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(54) Title: METHODS FOR DETECTING AND PREDICTING CANCER AND/OR CIN3

(57) Abstract: The present invention relates to assays for predicting the presence, absence or development of cancer in an individual, particularly endometrial and ovarian cancer, by determining the methylation status of certain CpGs in a population of DNA molecules in a sample which has been taken from the individual, deriving an index value based on the methylation status of the certain CpGs, and predicting the presence, absence or development of cancer in the individual based on the cancer index value. The invention further relates to a method of treating and/or prevention of cancer in an individual, particularly endometrial and ovarian cancer, the method comprising assessing the presence, absence or development of cancer in an individual by performing the assays of the invention, followed by administering one or more therapeutic treatments or measures to the individual based on the assessment. The invention further provides a method of monitoring the cancer status of an individual according to changes in the individual's cancer index value over the course of time. The invention further relates to arrays which are suitable for performing the assays of the invention.

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METHODS FOR DETECTING AND PREDICTING CANCER AND/OR CIN3

SEQUENCE LISTING

The instant application contains a Sequence Listing which has been submitted electronically in ASCII format and is hereby incorporated by reference in its entirety. Said ASCII copy, created on June 9, 2021, is named 'Sequence listing as filed 17 June 2021 N417234WO MGW JAS.txt' and is 564,410 bytes in size.

FIELD OF THE INVENTION

The present invention relates to assays for predicting the presence, absence or development of cancer and/or grade 3 cervical intra-epithelial neoplasia (CIN3) in an individual, particularly endometrial, ovarian and cervical cancer, by determining the methylation status of certain CpGs in a population of DNA molecules in a sample which has been taken from the individual, deriving an index value based on the methylation status of the certain CpGs, and predicting the presence, absence or development of cancer in the individual based on the cancer index value. The invention further relates to a method of treating and/or preventing cancer in an individual, particularly endometrial, ovarian and cervical cancer, and CIN3, the method comprising assessing the presence, absence or development of cancer in an individual by performing the assays of the invention, followed by administering one or more therapeutic or preventative treatments or measures to the individual based on the assessment. The invention further provides a method of monitoring the cancer status of an individual according to changes in the individual's cancer index value over the course of time. The invention further relates to arrays which are suitable for performing the assays of the invention.

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Research Council Executive Agency, H2020 BRCA-ERC under Grant Agreement No. 742432 as well as the charity, The Eve Appeal.

BACKGROUND TO THE INVENTION

Endometrial cancer has become the most frequently occurring gynaecological cancer in developed countries. By 2030, it is expected that endometrial cancer will be the third most common cancer affecting women in the US after that of breast and thyroid. Approximately 20% of women with endometrial cancer present with high-risk and/or more advanced disease characteristics with an increased incidence of distant metastases and cancer-related death and hence in addition to surgery require adjuvant chemo- and radiotherapy which are associated with a high morbidity.

Therefore, a tool with which to diagnose earlier and predict specifically high-risk endometrial cancers is urgently required.

Imaging-based screening for endometrial cancers is not efficient. The performance characteristics of endometrial thickness and abnormalities for detection of endometrial cancer within one year of transvaginal ultrasound in a population-based nested case-control study of postmenopausal women showed a sensitivity of only 54.1% and a positive predictive value of 6.1%.

Recent evidence has shown that an assay (called PapSEEK) for mutations in 18 genes as well as an assay for aneuploidy in cervical brush samples is able to identify 81% of women presenting with endometrial cancer. However, in this study, the average age of cases and controls was 62 and 34 years, respectively. The consistent observation of a high allele frequency of pathogenic driver mutations in DNA from non-malignant normal endometrium with increasing age combined with the fact that the cases were almost twice as old as the controls makes it impossible to judge the true specificity of the PapSEEK test.

The inventors, along with other scientists, have shown in the past that DNA methylation in vaginal fluid or cervical smears may be able to identify women with endometrial cancer. All of these studies were relatively small and did not validate the

findings in a large data set. In addition, none of these studies focused specifically on high risk endometrial cancers and, most importantly, none assessed cohort-based samples from women prior to the diagnosis of the disease.

Here, the inventors have developed and validated a DNA methylation signature in samples, particularly cervical smear samples, which is capable of both diagnosing and predicting the risk of developing cancer.

SUMMARY OF THE INVENTION

The current inventors set out to understand whether DNAme (DNA methylation) profiles may be used to detect the presence or absence of cancer, particularly endometrial and ovarian cancer. The inventors also set out to understand whether said DNAme profiles may be associated with the development of cancer, and therefore whether such profiles may be capable of functioning as surrogate markers for individual stratification purposes in connection with cancer.

In this regard the inventors have succeeded in developing assays involving "cancer index values" which are derived from and associated with DNAme profiles established from samples from tissue comprising epithelial cells from a given individual. The sample may particularly be derived from the cervix, the vagina, the buccal area, blood and/or urine. The sample is preferably a cervical liquid-based cytology sample, and more preferably a cervical smear sample. Subsequent DNAme profiles from a given individual, and which values can be used to stratify the individual in connection with cancer and/or CIN3 status. A preferred sample for use in any of the assays described and defined herein is a cervical liquid-based cytology sample. A particularly preferred sample for use in any of the assays described and defined herein is a cervical smear sample.

Accordingly, in contrast to prior art assays, the inventors have surprisingly determined that it is possible to derive "cancer index values" derived from and associated with DNAme profiles established from samples, wherein the samples are free of tumor-derived DNA. Thus the tissue(s) from which DNAme profiles of the present assays are established may act to provide surrogate markers for the presence, absence or development of cancer, wherein tumor cells, if present, or cells at risk of transforming into tumor cells, are located at an anatomical site distinct from the site from which the sample was taken.

The cancer index value is determined from data relating to the methylation status of one or more CpGs in a panel of CpGs as further defined and described herein. CpGs of the panel are methylation sites in DNA from cells derived from/obtained from

samples comprising epithelial cells. The sample may particularly be derived from the cervix, the vagina, the buccal area, blood and/or urine. The sample is preferably a cervical liquid-based cytology sample, and more preferably a cervical smear sample.

For the purposes of the present invention, the cancer index value may be used interchangeably herein with "WID-EC-Index", "WID-Index", "cancer index", "index" or "index value" (WID = women's risk identification). Furthermore, any reference to a cancer index value in the context of the present invention, may be equally used for the assessment of the presence, absence or development of endometrial cancer and/or ovarian cancer in an individual.

