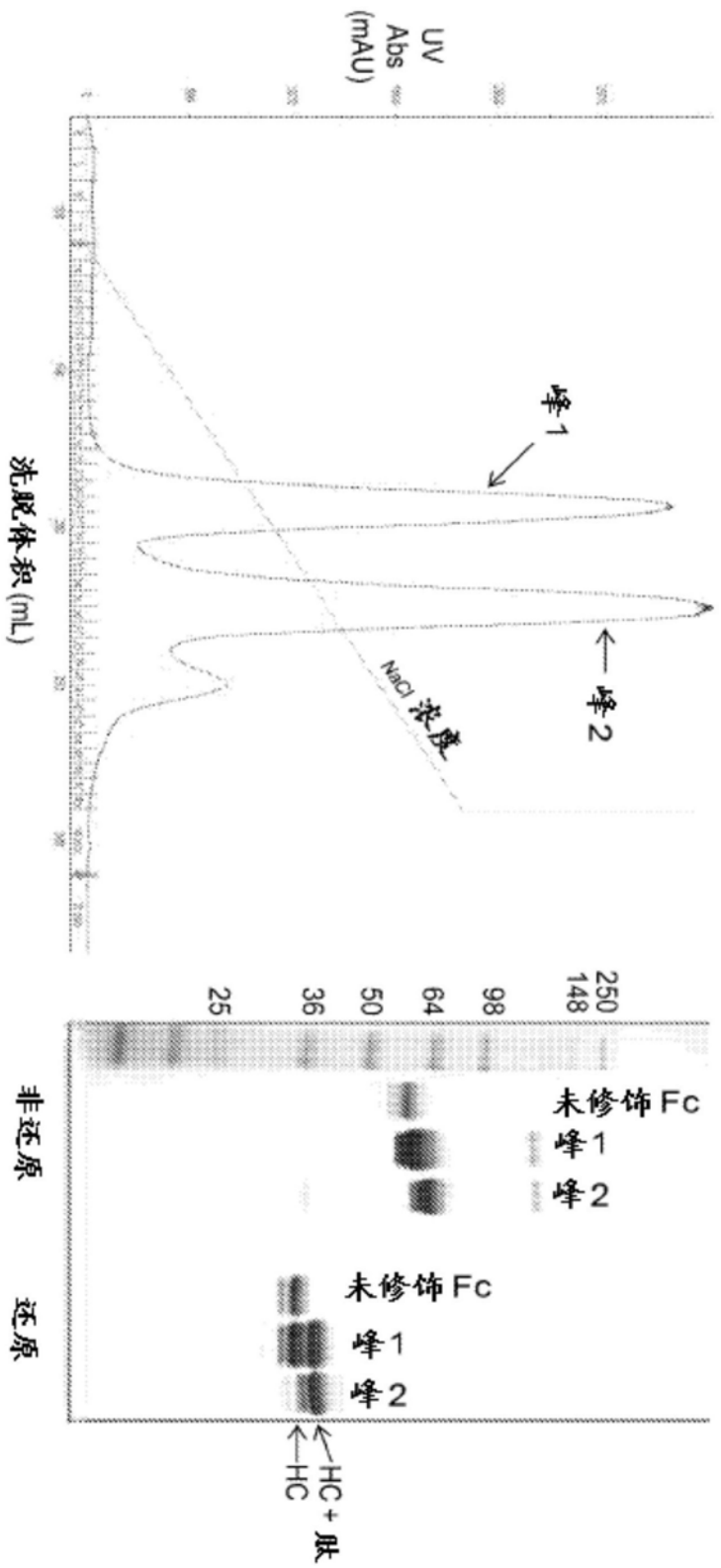

UV
Abs
(mAU)
洗脱体积(mL)
峰1
峰2
NaCl 浓度
25
36
50
64
98
148
250
非还原
未修饰 Fc
峰1
峰2
还原
未修饰 Fc
峰1
峰2
HC
HC+肼