Based on studies with patients known to be free of endometrial cancer, the inventors have established cancer index values, using specific panels of CpGs, which have been determined to be associated with/characteristic of endometrial tissue which is negative for endometrial cancer, i.e. normal endometrial tissue which is free of endometrial cancer. Based on studies with patients known to possess endometrial cancer, the inventors have established cancer index values which have been determined to be associated with/characteristic of endometrial tissue which is positive for endometrial cancer.

The inventors have further established that the same specific panels of CpGs that associate with endometrial tissue which is negative or positive for endometrial cancer may likewise be associated with ovarian tissue that is negative or positive for ovarian cancer and/or cervical tissue that is negative or positive for CIN3. Based on studies with patients known to be free of ovarian cancer and/or CIN3, the inventors have established cancer index values, using specific panels of CpGs, which have been determined to be associated with/characteristic of ovarian tissue which is negative for ovarian cancer, i.e. normal ovarian tissue which is free of ovarian cancer, and/or of cervical tissue which is negative for CIN3. Based on studies with patients known to possess ovarian cancer and/or CIN3, the inventors have established cancer index values which have been determined to be associated with/characteristic of ovarian tissue which is positive for ovarian cancer and or cervical tissue which is positive for CIN3.

Thus, the inventors have been able to establish cancer index values, using specific panels of CpGs, which can characterize an individual as having cancer and/or CIN3 or not having cancer and/or CIN3, or having a high risk of cancer and/or CIN3 development.

By determining the methylation profile-based cancer index value from a sample derived from the individual, the individual may be seen to possess a cancer index value which correlates with those possessed by individuals which are known, via the inventor's studies described herein, to be cancer positive or negative. Such correlations have been determined with a high degree of statistical accuracy, particularly with respect to parameters relevant to biological assays such as receiver operating characteristics (ROC) sensitivity and specificity, as well as area under the curve (AUC). Accordingly, by determining the cancer index value from a sample from a given individual, the individual may be determined to possess endometrial and/or ovarian tissue which is positive for cancer, i.e. the individual is diagnosed as having endometrial and/or ovarian cancer and/or CIN3, most preferably endometrial cancer. Conversely, by determining the cancer index value from a sample from a given individual, the individual may be determined to possess endometrial and/or ovarian tissue which is negative for cancer, i.e. the individual is diagnosed as not having endometrial and/or ovarian cancer, most preferably endometrial cancer.

Assessing the development of cancer in accordance with the assays of the invention may refer to assessing an increased or decreased likelihood of cancer development. Assessing of the development of cancer in accordance with the assays of the invention may refer to assessing progression or worsening of a pre-existing cancer lesion in an individual. Assessment of the development of cancer in accordance with the assays of the invention may refer to predicting the likelihood of recurrence of cancer.

The observation that the cancer index value discussed herein correlates with the stage and severity of cancer in women indicates that the cancer index value can act as a surrogate marker for indicating the severity of cancer in an individual. These observations from the current inventors further establish that the cancer index value, as

further described and defined herein, is dynamic and can change according to, at least, the stage and severity of the cancer. The cancer index value may therefore be used to monitor an individual's cancer status and risk of cancer development. Moreover, the cancer index value may be used to monitor the efficacy of cancer treatments being administered to an individual, including therapeutic treatments and preventative treatments.

Accordingly, in the context of the present invention, by determining the cancer index value from a sample from a given individual it is possible to assess the presence, absence or development of cancer in an individual, or in other words to stratify the individual for cancer. In the context of the present invention, stratification for cancer is the process of categorizing the individual as being a member of a group of individuals who possess a phenotype in connection with cancer, including the presence or absence of cancer in the individual, or the development of cancer, i.e. by having epithelial cells, particularly derived from the cervix, the vagina, the buccal area, blood and/or urine which is more characteristic of endometrial or ovarian tissue which is cancer positive than endometrial or ovarian tissue which is cancer negative, or which is more characteristic of cervical tissue which is CIN3 positive than cervical tissue which is CIN3 negative. The sample is preferably a cervical liquid-based cytology sample, and more preferably a cervical smear sample.

As explained herein, the assays methods of the invention are based on a cancer index value derived from a methylation profile from DNA originating from samples comprising epithelial cells. The sample may particularly be derived from the cervix, the vagina, the buccal area, blood and/or urine. The sample is preferably a cervical liquid-based cytology sample, and more preferably a cervical smear sample. Accordingly, the assays provide means for correlating samples derived from the cervix, the vagina, the buccal area, blood and/or urine-derived DNA methylation profile with a status connected with endometrial or ovarian cancer ranging from the individual being cancer negative, to the individual being cancer positive, or with cervical tissue ranging from the individual being CIN3 positive to CIN3 negative, with high statistical accuracy. Because the assays of the invention provide a correlation between the methylation

profile and the disease status, the skilled person will appreciate that as part of the stratification process and outcome, disease status is assigned on the basis of a likelihood. As such, the methods of the invention provide assays which are predictive of an individual's status with respect to cancer. The assays of the invention accordingly provide means for predicting the presence or absence of cancer and/or CIN3 in an individual. The assays of the invention accordingly also provide means for predicting the development of cancer and or CIN3 in an individual. The assays of the invention can provide means for predicting the development of cancer in an individual since the inventors have demonstrated that specific cancer index values can define endometrial and ovarian tissue which is cancer negative, whilst others can define endometrial and ovarian tissue which is cancer positive, and since the specific cancer index values may be dynamic and thereby increased in association with known risk factors associated with endometrial and ovarian cancer, in addition to CIN3 status, the values may be subject to change along a scale of cancer and/or CIN3 risk.

Whilst disease status may be assigned on the basis of a likelihood, the inventors have demonstrated herein that correlations between DNA methylation profile and cancer status using cancer index values can be achieved with a very high degree of statistical accuracy using parameters relevant to biological assays, as described further herein. As such, the assays of the invention provide means for predicting the presence or absence of cancer and/or CIN3 in an individual and for predicting the development of cancer in an individual, and for stratifying an individual for cancer, and wherein the prediction/stratification can be defined to be statistically highly reliable and robust. This in turn means that the prediction/stratification can be made with a high level of confidence. The assays of the invention can be defined to be statistically accurate by means known in the art, as further described and defined herein. The assays of the invention can be defined according to parameters relating to their statistical specificity and sensitivity. These parameters define the likelihood of false positive and false negative test results. The lower the proportion of false positive and false negative test results the more statistically accurate the assay becomes. In this regard the inventors have established CpG panels, as described and defined further herein, wherein the

methylation status of CpGs in the panel can be used to establish cancer index values such that the assays produce statistically accurate predictions of cancer status. Accordingly, the inventors have determined that the assays described herein may be defined according to statistical parameters such as percentage specificity and sensitivity and also by receiver operating characteristics (ROC) area under the curve (AUC). All such means are known in the art and are known to be defined measures of statistical accuracy for biological assays such as those described and defined herein.