图 84

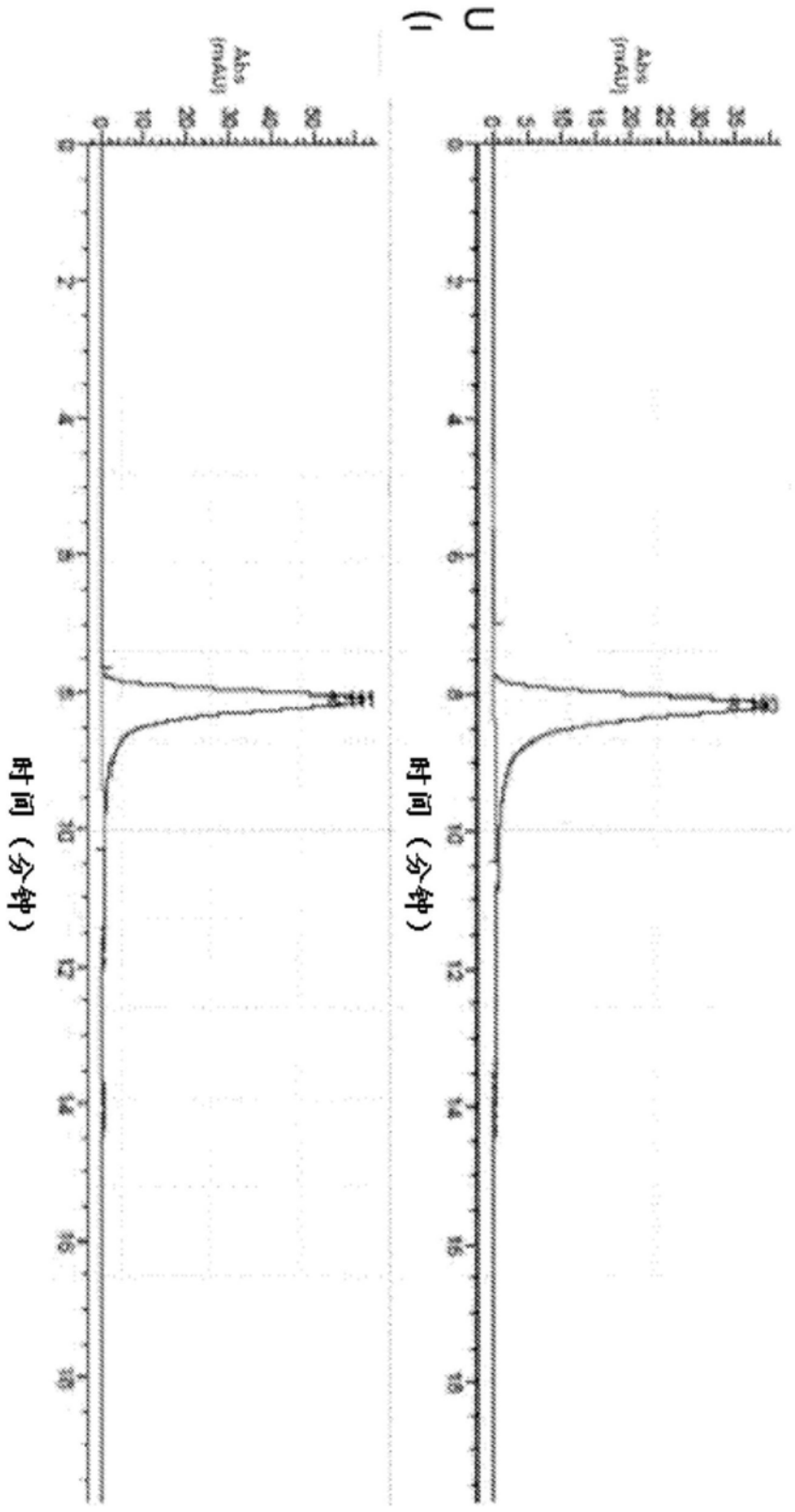


图 85

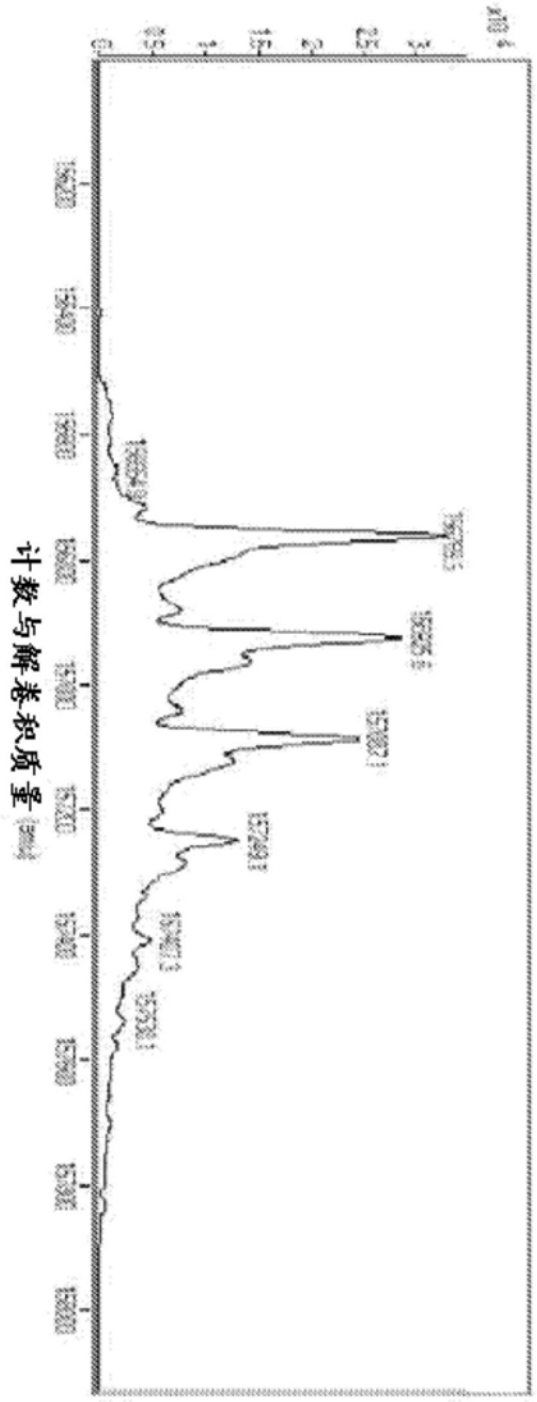


图 86

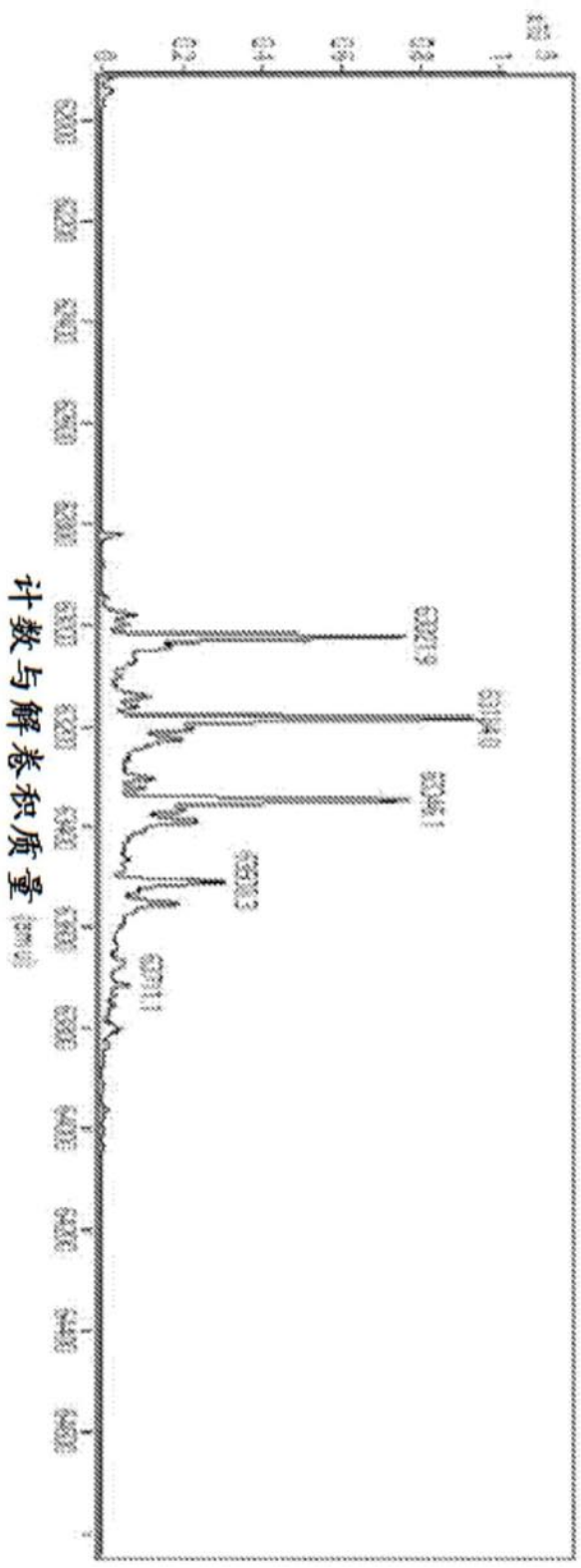


图 87

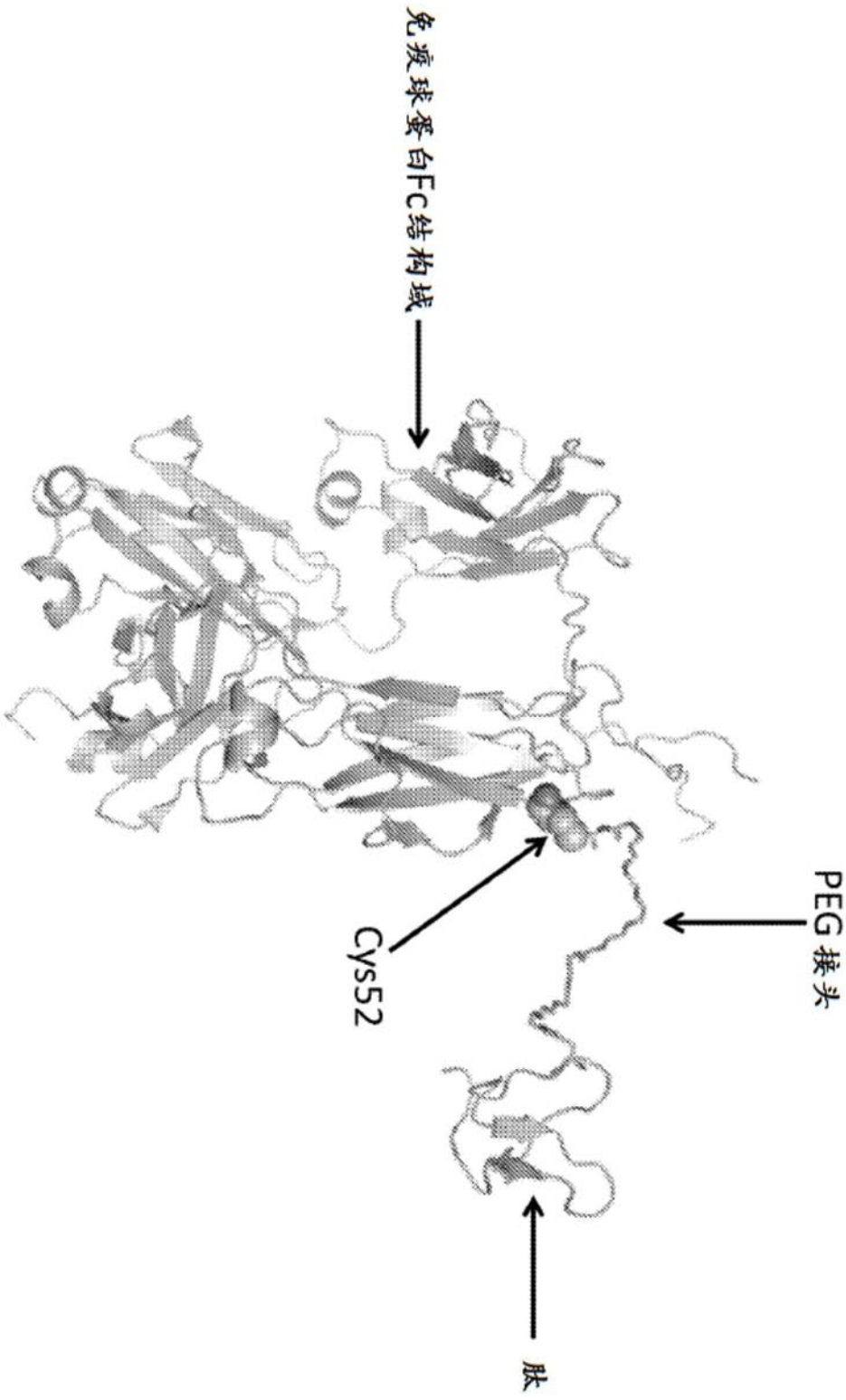


图 88

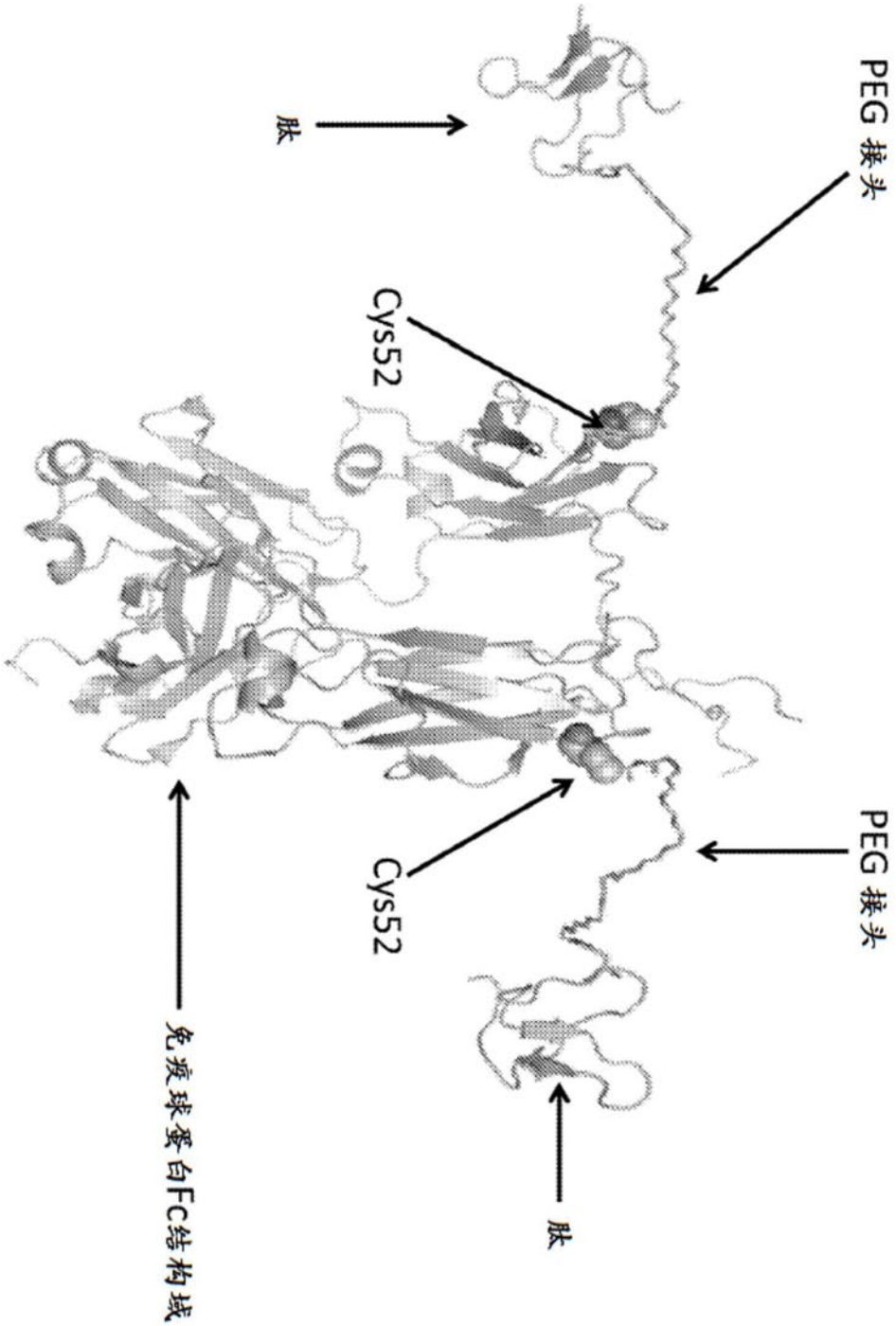


图 89

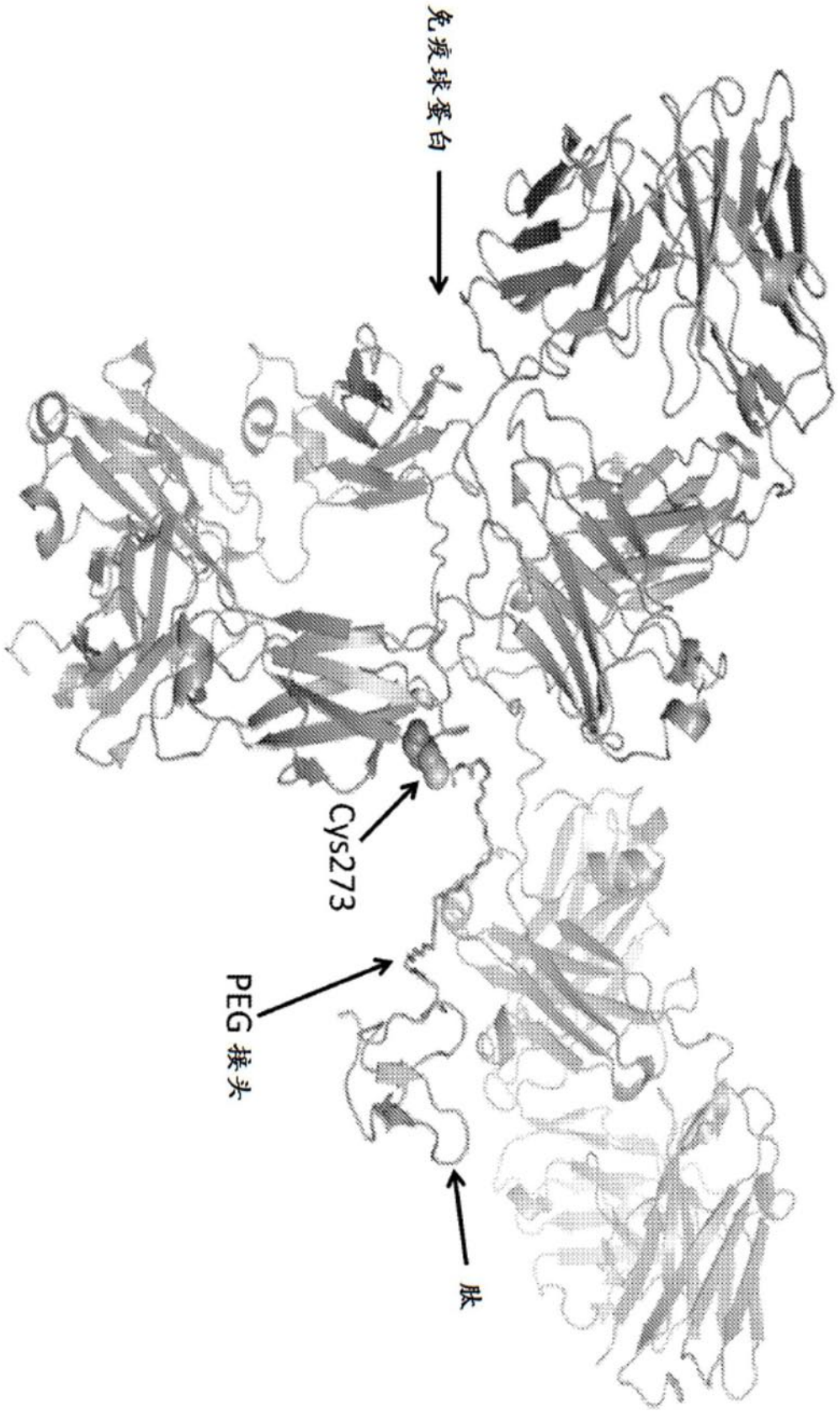


图 90

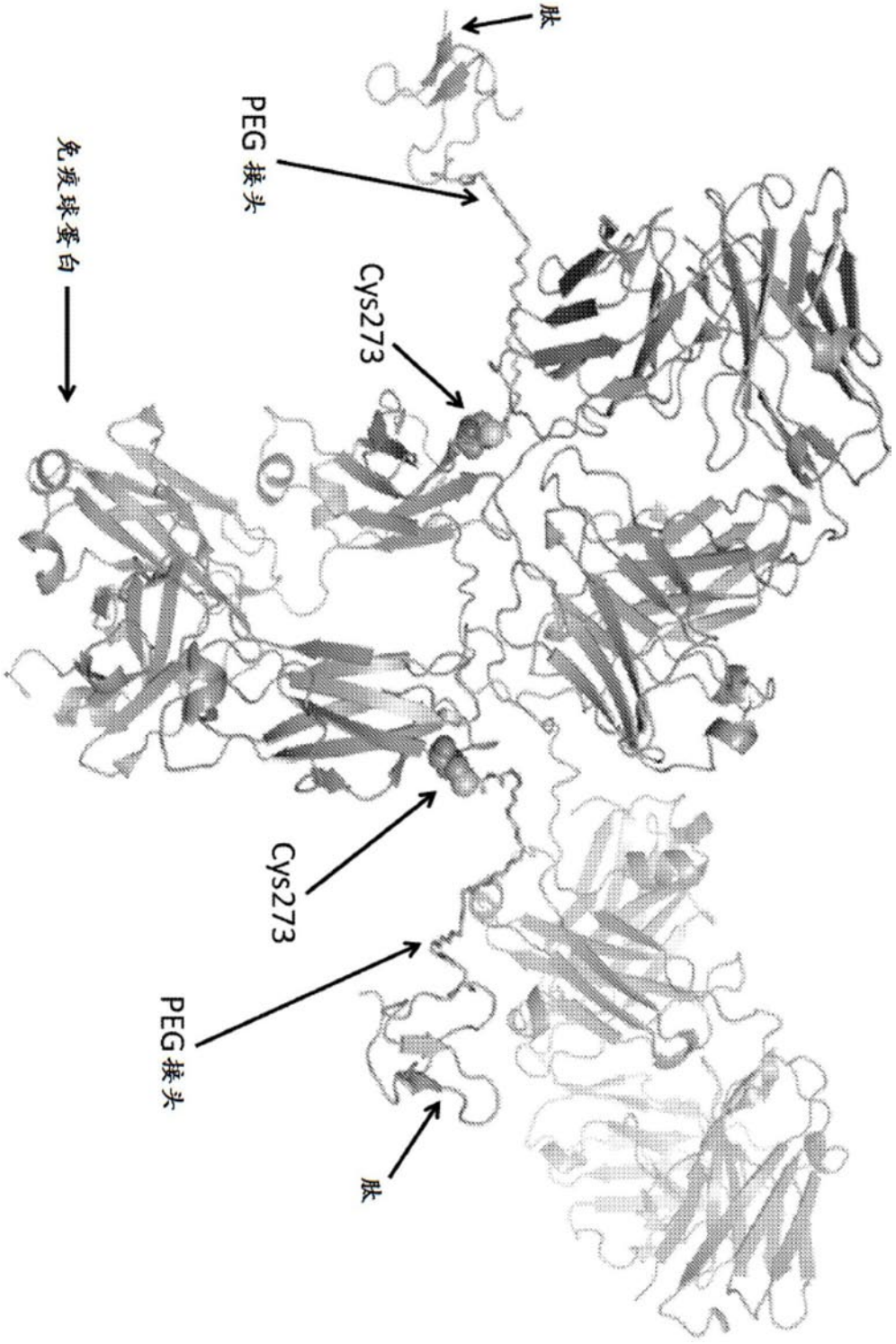


图 91

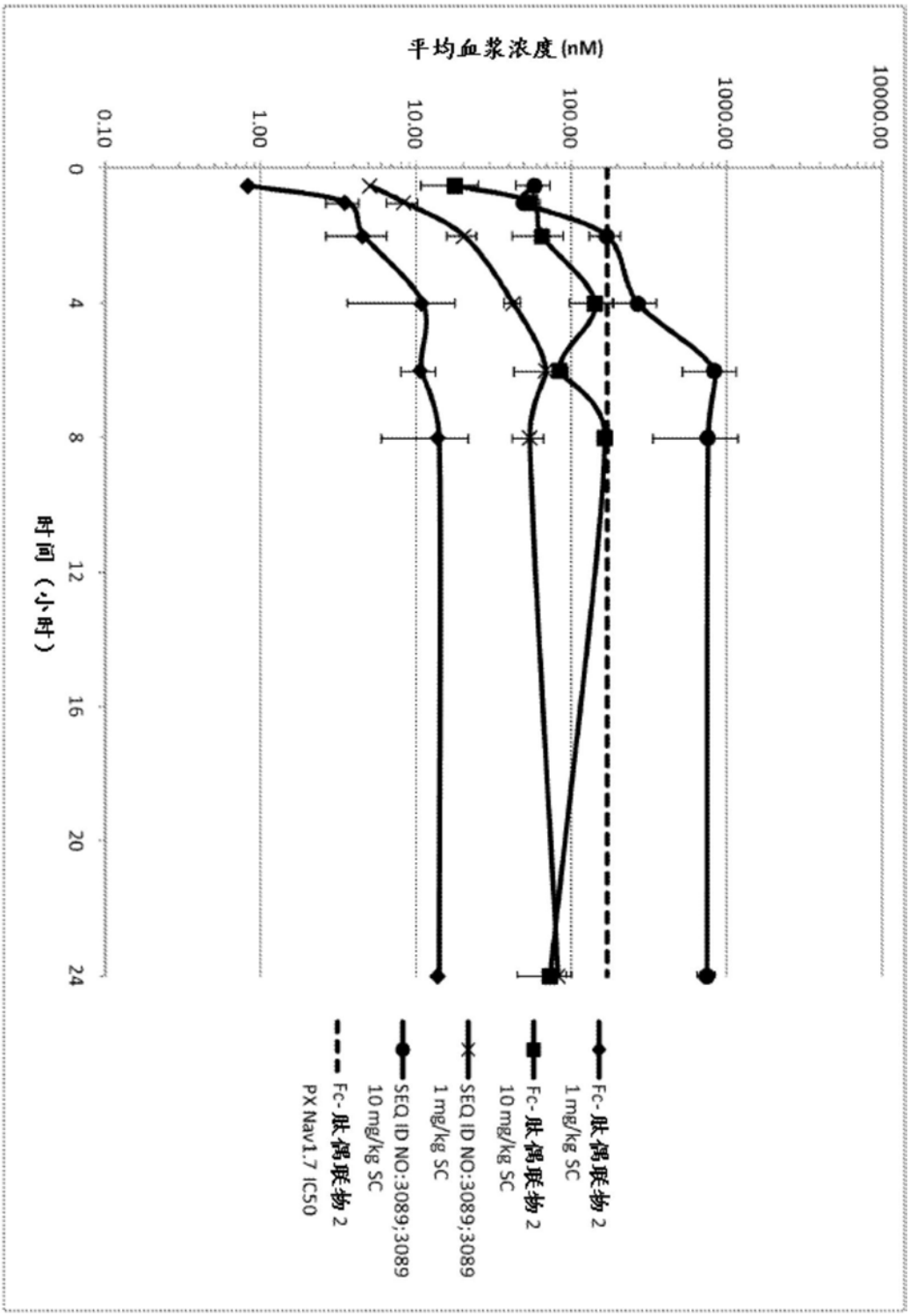

平均血浆浓度(nM)
10000.00
1000.00
100.00
10.00
1.00
0.10
0
4
8
12
16
20
24
时间（小时）
Fc-肽偶联物 2
1 mg/kg SC
Fc-肽偶联物 2
10 mg/kg SC
SEQ ID NO:3089;3089
1 mg/kg SC
SEQ ID NO:3089;3089
10 mg/kg SC
Fc-肽偶联物 2
PX Nav1.7 IC50

图 92

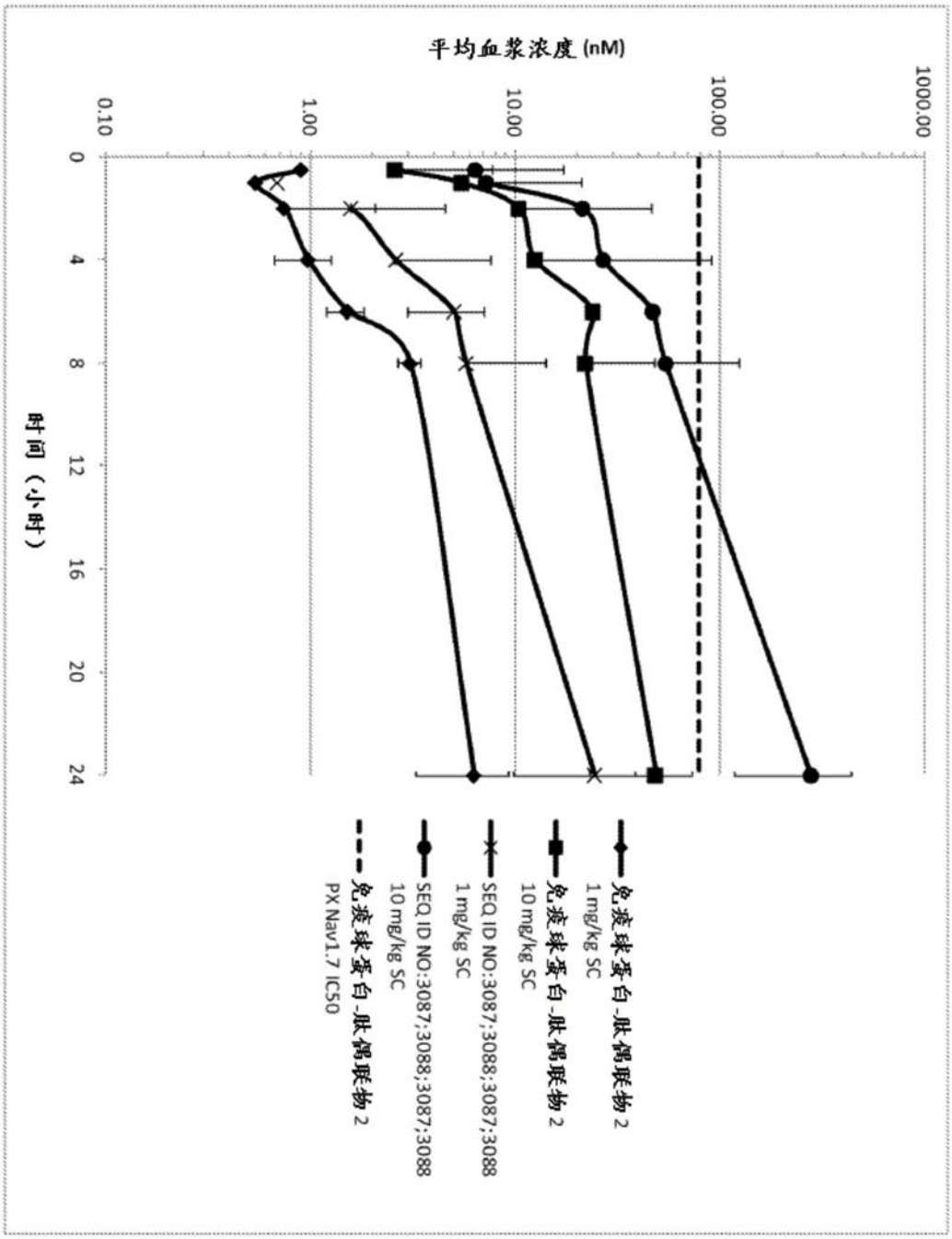

平均血浆浓度 (nM)
1000.00
100.00
10.00
1.00
0.10
0
4
8
12
16
20
24
时间（小时）
兔疫球蛋白-肽偶联物 2
1 mg/kg SC
兔疫球蛋白-肽偶联物 2
10 mg/kg SC
SEQ ID NO:3087;3088;3087;3088
1 mg/kg SC
SEQ ID NO:3087;3088;3087;3088
10 mg/kg SC
兔疫球蛋白-肽偶联物 2
PX Nav1.7 IC50

图 93

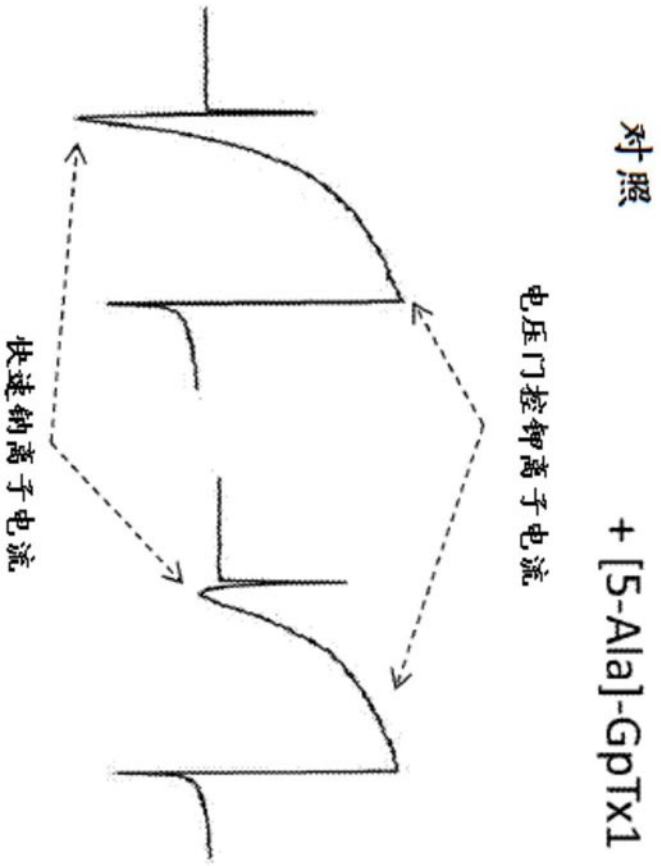


图 94

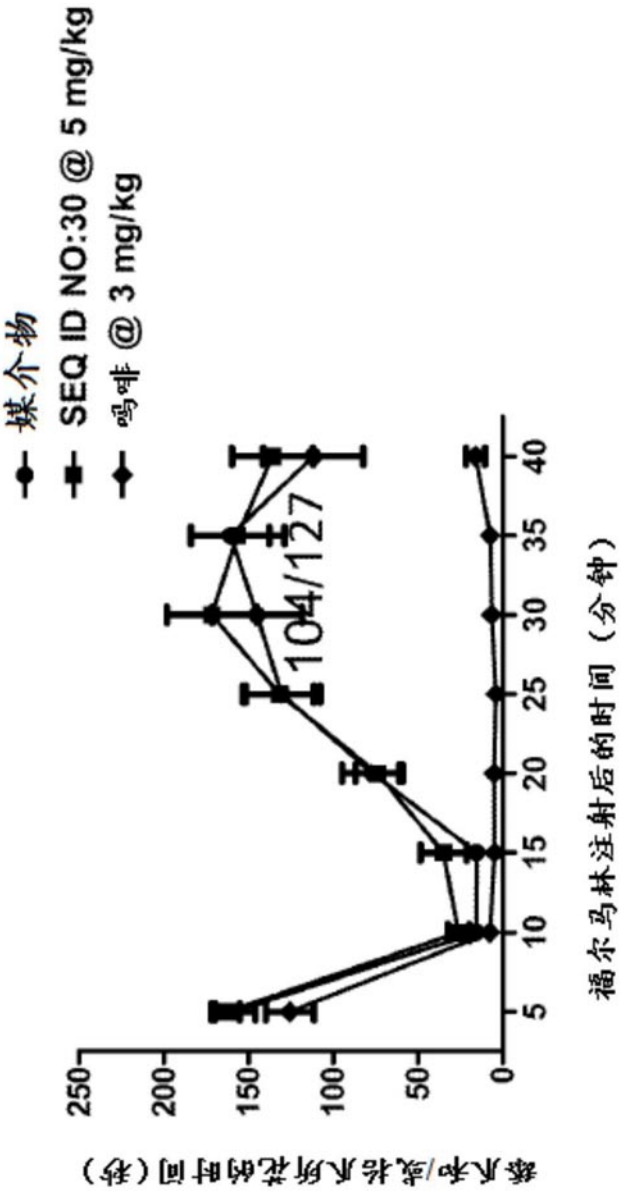

媒介物
SEQ ID NO:30 @ 5 mg/kg
吗啡 @ 3 mg/kg
104/127
250
200
150
100
50
0
5
10
15
20
25
30
35
40
福尔马林注射后的时间（分钟）
舔爪和/或拾爪所花的时间（秒）