Thus the methods of the invention provide assays which can be used, with a high degree of statistical accuracy, to predict the presence, absence or development of cancer. The methods of the invention provide assays which can be used, with a high degree of statistical accuracy, to stratify an individual with respect to cancer status. Accordingly, the methods of the invention provide useful information to individuals and their physicians concerning patient cancer status. This information may help inform actual therapeutic treatment measures if the presence of cancer is identified in the individual. The information may help to monitor the progress of therapeutic treatment measures in the individual by monitoring changes in the cancer index value over the course of a period of time. The information may help to monitor the progress of prophylactic or preventative treatment measures in the individual by monitoring changes in the cancer index value over the course of a period of time. As such the methods of the invention offer significant advantages in the personalized prevention and early detection as well as treatment and management of cancer in individuals.

Accordingly, the invention provides an assay for assessing the presence, absence or development of cancer and/or grade 3 cervical intra-epithelial neoplasia (CIN3) in an individual, the assay comprising:

1. providing a sample which has been taken from the individual, the sample comprising a population of DNA molecules;
2. determining in the population of DNA molecules in the sample the methylation status of a panel of:

i. one or more CpGs selected from a panel of CpGs identified in SEQ ID NOs 1 to 500 wherein the CpGs are identified at nucleotide positions 61 to 62; and/or

ii. one or more CpGs selected from within a panel of one or more Differentially Methylated Regions (DMRs) defined by SEQ ID NOs 501 to 808, wherein the CpGs are denoted by CG;

3. deriving a cancer index value based on the methylation status of the one or more CpGs in the panel; and

4. assessing the presence, absence or development of cancer and/or CIN3 in the individual based on the cancer index value;

wherein the assay is characterised as having an area under the curve (AUC) of 0.60 or more as determined by receiver operating characteristics (ROC).

The assay of the invention may be performed above and additionally wherein the panel of one or more CpGs comprises at least 50 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.90.

The assay of the invention may be performed above and additionally wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, preferably wherein the assay is characterised as having an AUC of at least 0.95.

The assay of the invention may be performed above and additionally wherein the panel of one or more CpGs comprises at least 100 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.93.

The assay of the invention may be performed above and additionally wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62, preferably wherein the assay is characterised as having an AUC of at least 0.96.

The assay of the invention may be performed above and additionally wherein the panel of one or more CpGs comprises at least 150 CpGs selected from the CpGs

identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.93.

The assay of the invention may be performed above and additionally the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 150 and identified at nucleotide positions 61 to 62, preferably wherein the assay is characterised as having an AUC of at least 0.96.

The assay of the invention may be performed above and additionally wherein the panel of one or more CpGs comprises at least 200 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.93.

The assay of the invention may be performed above and additionally wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 200 and identified at nucleotide positions 61 to 62, preferably wherein the assay is characterised as having an AUC of at least 0.96.

The assay of the invention may be performed above and additionally wherein the panel of one or more CpGs comprises at least the 500 CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and further wherein the assay is characterised as having an AUC of at least 0.97.

The assay of the invention may be performed above and additionally wherein the step of determining in the population of DNA molecules in the sample the methylation status of the one or more CpGs in the panel comprises determining a β value of each CpG.

The assay of the invention may be performed above and additionally wherein the step of deriving the cancer index value based on the methylation status of the one or more CpGs in the panel comprises:

1. providing a methylation β-value data set comprising the methylation β-values for each CpG in the panel;
2. providing a mathematical model capable of generating the cancer index from the methylation β-value data set; and

3. applying the mathematical model to the methylation β-value data set, thereby generating the cancer index.

The assay of the invention may be performed above and additionally wherein the cancer index value is a WID-EC-Index cancer index value , and wherein the mathematical model which is applied to the methylation β-value data set to generate the cancer index is an algorithm according to the following formula:

$$WID - EC - index = \sum_{i=1}^{n} \frac{w_i \beta_i - \mu}{\sigma}$$

wherein:

1. $\beta_1, \ldots, \beta_n$ are methylation beta-values (between 0 and 1);
2. $w_1, \ldots, w_{500}$ are real valued coefficients;
3. μ and σ are real valued parameters used to scale the index; and
4. n refers to the number of CpGs in the panel of one or more CpGs;

preferably wherein the cancer is endometrial cancer.

The assay of the invention may be performed above and additionally wherein when the cancer index value for the individual is about -0.201 or more, the individual is assessed as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, or wherein when the cancer index value for the individual is less than about -0.201, the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, preferably wherein:

1. the panel of one or more CpGs comprises at least 50 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 88% and the specificity is at least 76%;
2. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 90% and specificity is at least 80%;
3. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62,

and wherein the sensitivity is at least 92% and specificity is at least 79%; or

4. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 150 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 93% and specificity is at least 80%;

preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, more preferably wherein the cancer is endometrial cancer.

The assay of the invention may be performed above and additionally wherein when the cancer index value for the individual is about 0.269 or more, the individual is assessed as having cancer and/or CIN3, or as having a high risk of cancer and/or CIN3 development, or wherein when the cancer index value for the individual is less than about 0.269, the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, preferably wherein:

1. the panel of one or more CpGs comprises at least 50 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 75% and the specificity is at least 94%;
2. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 73% and specificity is at least 98%;
3. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 75% and specificity is at least 98%; or
4. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 150 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 79% and specificity is at least 97%;

preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, more preferably wherein the cancer is endometrial cancer.

The assay of the invention may be performed above and additionally wherein when the cancer index value for the individual is about 1.072 or more, the individual is assessed as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, or wherein when the cancer index value for the individual is less than about 1.072, the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, preferably wherein:

1. the panel of one or more CpGs comprises at least 50 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 58% and the specificity is at least 99%;
2. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 60% and specificity is 100%;
3. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 63% and specificity is 100%; or
4. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 150 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 64% and specificity is 100%;

preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, more preferably wherein the cancer is endometrial cancer.

The assay of the invention may be performed above and additionally wherein when the cancer index value for the individual is:

1. less than about -0.660 the individual is assessed as not having cancer and/or CIN3;
2. about -0.660 or more and less than about -0.430 the individual is assessed as having a low risk of cancer and/or CIN3 development;
3. about -0.430 or more and less than about -0.230 the individual is assessed as having a moderate risk of cancer and/or CIN3 development; or

4. about -0.230 or more the individual is assessed as having a high risk of cancer and/or CIN3 development;

preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, more preferably wherein the cancer is endometrial cancer.