图 95

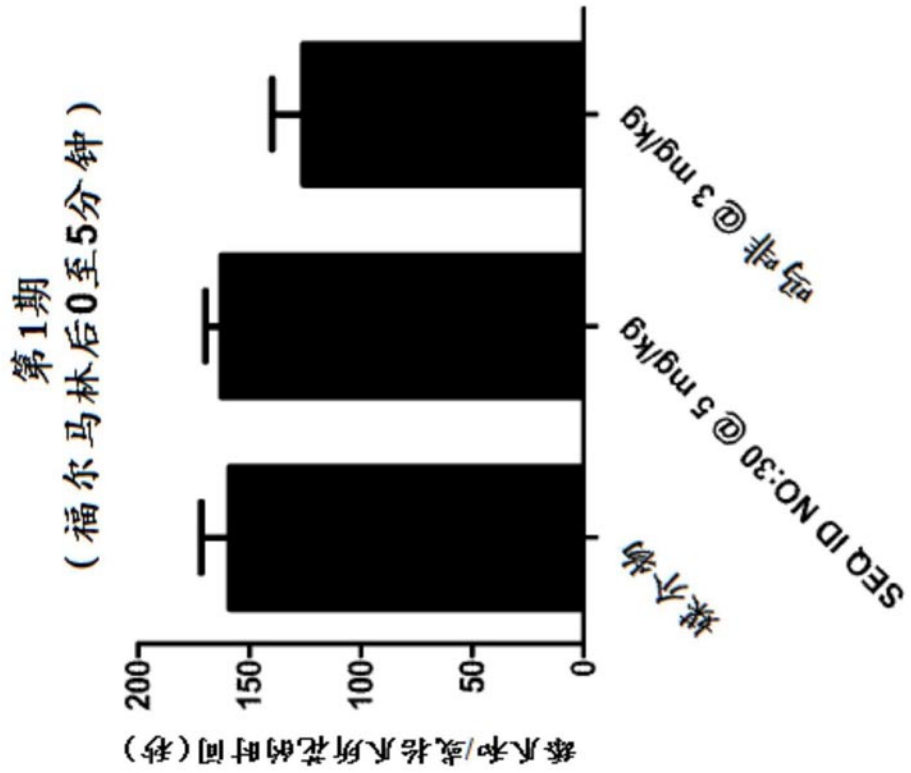

第1期
（福尔马林后0至5分钟）
舔爪和/或抬爪所花的时间（秒）
200
150
100
50
0
媒介物
SEQ ID NO:30 @ 5 mg/kg
吗啡 @ 3 mg/kg

图 96

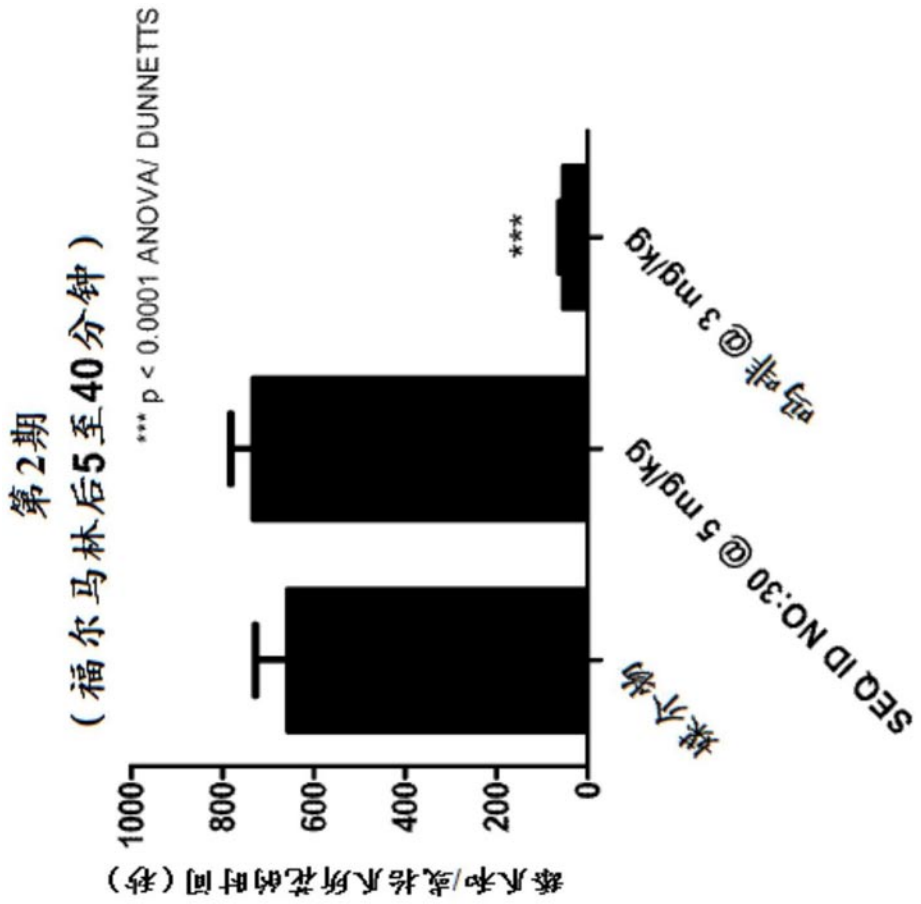

第2期
（福尔马林后5至40分钟）
*** p < 0.0001 ANOVA/ DUNNETTS
舔爪和/或抬爪所花的时间（秒）
1000
800
600
400
200
0
媒介物
SEQ ID NO:30 @ 5 mg/kg
吗啡 @ 3 mg/kg
***

图 97

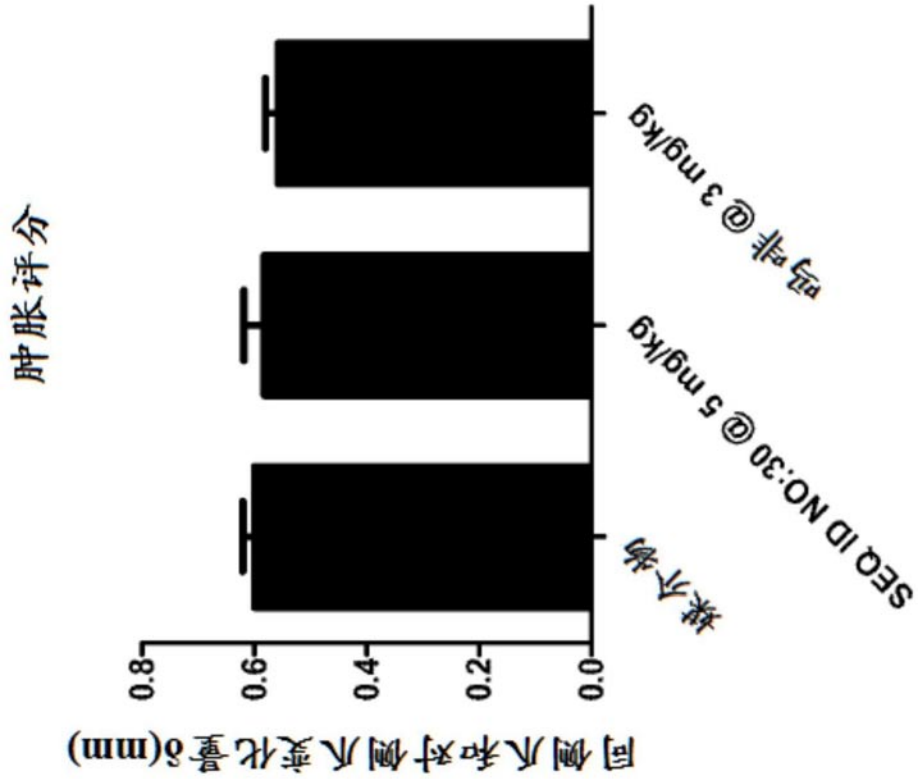

同侧爪和对侧爪变化量δ(mm)
0.0
0.2
0.4
0.6
0.8
媒介物
SEQ ID NO:30 @ 5 mg/kg
吗哌 @ 3 mg/kg
肿胀评分

图 98

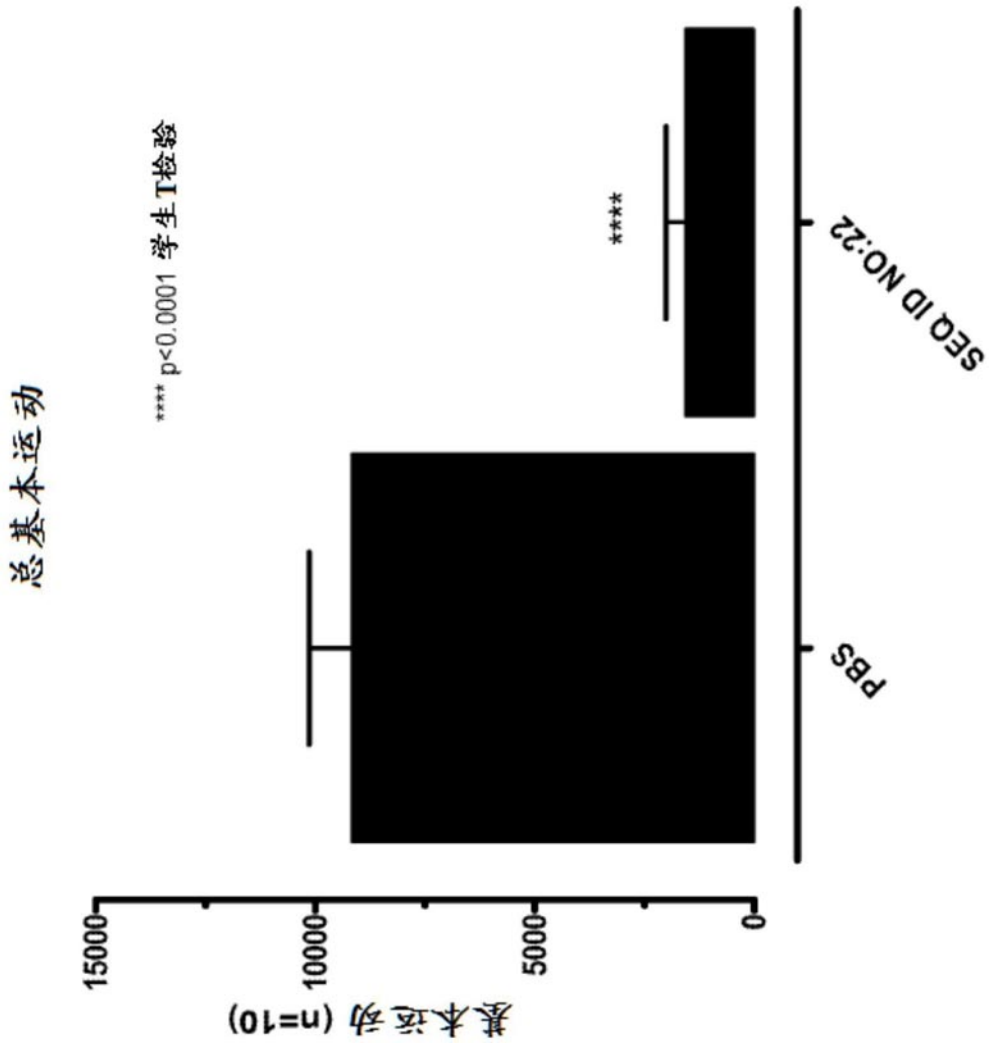

总基本运动
**** p<0.0001 学生T检验
****
SEQ ID NO:22
PBS
基本运动 (n=10)
15000
10000
5000
0

图 99

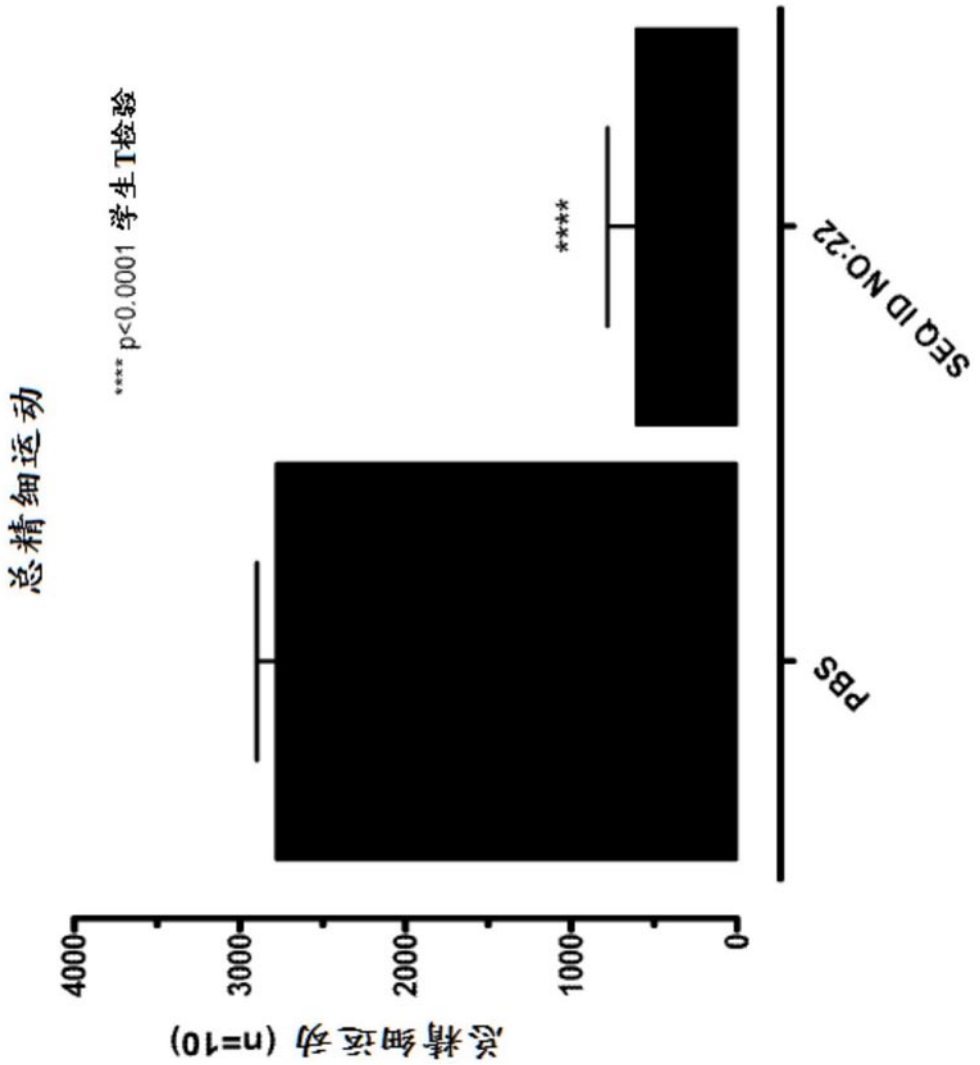

总精细运动
**** p<0.0001 学生T检验
****
SEQ ID NO:22
PBS
4000
3000
2000
1000
0
总精细运动 (n=10)

图 100

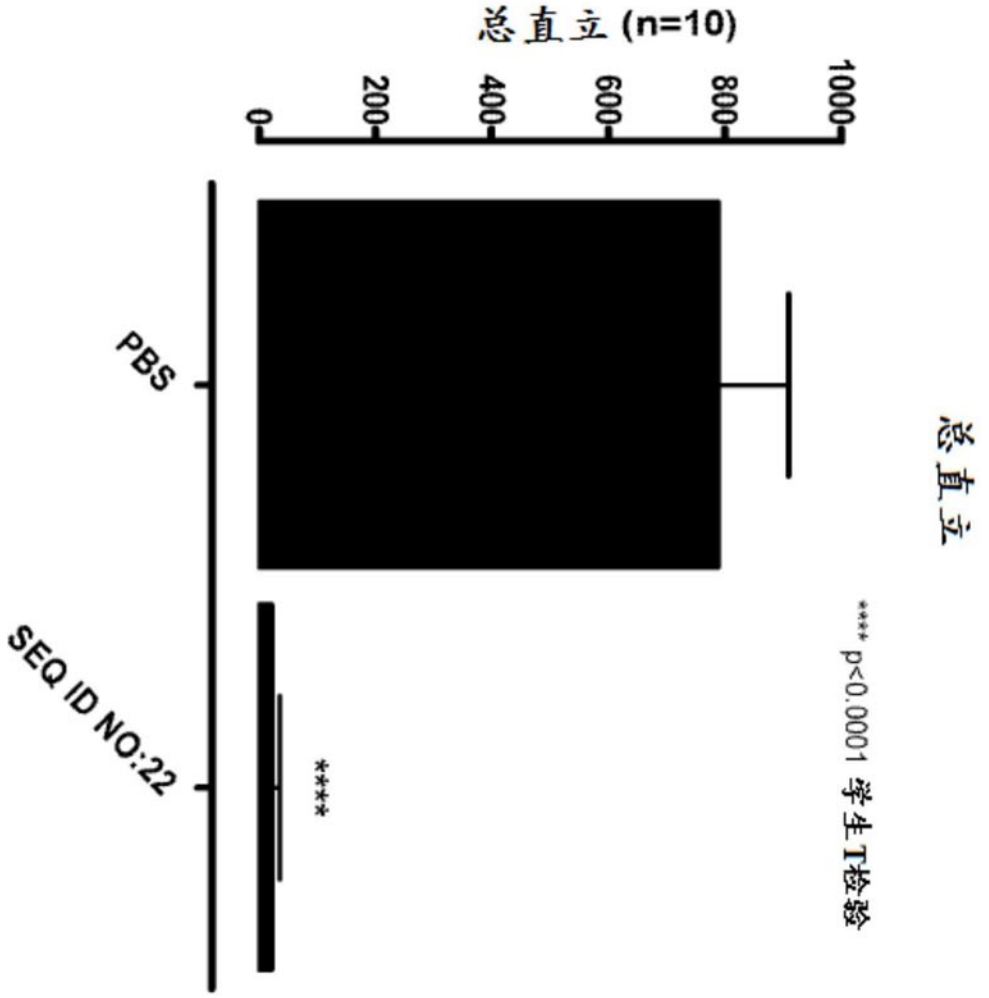


图 101

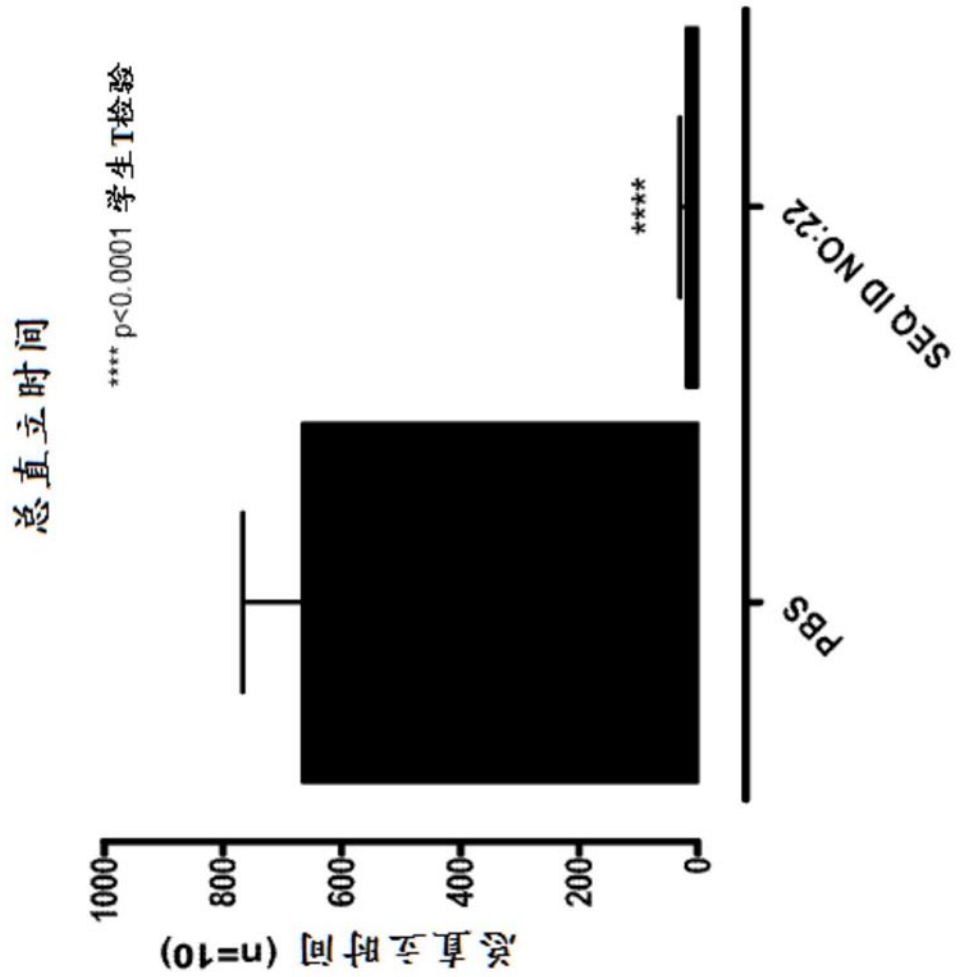

总直立时间
**** p<0.0001 学生T检验
****
SEQ ID NO:22
PBS
总直立时间 (n=10)
1000
800
600
400
200
0