The assay of the invention may be performed above and additionally wherein the step of determining the methylation status of a panel of one or more CpGs comprises determining the methylation status of one or more CpGs denoted by CG identified in a panel of one or more DMRs defined by SEQ ID NOs 501 to 808, optionally wherein the panel of one or more CpGs comprises two or more CpGs denoted by CG identified in the panel of DMR(s), three or more CpGs denoted by CG identified in the panel of DMR(s), four or more CpGs denoted by CG identified in the panel of DMR(s), or all CpGs denoted by CG identified in the DMR(s) defined by SEQ ID NOs 501 to 808.

The assay of the invention may be performed above and additionally wherein the step of determining the methylation status of a panel of the one or more CpGs comprises determining the methylation status of five or more, six or more, seven or more, eight or more, or nine or more, or all of the CpGs denoted by CG within any one or more of the DMRs defined by SEQ ID NOs 501 to 808.

The assay of the invention may be performed above and additionally wherein the step of determining the methylation status of a panel of one or more CpGs comprises determining the methylation status of two or more, three or more, four or more, five or more, six or more, seven or more, eight or more, or nine or more, or all of the CpGs denoted by CG within:

1. any combination of two, three, four, five, six, seven, eight, or nine or more of DMRs 1 to 308;
2. any combination of ten, twenty, thirty, forty, fifty, sixty, seventy, eighty, or ninety or more of DMRs 1 to 308;
3. all 308 of DMRs 1 to 308;

4. one DMR defined by SEQ ID NO: 501, two DMRs defined by SEQ ID NOs: 501 to 502, three DMRs defined by SEQ ID NOs: 501 to 503, four DMRs defined by SEQ ID NOs: 501 to 504, five DMRs defined by SEQ ID NOs: 501 to 505, six DMRs defined by SEQ ID NOs: 501 to 506, seven DMRs defined by SEQ ID NOs: 501 to 507, eight DMRs defined by SEQ ID NOs: 501 to 508, or nine DMRs defined by SEQ ID NOs: 501 to 509; or
5. ten DMRs defined by SEQ ID NOs: 501 to 510, twenty DMRs defined by SEQ ID NOs: 501 to 520, thirty DMRs defined by SEQ ID NOs: 501 to 530, forty DMRs defined by SEQ ID NOs: 501 to 540, fifty DMRs defined by SEQ ID NOs: 501 to 550, sixty DMRs defined by SEQ ID NOs: 501 to 560, seventy DMRs defined by SEQ ID NOs: 501 to 570, eighty DMRs defined by SEQ ID NOs: 501 to 580, or ninety DMRs defined by SEQ ID NOs: 501 to 590; or
6. ten DMRs defined by SEQ ID NOs: 501 to 510, SEQ ID NOs: 511 to 520, SEQ ID NOs: 521 to 530, SEQ ID NOs: 531 to 540, SEQ ID NOs: 541 to 550, SEQ ID NOs: 551 to 560, SEQ ID NOs: 561 to 570, SEQ ID NOs: 571 to 580, SEQ ID NOs: 581 to 590, SEQ ID NOs: 591 to 600, SEQ ID NOs: 601 to 610, SEQ ID NOs: 611 to 620, SEQ ID NOs: 621 to 630, SEQ ID NOs: 631 to 640, SEQ ID NOs: 641 to 650, SEQ ID NOs: 651 to 660, SEQ ID NOs: 661 to 670, SEQ ID NOs: 671 to 680, SEQ ID NOs: 681 to 690, SEQ ID NOs: 691 to 700, SEQ ID NOs: 701 to 710, SEQ ID NOs: 711 to 720, SEQ ID NOs: 721 to 730, SEQ ID NOs: 731 to 740, SEQ ID NOs: 741 to 750; SEQ ID NOs: 751 to 760; SEQ ID NOs: 761 to 770; SEQ ID NOs: 771 to 780; SEQ ID NOs: 781 to 790; SEQ ID NOs: 791 to 800 or SEQ ID NOs: 801 to 808.

The assay of the invention may be performed above and additionally wherein the step of determining the methylation status of a panel of one or more CpGs comprises determining the methylation status of one or more CpGs within any one or more DMRs selected from the group of DMRs consisting of DMRs 1 to 308 as defined by SEQ ID NOs 501 to 808, including:

a. one or more CpGs within DMR 1 as defined by SEQ ID NO: 501 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.911, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

b. one or more CpGs within DMR 2 as defined by SEQ ID NO: 502 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.903, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

c. one or more CpGs within DMR 3 as defined by SEQ ID NO: 503 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.899, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

d. one or more CpGs within DMR 4 as defined by SEQ ID NO: 504 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.899, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

e. one or more CpGs within DMR 5 as defined by SEQ ID NO: 505 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.899, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

f. one or more CpGs within DMR 6 as defined by SEQ ID NO: 506 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.897, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

g. one or more CpGs within DMR 7 as defined by SEQ ID NO: 507 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.894, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

h. one or more CpGs within DMR 8 as defined by SEQ ID NO: 508 and denoted by CG, preferably wherein the assay is characterised as having an

ROC AUC of at least 0.894, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

i. one or more CpGs within DMR 9 as defined by SEQ ID NO: 509 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.892, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]]; or

j. one or more CpGs within DMR 10 as defined by SEQ ID NO: 510 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.891, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]].

The assay of the invention may be performed above and additionally wherein:

1. when the cancer index for the individual is about 0.025 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
2. when the cancer index for the individual is less than about 0.025 the individual is classified as not having cancer and/or CIN3;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

The assay of the invention may be performed above and additionally wherein:

1. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 1 defined by SEQ ID NO: 501, and wherein when the cancer index for the individual is about 0.209 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 1, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 501;

2. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 1 defined by SEQ ID NO: 501, and wherein when the cancer index for the individual is less than about 0.209 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 1, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 501;
3. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 2 defined by SEQ ID NO: 502, and wherein when the cancer index for the individual is about 0.271 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 77.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpG from DMR 2, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 502;
4. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 2 defined by SEQ ID NO: 502, and wherein when the cancer index for the individual is less than about 0.271 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 77.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 2, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 502;
5. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 3 defined by SEQ ID NO: 503, and wherein when the cancer index for the individual is about 0.123 or more the individual is

classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 3, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 503;

6. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 3 defined by SEQ ID NO: 503, and wherein when the cancer index for the individual is less than about 0.123 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 3, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 503;
7. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 4 defined by SEQ ID NO: 504, and wherein when the cancer index for the individual is about 0.123 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 4, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 504;
8. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 4 defined by SEQ ID NO: 504, and wherein when the cancer index for the individual is less than about 0.123 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%,

preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 4, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 504;

9. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 5 defined by SEQ ID NO: 505, and wherein when the cancer index for the individual is about 0.105 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 5, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 505; or
10. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 5 defined by SEQ ID NO: 505, and wherein when the cancer index for the individual is less than about 0.105 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 5, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 505.

The assay of the invention may be performed above and additionally wherein the step of determining the methylation status of the one or more CpGs in the panel further comprises or additionally comprises determining the methylation status of each CpG within one or more of the sequences identified by SEQ ID NOs 809 to 919.

The assay of the invention may be performed above and additionally wherein the step of determining the methylation status of the one or more CpGs in the panel comprises determining each CpG within:

a. SEQ ID NO 809 and/or SEQ ID NO 846 and/or SEQ ID NO 883 and wherein when the cancer index value is about 0.282 or more the individual is

classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 809 and/or SEQ ID NO 846 and/or SEQ ID NO 883;

b. SEQ ID NO 809 and/or SEQ ID NO 846 and/or SEQ ID NO 883 and wherein when the cancer index value is less than about 0.282 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 809 and/or SEQ ID NO 846 and/or SEQ ID NO 883;

c. SEQ ID NO 810 and/or SEQ ID NO 847 and/or SEQ ID NO 884 and wherein when the cancer index value is about 0.212 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 55.00%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 810 and/or SEQ ID NO 847 and/or SEQ ID NO 883;

d. SEQ ID NO 810 and/or SEQ ID NO 847 and/or SEQ ID NO 884 and wherein when the cancer index value is less than about 0.212 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 55.00%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 810 and/or SEQ ID NO 847 and/or SEQ ID NO 884;

e. SEQ ID NO 811 and/or SEQ ID NO 848 and/or SEQ ID NO 885 and wherein when the cancer index value is about 0.002 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 90.00%, the specificity of the assay is about 80.00%, and the AUC is about 0.98, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 740 and/or SEQ ID NO 777 and/or SEQ ID NO 814;

f. SEQ ID NO 811 and/or SEQ ID NO 848 and/or SEQ ID NO 885 and wherein when the cancer index value is less than about 0.002 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 90.00%, the specificity of the assay is about 80.00%, and the AUC is about 0.98, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 811 and/or SEQ ID NO 848 and/or SEQ ID NO 885;

g. SEQ ID NO 812 and/or SEQ ID NO 849 and/or SEQ ID NO 886 and wherein when the cancer index value is about 0.026 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 90.00%, and the AUC is about 0.98, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 812 and/or SEQ ID NO 849 and/or SEQ ID NO 886 ;

h. SEQ ID NO 812 and/or SEQ ID NO 849 and/or SEQ ID NO 886 and wherein when the cancer index value is less than about 0.026 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 90.00%, and the AUC is about 0.98, preferably wherein the cancer index value is the percent

methylated reference for sequence defined by SEQ ID NO 812 and/or SEQ ID NO 849 and/or SEQ ID NO 886;

i. SEQ ID NO 813 and/or SEQ ID NO 850 and/or SEQ ID NO 887 and wherein when the cancer index value is about 0.003 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 85.00%, and the AUC is about 0.97, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 813 and/or SEQ ID NO 850 and/or SEQ ID NO 887 ; and/or

j. SEQ ID NO 813 and/or SEQ ID NO 850 and/or SEQ ID NO 887 and wherein when the cancer index value is less than about 0.003 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 85.00%, and the AUC is about 0.97, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 813 and/or SEQ ID NO 850 and/or SEQ ID NO 887.

The assay of the invention may be performed above and additionally wherein the step of determining the methylation status of the one or more CpGs in the panel further comprises or additionally comprises determining the methylation status of each CpG within one or more of the sequences identified by SEQ ID NOs 809, 846, 883, 811, 848, 885, 813, 850, and 887.

The assay of the invention may be performed above and additionally wherein the step of determining in the population of DNA molecules in the sample the methylation status of each CpG in the panel of one or more CpGs comprises:

1. performing a sequencing step to determine the sequence of each CpG;
2. hybridising DNA to an array comprising probes capable of discriminating between methylated and non-methylated forms of the CpGs and applying

a detection system to the array so as to determine the methylation status of each CpG; and/or

3. performing a PCR step using methylation-specific primers, wherein the methylation status of the CpG is determined by the presence or absence of a PCR product.

The assay of the invention may be performed above and additionally wherein the step of determining the methylation status of each CpG in the panel of one or more CpGs comprises:

1. bisulphite converting the DNA; or
2. performing the steps of oxidising 5-methylcytosine bases (5mC) to 5-carboxylcytosine bases (5caC), preferably by ten-eleven translocation (TET), and/or oxidising 5-hydroxymethylcytosine bases (5hmC) to 5-carboxylcytosine bases (5caC), preferably by ten-eleven translocation (TET); followed by reducing 5-carboxylcytosine bases (5caC) to dihydrouracil bases (DHU), optionally with pyridine borane.

The invention also provides a method of treating or preventing cancer in an individual, the method comprising:

1. assessing the cancer status of the individual by assessing the presence, absence or development of cancer in the individual by performing the assay of any one of the assays of the invention;
2. administering one or more therapeutic or preventative treatments to the individual based on the assessment.

The method of the invention may be performed above and additionally wherein the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the cancer index value is about -0.660 or more and less than about -0.430, and preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, the individual is subjected to one or more treatments according to their cancer index value, the one or more treatments comprise:

1. a transvaginal ultrasound to assess endometrium and ovaries;

2. a repeat assay according to any one of the assays of the invention, preferably wherein the repeat assay is performed about two years after the previous assay.