图 102

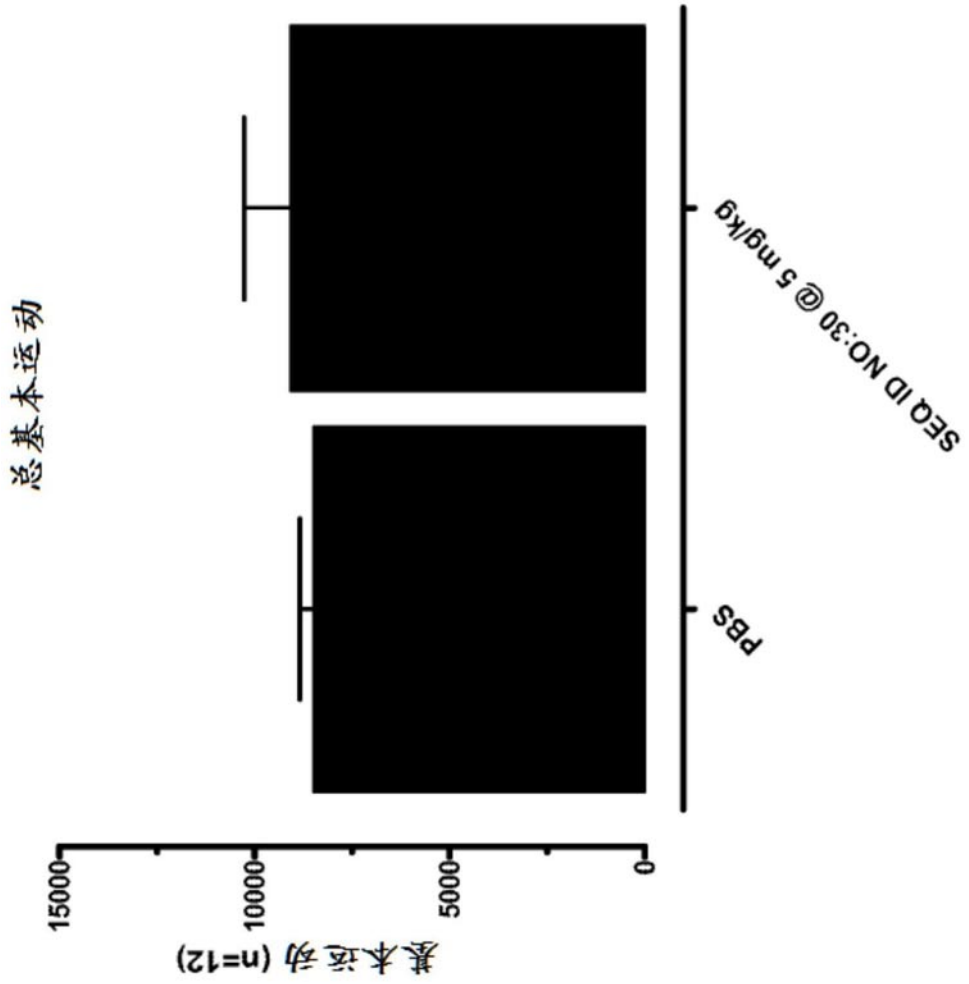


图 103

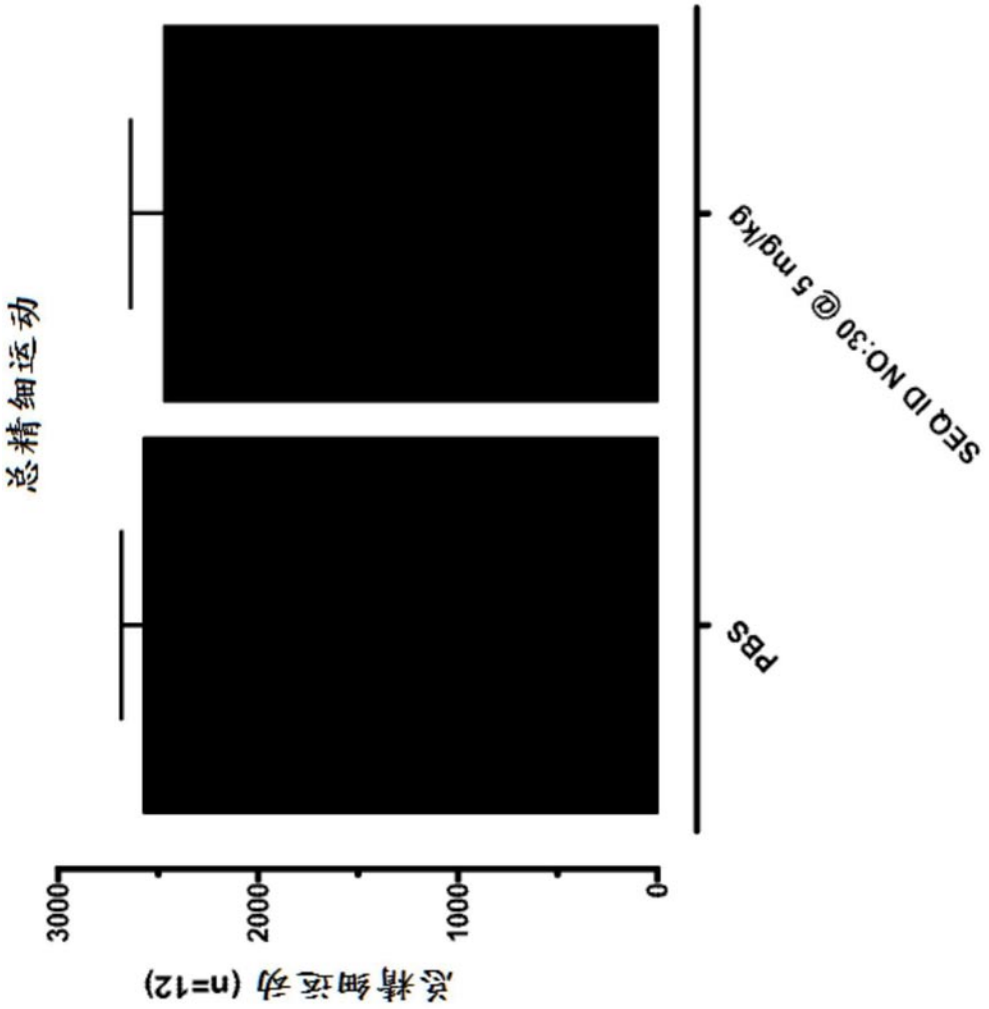


图 104

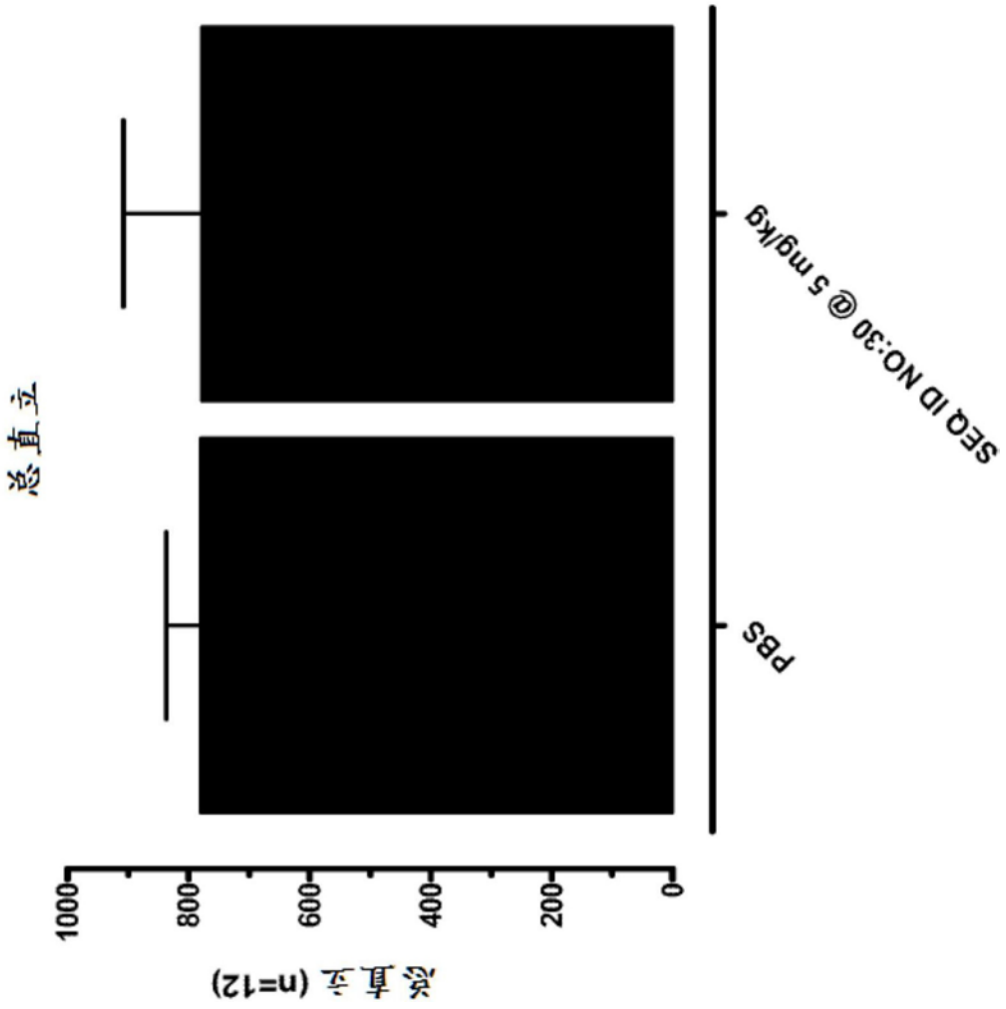


图 105

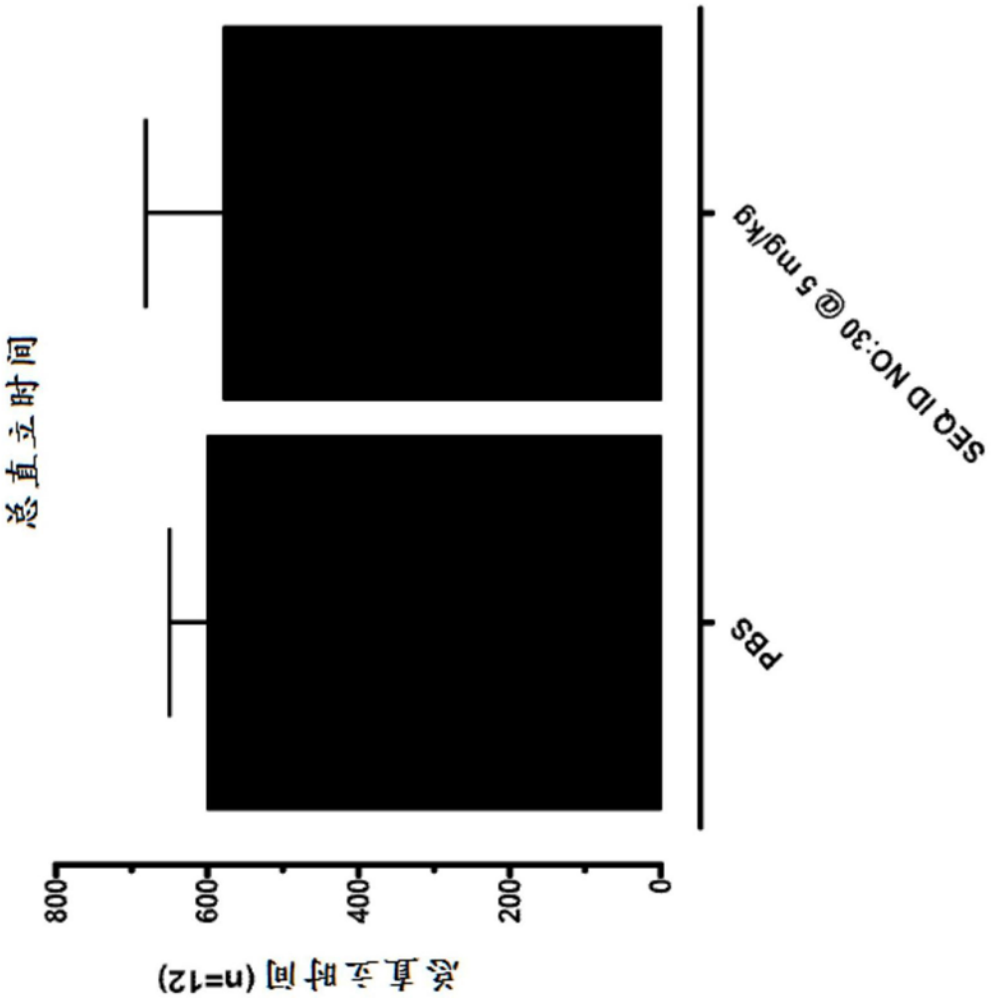


图 106

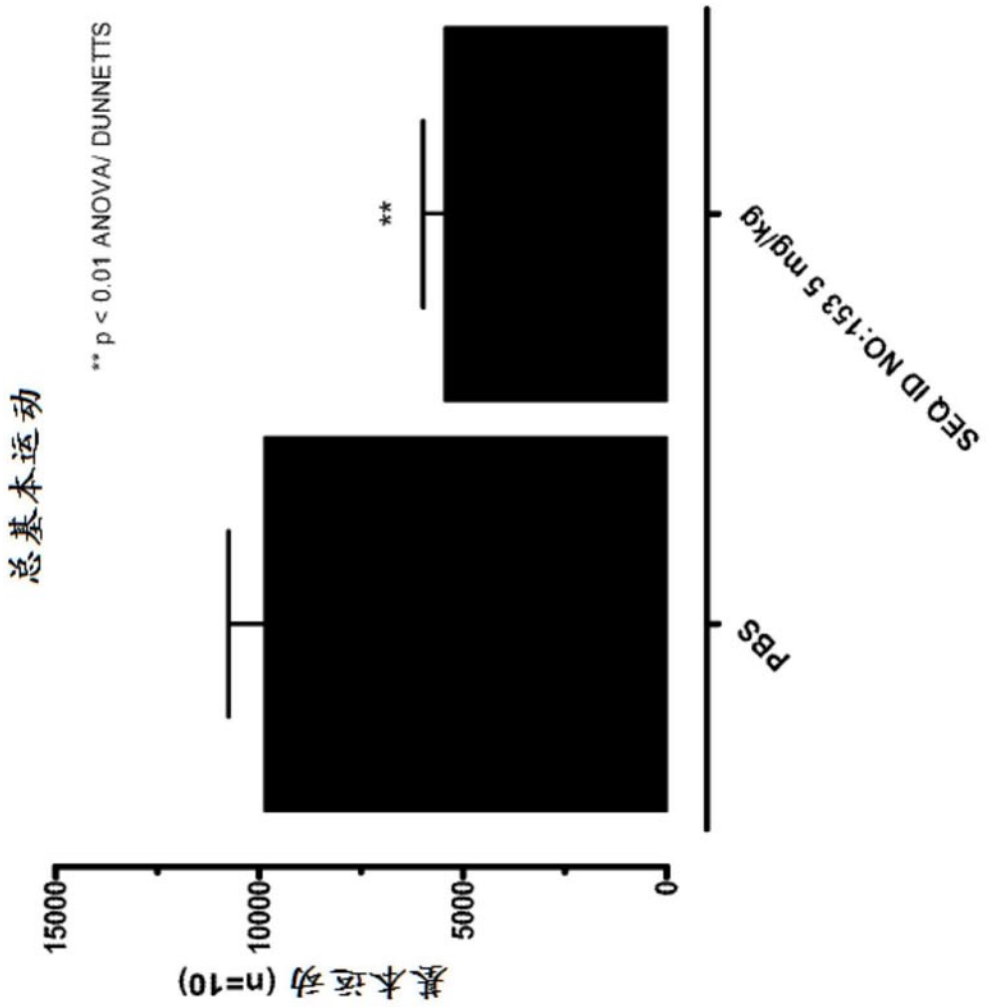

总基本运动
** p < 0.01 ANOVA/ DUNNETTS
**
SEQ ID NO:153 5 mg/kg
PBS
15000
10000
5000
0
基本运动 (n=10)

图 107

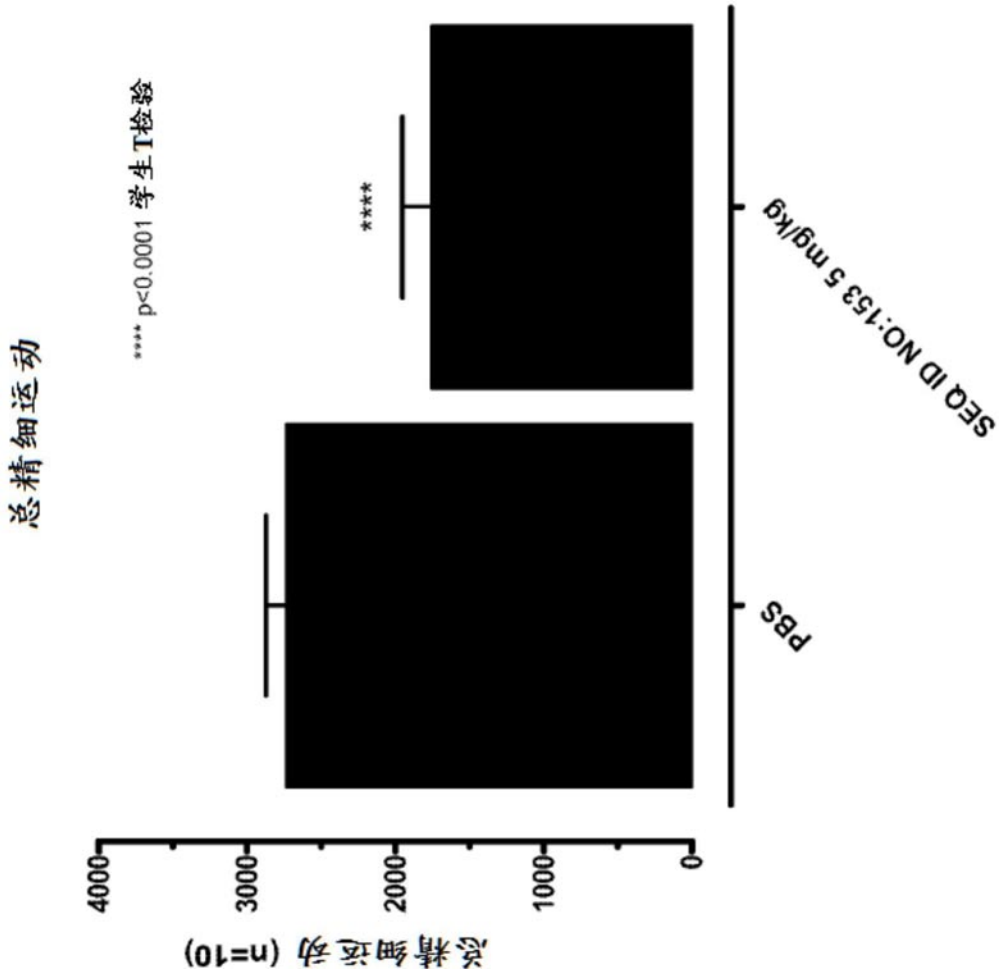

总精细运动
**** p<0.0001 学生T检验
****
SEQ ID NO:153 5 mg/kg
PBS
4000
3000
2000
1000
0
总精细运动 (n=10)