The method of the invention may be performed above and additionally wherein the individual is assessed as having a moderate risk of having cancer and/or CIN3 or as having a moderate risk of cancer and/or CIN3 development, and wherein the cancer index value is about -0.430 or more and less than about -0.230, and preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, the individual is subjected to one or more treatments according to their cancer index value, the one or more treatments comprise any of:

1. a transvaginal ultrasound to assess endometrium and ovaries;
2. intensified screening, preferably wherein the intensified screening comprises one or more of:
   i. a colposcopy;
   ii. a HPV test;
   iii. a cervical cytology test;
   iv. a test for CA125, preferably wherein the test is repeated six-monthly;
   v. a test for cell-free tumour DNA methylation in plasma/serum, preferably wherein the test is repeated annually;
   vi. a test for cell-free tumour DNA methylation in vaginal fluid, preferably wherein the test is repeated annually
   vii. a pelvic MRI scan, preferably wherein the individual being subjected to the pelvic MRI scan is post-menopausal, and preferably wherein the scan is repeated annually;
   viii. a repeat assay according to any one of the assays of the invention, preferably wherein the repeat assay is performed about one year after the previous assay
3. administration of one or more of progestogens, particularly wherein the progestogens are delivered locally or systemically, Aspirin, Metformin, aromatase-inhibitors, weight-loss regimen.

The method of the invention may be performed above and additionally wherein when the colposcopy, HPV and cytology tests are negative, the intensified screening further comprises a hysteroscopy and endocervical and endometrial biopsy.

The method of the invention may be performed above and additionally wherein when the transvaginal ultrasound and intensified screening are both negative:

1. the transvaginal ultrasound, the test for CA125, the test for cell-free tumour DNA methylation in plasma/serum, and the test for cell-free tumour DNA methylation in vaginal fluid is repeated about six months after the previous assay; and
2. the colposcopy, the HPV test, and the cervical cytology test, is repeated about one year after the previous assay.

The method of the invention may be performed above and additionally wherein the individual is assessed as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the cancer index value is about -0.230 or more, and preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, the individual is subjected to one or more treatments according to their cancer index value, the one or more treatments comprise any of:

1. a transvaginal ultrasound to assess endometrium and ovaries;
2. intensified screening, preferably wherein the intensified screening comprises one or more of:
   i. a colposcopy;
   ii. a HPV test;
   iii. a cervical cytology test;
   iv. a test for CA125, preferably wherein the test is repeated six-monthly;
   v. a test for cell-free tumour DNA methylation in plasma/serum, preferably wherein the test is repeated annually;
   vi. a test for cell-free tumour DNA methylation in vaginal fluid, preferably wherein the test is repeated annually

vii. a pelvic MRI scan, preferably wherein the individual being subjected to the pelvic MRI scan is post-menopausal, and preferably wherein the scan is repeated annually;

viii. a repeat assay according to any one of the assays of the invention, preferably wherein the repeat assay is performed about one year after the previous assay;

3. administration of one or more of progestogens, particularly wherein the progestogens are delivered locally or systemically, Aspirin, Metformin, aromatase-inhibitors, weight-loss regimen;

4. a total hysterectomy and bilateral salpingo-oophorectomy.

The method of the invention may be performed above and additionally wherein when the colposcopy, HPV and cytology tests are negative, the intensified screening further comprises a hysteroscopy and endocervical and endometrial biopsy.

The method of the invention may be performed above and additionally wherein when the transvaginal ultrasound and intensified screening are both negative:

1. the transvaginal ultrasound, the test for CA125, the test for cell-free tumour DNA methylation in plasma/serum, the test for cell-free tumour DNA methylation in vaginal fluid, the colposcopy, the HPV test, and the cervical cytology test is repeated about six months after the previous assay; and

2. the pelvic MRI scan is repeated about one year after the previous assay.

The method of the invention may be performed above and additionally wherein the progestogens are delivered locally via an intrauterine device.

The method of the invention may be performed above and additionally wherein the one or more treatments that the individual is subjected to are repeated on a monthly, three monthly, six monthly, yearly or two yearly basis following an initial administration.

The invention also provide a method of monitoring the cancer status of an individual according to the individual's cancer index value, the method comprising: (a) assessing the presence, absence or development of cancer in an individual by

performing the assay according to any one of the assays of the invention at a first time point; (b) assessing the presence, absence or development of cancer in the individual by performing the assay according to any one of the assays of the invention at one or more further time points; and (c) monitoring any change in the cancer index value and/or cancer status and/or CIN3 status of the individual between time points.

The method of the invention may be performed above and additionally the further time points are monthly, three monthly, six monthly, yearly or two yearly basis following an initial assessment.

The method of the invention may be performed above and additionally wherein depending on the cancer index value and/or cancer status and/or CIN3 status of the individual, one or more treatments are administered to the individual according to any one of the methods of the invention, or when the cancer index value of the individual is less than about -0.660 no treatment is administered to the individual.

The method of the invention may be performed above and additionally wherein an increase in the cancer index value indicates a negative response to the one or more treatments.

The method of the invention may be performed above and additionally wherein changes are made to the one or more treatments if a negative response is identified.

The method of the invention may be performed above and additionally wherein a decrease in the cancer index value indicates a positive response to the one or more treatments.

The method of the invention may be performed above and additionally wherein changes are made to the one or more treatments if a positive response is identified.

The assay of the invention may be performed above and additionally wherein the sample is obtained from a tissue comprising epithelial cells, preferably wherein the sample is not obtained from ovarian or endometrial tissue.

The assay of the invention may be performed above and additionally wherein the sample is obtained from:

1. cervical tissue;
2. vaginal tissue;

3. cervicovaginal tissue;
4. buccal tissue;

preferably wherein the sample is obtained from cervical tissue, most preferably wherein the sample is obtained from tissue from a cervical smear.

The assay of the invention may be performed above and additionally wherein the assay is for assessing the presence, absence or development of:

1. endometrial cancer, preferably wherein the endometrial cancer is an endometriod cancer, uterine carcinosarcoma, squamous cell carcinoma, small cell carcinoma, transitional carcinoma, serous carcinoma, clear-cell carcinoma, mucinous adenocarcinoma, undifferentiated carcinoma, dedifferentiated carcinoma or serous adenocarcinoma;
2. ovarian cancer, particularly wherein the ovarian cancer is serious carcinoma, mucinous carcinoma, endometrioid carcinoma, clear cell carcinoma, lop malignant potential (LMP) tumor, borderline epithelial ovarian cancer, teratoma, dysgerminoma, endodermal sinus tumor, Choriocarcinoma, granulosa-theca tumor, Sertoli-Leydig tumor, granulosa cell tumor, small cell carcinoma of the ovary or primary peritoneal carcinoma;
3. grade 3 cervical epithelial neoplasia (CIN3) and/or cervical cancer, particularly wherein the cervical cancer is squamous cell cancer, an adenocarcinoma or an adenosquamous carcinoma.

The invention also provides an array capable of discriminating between methylated and non-methylated forms of CpGs; the array comprising oligonucleotide probes specific for a methylated form of each CpG in a CpG panel and oligonucleotide probes specific for a non-methylated form of each CpG in the panel; wherein the panel consists of at least 50 CpGs selected from the CpGs identified in SEQ ID NOs 1 to 500 and identified at nucleotide positions 61 to 62, and identified in SEQ ID NOs 501 to 808 and denoted by CG.