图 108

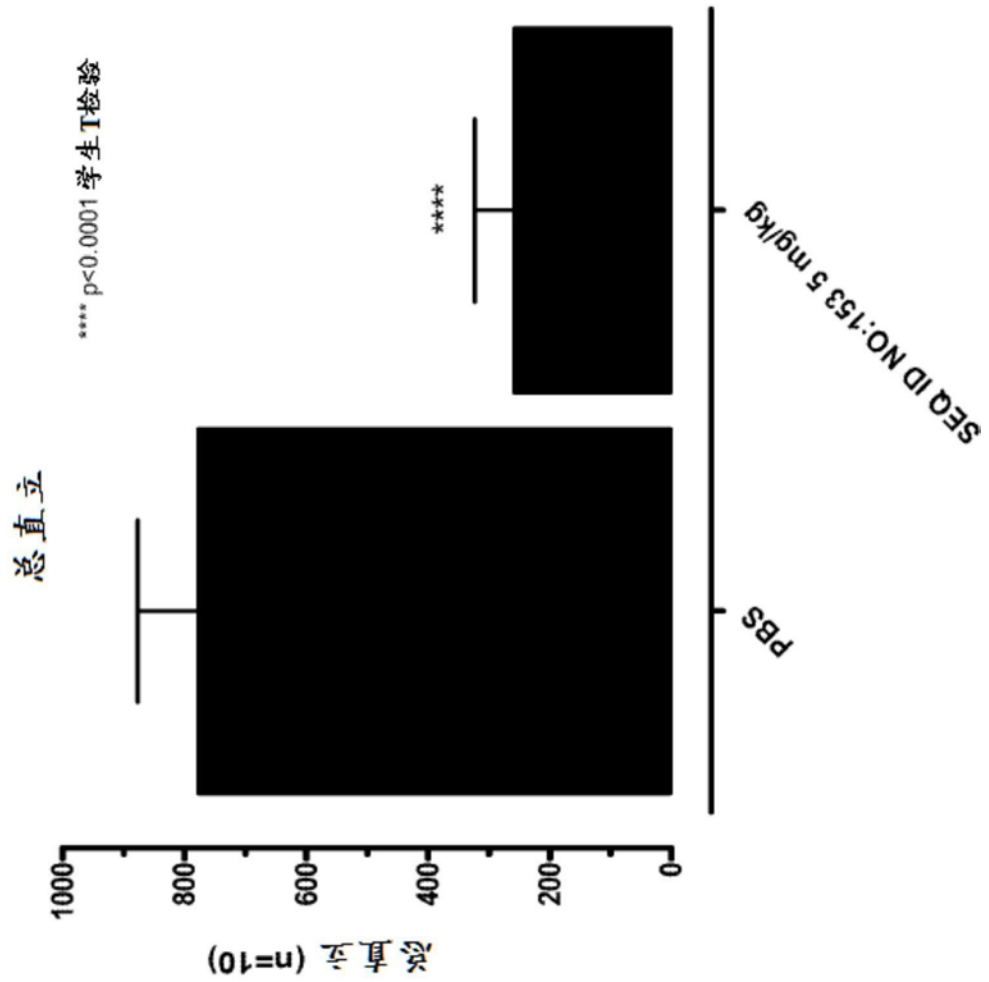

总直立 (n=10)
1000
800
600
400
200
0
PBS
SEQ ID NO:153 5 mg/kg
****
**** p<0.0001 学生T检验
总直立

图 109

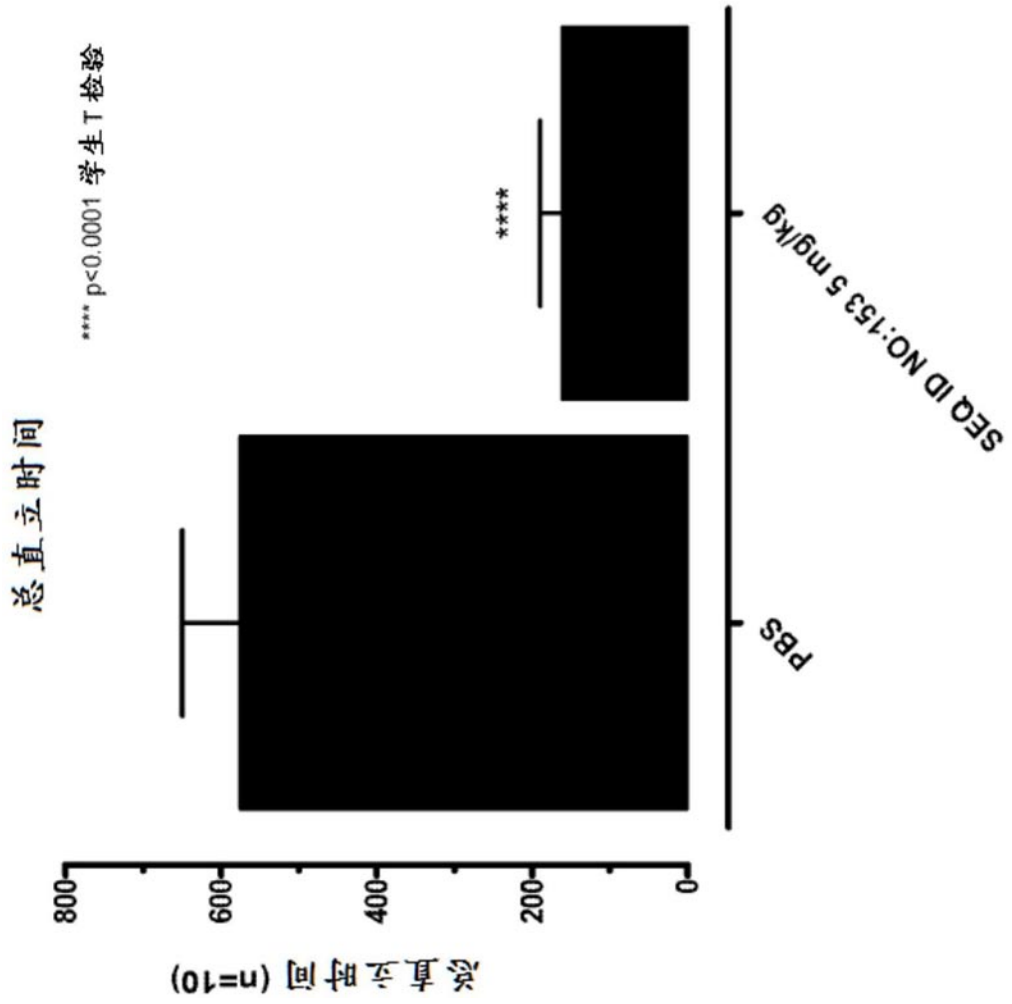

总直立时间 (n=10)
800
600
400
200
0
总直立时间
**** p<0.0001 学生 T 检验
****
SEQ ID NO:153 5 mg/kg
PBS