The array of the invention may be performed above and additionally provided that the array is not an Infinium MethylationEPIC BeadChip array or an Infinium

HumanMethylation450, and/or provided that the number of CpG-specific oligonucleotide probes of the array is 482,000 or less, 480,000 or less, 450,000 or less, 440,000 or less, 430,000 or less, 420,000 or less, 410,000 or less, or 400,000 or less.

The array of the invention may be performed above and additionally wherein the panel comprises any panel of CpGs defined in the assays of any one of the assays of the invention.

The array of the invention may be performed above and additionally further comprising one or more oligonucleotides comprising any set of CpGs defined in the assays of any one of the assays of the invention, wherein the one or more oligonucleotides are hybridized to corresponding oligonucleotide probes of the array.

The invention also provides a hybridized array, wherein the array is obtainable by hybridizing to an array of the invention a group of oligonucleotides comprising any panel of CpGs defined in the assays of the invention.

The invention also provides process for making the hybridized array of the invention, comprising contacting an array of the invention with a group of oligonucleotides comprising any panel of CpGs defined in the assays of the invention.

Brief description of the Figures

Figure 1 shows the experimental design underpinning the discovery and validation of the WID-EC-index.

Figure 2 shows ROC curve of the WID-EC-index in the internal validation set (Panel A). Box plot of the WID-EC index in the internal validation set (Panel B).

Figure 3 shows WID-EC-index in endometrial cancer cases and healthy controls in the external validation dataset (Panel A). ROC curve in the external validation set (Panel C). WID-EC-index versus time-to-event in prospectively collected validation samples (Panel D). ROC curve corresponding to the prospective samples (Panel E).

Figure 4 shows the WID-EC-index versus age in samples from the internal and external validation datasets (Panel A). Correlation with body mass index (BMI) in controls (Panel B). Menopause (Panel C). Parity (Panel D). Stage (Panel E). Grade

(Panel F). Histology (Panel G). Panels A to D are based on controls from the internal and external validation datasets. Panels E to G are based on cases from the internal and external validation datasets.

Figure 5 shows WID-EC-index versus the estimated proportion of tumor DNA (Panel A). The estimated proportion of tumor DNA in each cervical smear sample as estimated using the EpiDISH algorithm for controls (Panel B) and endometrial cancers (Panel C).

Figure 6 shows the distribution of p-values obtained by comparing cases and controls at each CpG site and after controlling for immune cell proportion and age (Panel A). Distribution of different cell types in the discovery dataset inferred using the HEpiDISH algorithm (* $p<0.05$, ** $p<0.01$, *** $p<0.001$) (Panel B). Area under the reciever operating characteristic curve (AUROC) in the internal validation set as a function of the number of CpGs used to train the classifier (Panel C). Distribution of the WID-EC-index with respect to immune cell proportion in the internal validation set (Panel D).

Figure 7 shows the distribution of different cell types in the external validation dataset inferred using the HEpiDISH algorithm (* $p<0.05$, ** $p<0.01$, *** $p<0.001$) (Panel A). Cell type distribution in the propspective validation dataset (Panel B). The mean delta-beta (difference between mean beta values in control samples from the proposective and discovery datasets) across different genomic regions (Panel C). Odds ratios corresonding to the genomic annotation of the 500 CpGs comprising the WID-EC-index (when compared to the 776,725 CpGs in the dataset; *** $p<0.001$) (Panel D).

Figure 8 shows the distribution of the WID-EC-index in controls that volunteered from the general population and women that presented at hospitals for benign women-specific conditions (Discovery set) (Panel A). The WID-EC-index versus the number of days between sample collection and DNA extraction.

Figure 9 shows the inferred tumour DNA proportion versus the inferred epithelial cell proportion in the discovery set as determined using the HEpiDISH algorithm.

Figure 10 shows the WID-EC-index versus immune cell proportion in the ovarian cancer validation dataset (Panel A) and the corresponding ROC curve (Panel B).

Figure 11 shows cutpoints applied to the patient data, and consequent specificity and sensitivity for cancer status discrimination achieved when these cutpoints are applied.

DETAILED DESCRIPTION OF THE INVENTION

Identification of CpGs

The present inventors sought to identify CpG methylation-based assays capable of assessing the presence, absence or development of cancer in an individual. Any of the assays described herein for assessing the presence, absence or development of cancer in an individual are capable of being utilised for assessing the presence, absence or development of endometrial cancer and/or ovarian cancer, particularly endometrial cancer. The present inventors compared CpG methylation levels in non-cancerous epithelial tissue, particularly cervical tissue, vaginal tissue or cervicovaginal tissue across groups of women that were either known to be both endometrial and ovarian cancer negative, and/or CIN3 negative, or known to be endometrial and/or ovarian cancer positive, and/or CIN3 positive. This led to the surprising establishment of a "cancer index", used interchangeable herein with "index", "index value", "WID-EC-Index" or "WID-Index" (WID = women's risk identification).

A CpG as defined herein refers to the CG dinucleotide motif identified in relation to each SEQ ID NO., wherein the CG dinucleotide of interest is denoted by CG. Thus by determining the methylation status of any panel of one or more CpGs defined by or identified in a given SEQ ID NO, it is meant that a determination is made as to the methylation status of the cytosine of the CG dinucleotide motif identified in square brackets in the panel of one or more CpGs in each sequence shown below, accepting

that variations in the sequence upstream and downstream of any given CpG may exist due to sequencing errors or variation between individuals.

As set out in more detail in the Examples, the methylation status of sub-selections of the 500 CpGs, as identified in SEQ ID NOs 1 to 500, may be determined in order to assess an individual for the presence, absence or development of cancer with high sensitivity and specificity. The cancer is preferably endometrial cancer or ovarian cancer, most preferably endometrial cancer. A panel of one or more of the CpGs identified in SEQ ID NOs 1 to 500 may be utilised to derive a cancer index for an individual in accordance with the invention described herein.

The methylation status of a panel of one or more CpGs of the 500 CpGs defined according to SEQ ID NOs: 1 to 500 may be assessed by any suitable technique. As explained in more detail in the Examples below, one particular exemplary technique which the inventors have used is an array-based analysis technique coupled with beta value analysis. SEQ ID NOs 1 to 500 correspond to the sequences of commercial probes utilised in said array.