图 110

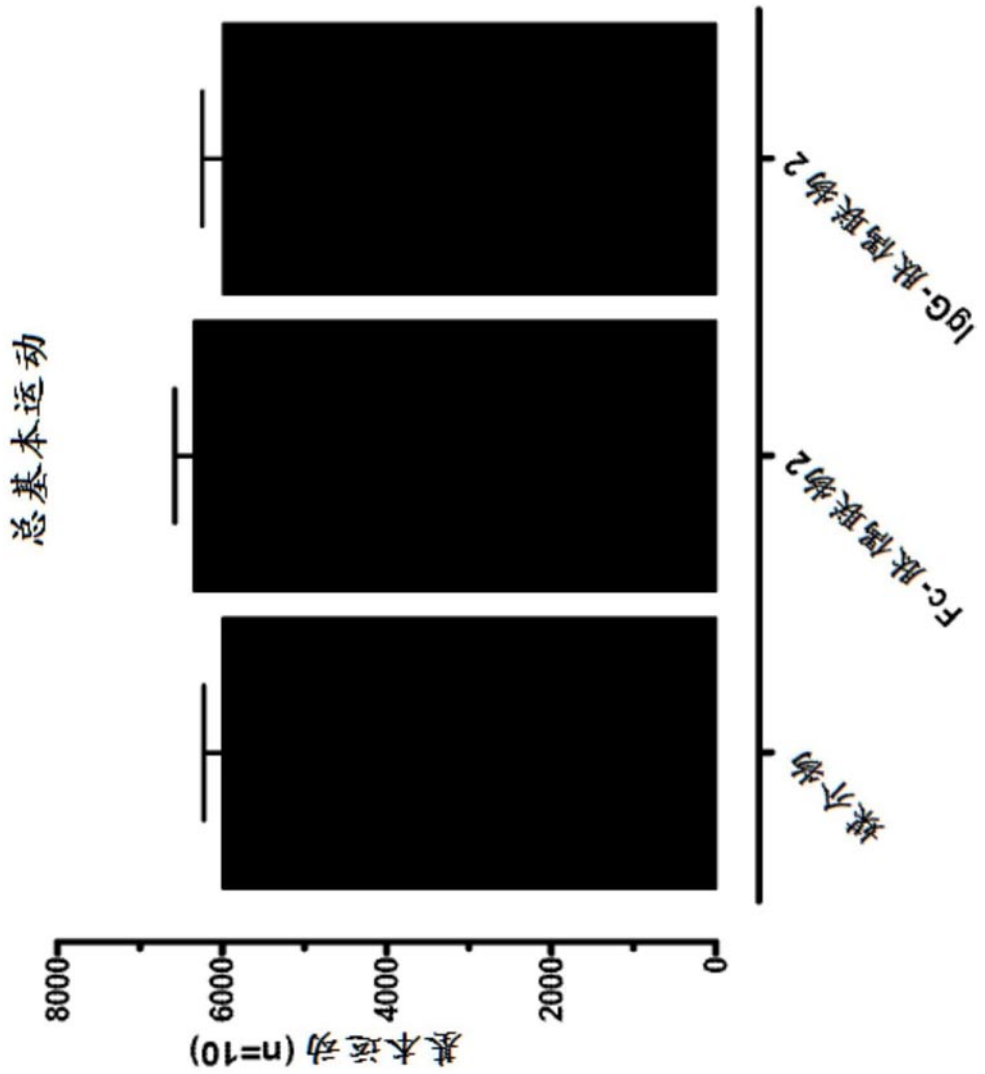


图 111

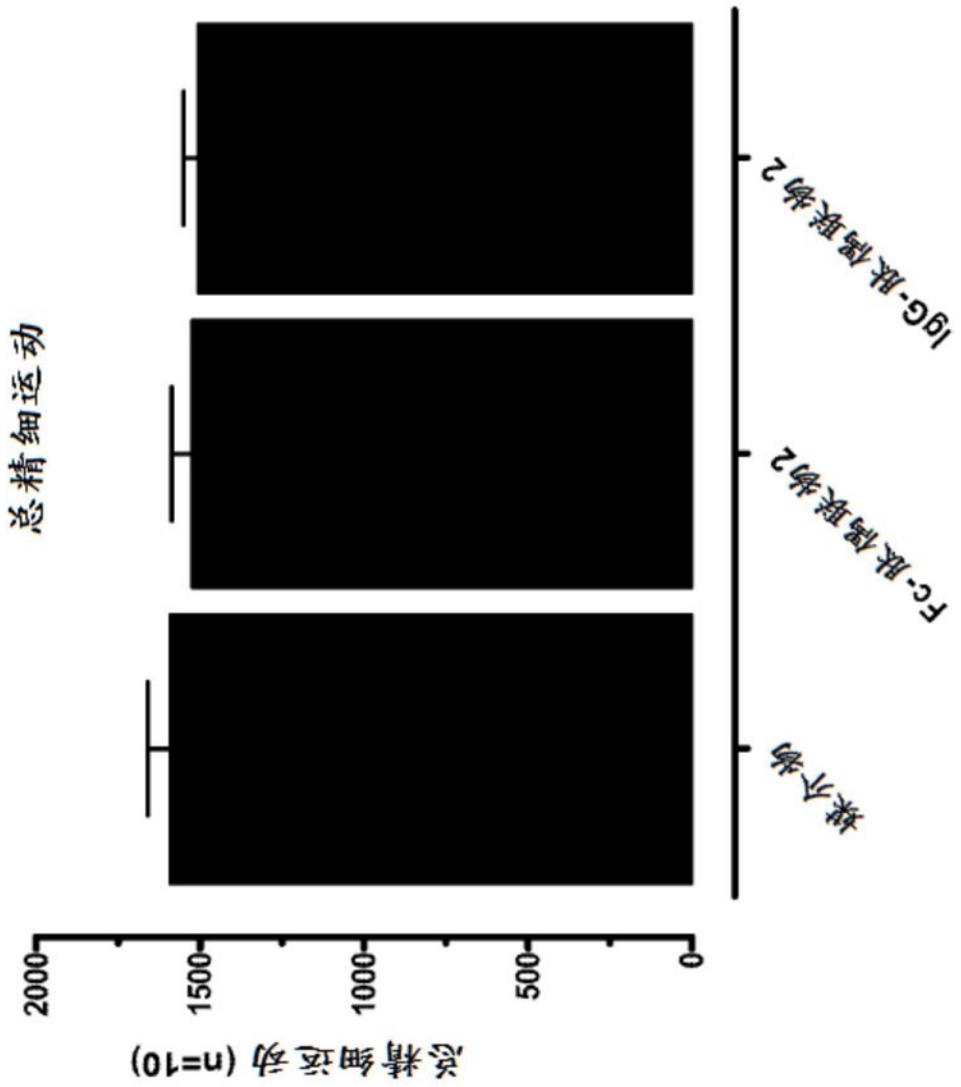


图 112

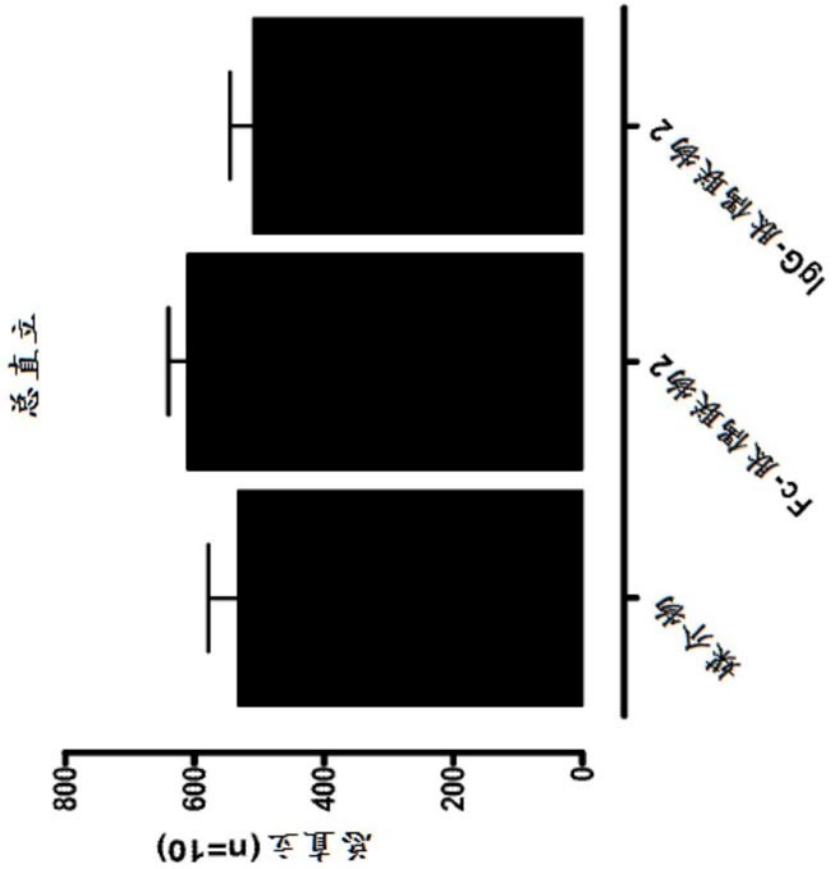


图 113

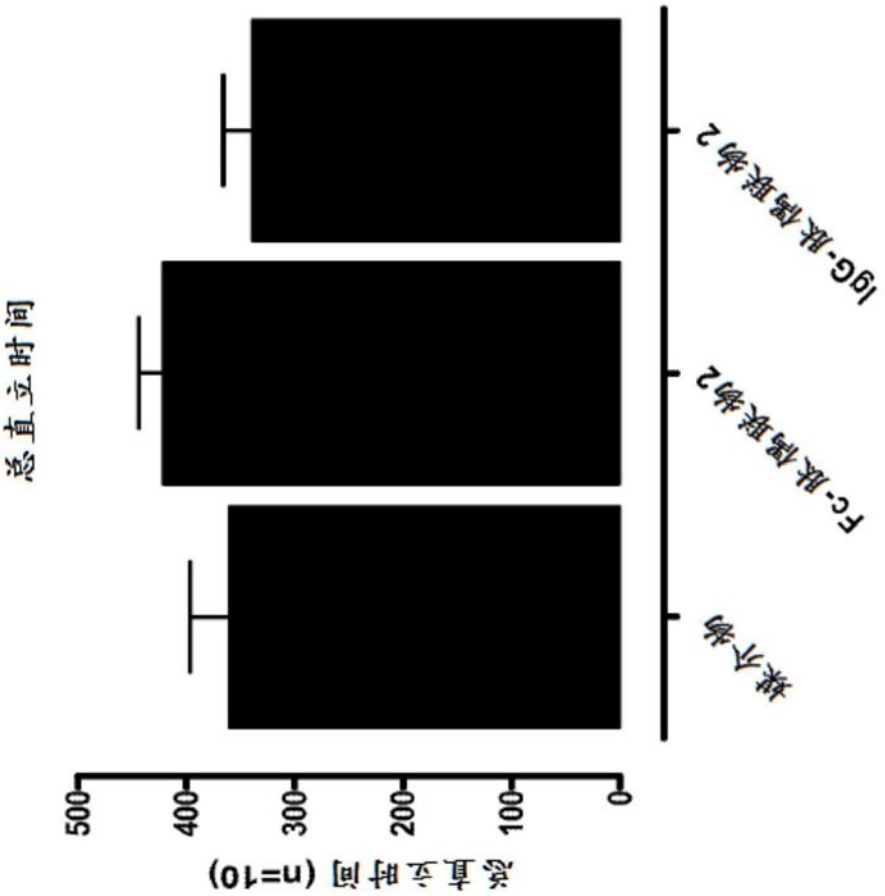


图 114

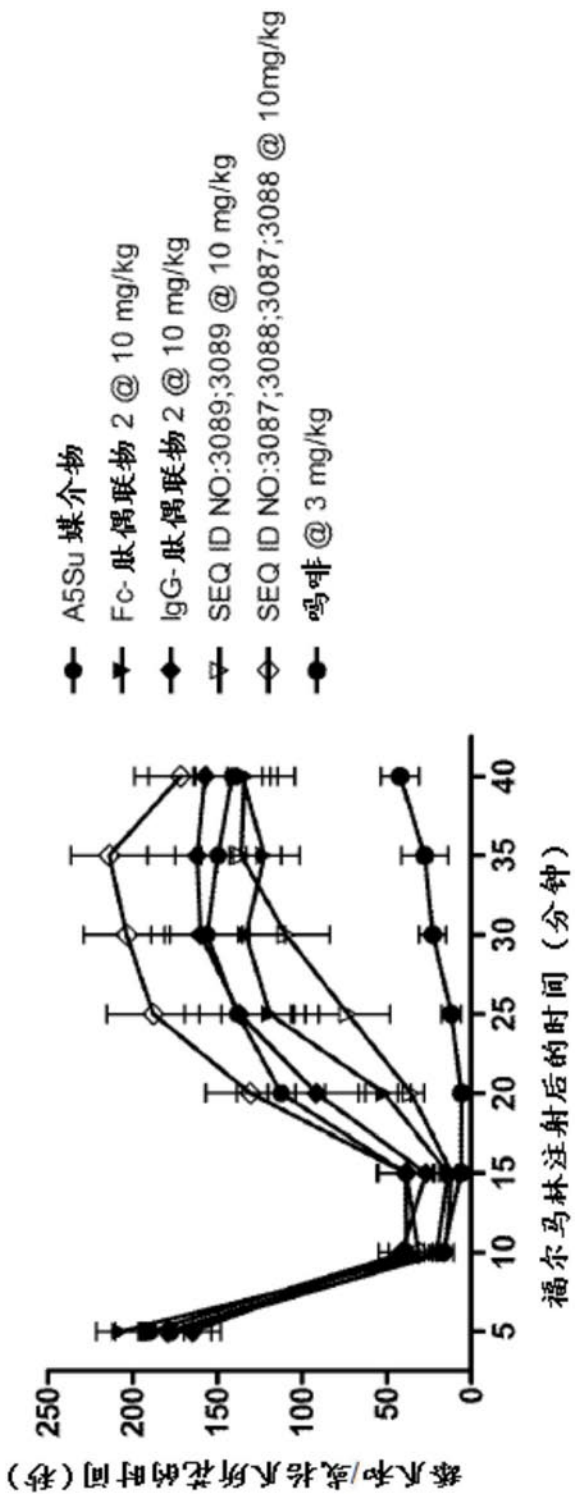

A5Su 媒介物
Fc- 肽偶联物 2 @ 10 mg/kg
IgG- 肽偶联物 2 @ 10 mg/kg
SEQ ID NO:3089;3089 @ 10 mg/kg
SEQ ID NO:3087;3088;3087;3088 @ 10mg/kg
吗啡 @ 3 mg/kg
250
200
150
100
50
0
5
10
15
20
25
30
35
40
福尔马林注射后的时间（分钟）
舔爪和/或拾爪所花的时间（秒）

图 115

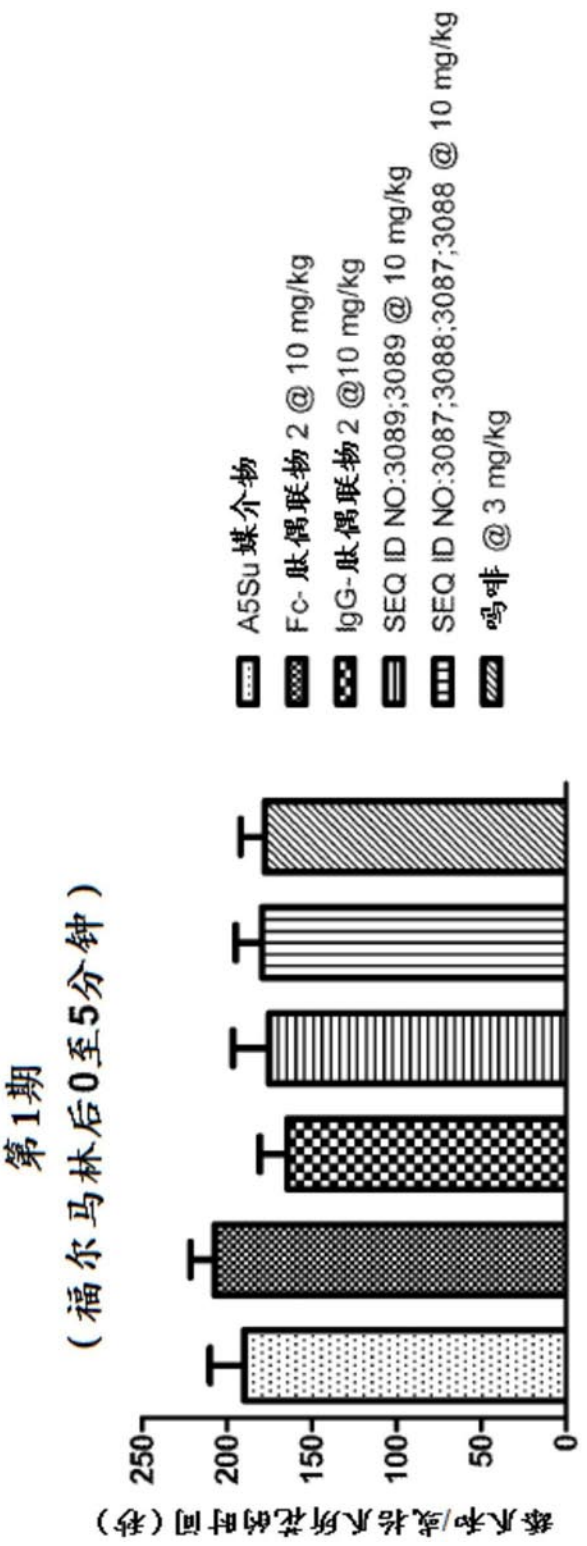

第1期
（福尔马林后0至5分钟）
A5Su 媒介物
Fc- 肽偶联物 2 @ 10 mg/kg
IgG- 肽偶联物 2 @10 mg/kg
SEQ ID NO:3089;3089 @ 10 mg/kg
SEQ ID NO:3087;3088;3087;3088 @ 10 mg/kg
吗啡 @ 3 mg/kg
250
200
150
100
50
0
舔爪和/或拾爪所花的时间（秒）

图 116

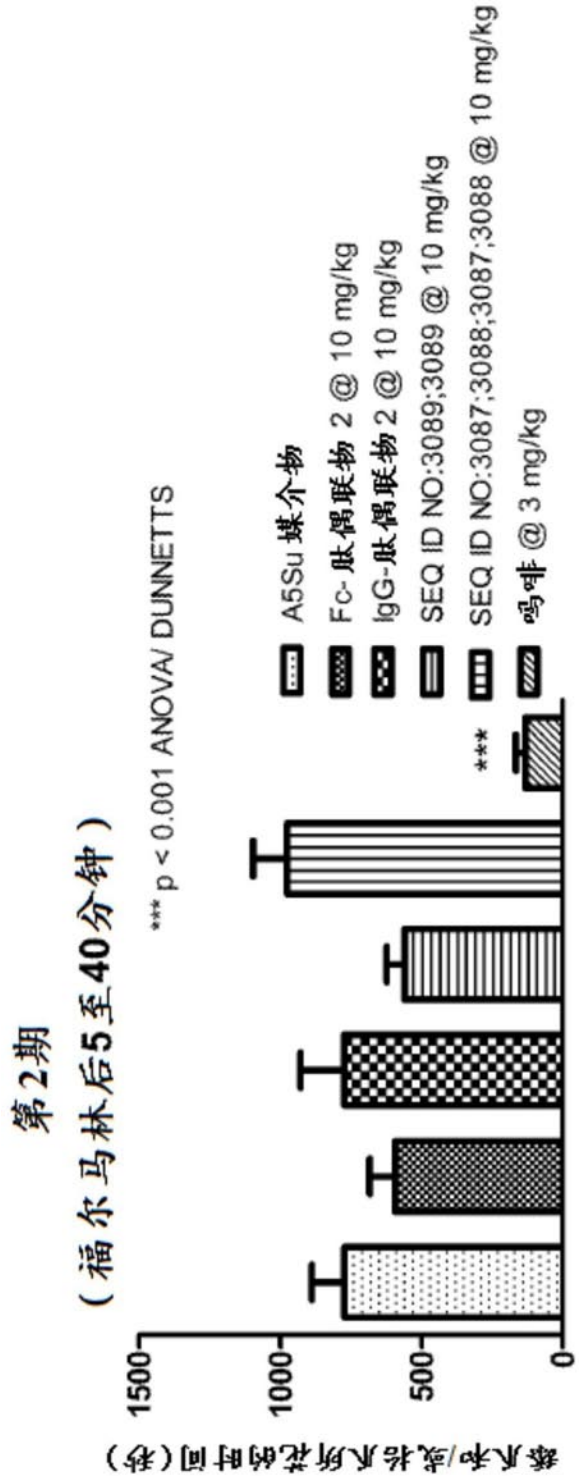

第2期
（福尔马林后5至40分钟）
*** p < 0.001 ANOVA/ DUNNETTS
1500
1000
500
0
A5Su 媒介物
Fc- 肽偶联物 2 @ 10 mg/kg
IgG-肽偶联物 2 @ 10 mg/kg
SEQ ID NO:3089;3089 @ 10 mg/kg
SEQ ID NO:3087;3088;3087;3088 @ 10 mg/kg
吗啡 @ 3 mg/kg
***

图 117