The inventors further identified 308 differentially methylated regions (DMRs) with relevance to cancer, particularly endometrial or ovarian cancer. The nucleotide sequences of the 308 DMRs are defined respectively by the nucleotide sequences of SEQ ID NO: 501 to 808 as set out in Table 1 below, accepting that variation in the nucleotide sequence of any given DMR may exist due to sequencing errors and/or variation between individuals. In each sequence shown below the cytosine of the CG dinucleotide motif identified in square brackets or double square brackets is a cytosine of a CpG which may be included in a panel of CpGs when performing the assays of the invention.

The inventors further defined 37 regions within a select number of the 308 DMRs with particular relevance to cancer and CIN3, particularly endometrial and ovarian cancer. The nucleotide sequence of the 37 regions are defined respectively by the nucleotide sequence of SEQ ID NOs: 809 to 919 as set out in Table 10 below, accepting that variation in the nucleotide sequence of any given DMR may exist due to sequencing errors and/or variation between individuals. When any one or more of the 37 regions are included in a panel of CpGs when performing the assays of the invention, the methylation status of every cytosine within a CG dinucleotide in the region is determined. The amplicon sequences generated by the 37 primer and probe reactions as set out Table 10 are described and defined by SEQ ID NOs 920 to 956 and in Table 12. In any of the assays described herein, the step of determining the methylation status of a panel of one or more CpGs may comprise determining the methylation status of one or more CpGs within any one or more the amplicons defined by SEQ ID NOs 920 to 956 and denoted by CG. More preferably, in any of the assays described herein, the step of determining the methylation status of a panel of one or more CpGs may comprise determining the methylation status of one or more CpGs within any one or more the amplicons defined by SEQ ID NOs 920, 922 and 924 and denoted by CG, yet more preferably all of the CpGs denoted by CG in the amplicons defined by SEQ ID NOs 920, 922 and 924.

Table 10

gene_name	Forward.Primer	SEQ ID NO of forward primer	Reverse.Primer	SEQ ID NO of reverse primer	Probe	SEQ ID NO of probe
ZNF132	AGAGCGGTCGCGGAAGT	809	AACCGAAAACGACCACGAAA	846	CGTTTCGCGCGGGTTGGTTTT	883
HCG4	TCGATAGCGACGTTACGAGTTTT	810	TCCGACCCCTCCTACTCCAT	847	ATGGAGTCGCGGGCGTCGTG	884
GYPC	TTTGGTTAGTTTTCGCGGTTTT	811	CGACGAATACTCACCGAAACTAAA	848	TCGGGTTGACGTTTAGGAATGTGGTCG	885
RASSF1	CGGGTTTCGATTTTAGCGTTT	812	CCATTACGCGACTCTCCTCAA	849	TAGGATTTAGATTGGGCGGCGGGAAG	886
GYPC	TGCGGGTCGCGGTTT	813	CCCAACAACACGACGTAACCT	850	TTTTTTTACGGCGGGTATTTATCGAGGTTG	887
TRH	GATGTGTTCGCGTCGTGTTTT	814	CGATACACAAACGAACGCTATACTC	851	CGTCGGGTTTTCGGTTTGCGTTC	888
PTGER4	AGGTTGCGTATCGTTAGTTATTATTATGTT	815	CACCGCCGAAATAATCACTAAAC	852	TTAATTCGTTCGTTTTTTTGAGTTTCGATCGG	889
FAIM2	GAGGAGAGGGTCGGGTTTG	816	TTACCCCGAACTCGCGAAT	853	AAGATGTTGCGGAGGACGTTGCG	890
DMRTA2	CGAGTTGTAGTTGTTTTACGGTATTGTC	817	TCGTAAACGAACCTCGAAAAAATAA	854	TTGGCGTTGGTCGTCGTTAACGGT	891
NA	GAGTTGGTGAGGTCGTTTAGTTAGG	818	GCCCGCTACGCTATACGAAA	855	TTGGTTAGCGTGCGATATAGGCGCG	892
TRABD	GTCGGGTTTTTTTTGGAGGTTT	819	ACCCCCGACCTCACGAA	856	CGGACGATCGGAAGTGATTGAGCG	893
TCP11	GAGGAGGAGGTGACGGTTTG	820	AAAACGTAAAAAAAACCCCTTCCTT	857	TTTGGGTCGGCGTTTCGGGC	894
GATA3	CGCGAGTATAGTCGAGGTTATGG	821	CCCGTTAAACACGACGAAATAAT	858	ACGGCGGATTAGTCGCGTTGGG	895
NA	GGCGGTGATGGTTTTTGGA	822	AACGTACGACATAAACGCGAAA	859	CGCGCGGTCGTAGTGTGTCGTT	896
SPDYA	GTTGGTTAGCGATCGACGAGTA	823	CCGAACAACGACGATCAAAA	860	TCGTTTGAGGTTAGGAGCGTTGCGA	897
NA	GCGTAGCGGGCGGTATATT	824	CCCAACTATACGCATCGCTAACT	861	TAGAGTTATTATCGTTAGGAGGACGTATTCGGCG	898
KIAA1383	AGTAGGTTGTAGGCGGAAGAGGTA	825	GCCGAACCGTAACCCGATA	862	TTTGTCGCGATCGAAGCGGATG	899
CDH4	CGGCGGGAGTTGTAGGAATT	826	ACAACAACGCTACCCGAAAAA	863	TTTTTCGTGGTCGATCGGTTTCGTTG	900
EPHX3	GGCGGGTTTAGCGGTTTC	827	CAAACGTACAAAAACGAACTAACGA	864	TTCGGCGTCGTTTTTTTGTTGGTTTAATAGG	901
NEFM	TTTTCGGTCGTCGTTTTTACG	828	CGCCGCAACCCATTTATAA	865	TTTTGGTTCGGGATTAGCGTCGCG	902
SORCS3	CGTCGGGCGTAGTTTTTAATTATT	829	ACCCTTAACAAAAAAACGACTTCCT	866	ACGTTTGGGTTATTGTTTCGGTCGATGG	903
ZNF718	CGTTTCGTCGTTGTTCGTATTTC	830	AAAAACGAATCCGCGACGTA	867	CGCGTTCGGAGTTTAGCGTAGTATAGAGGAGTC	904

TRH	CGGGATTCGTAGTCGGTAGGT	831	GACCCATCTAAAAAAAACTCGACAA	868	AGTTTGTAGCGTTGAGGATTTCGGGCG	905
DMRT1	ACGCGTTTTCGGCGTTT	832	ACAACGACGACGCTTAAAATCC	869	ATCGGCGATGTAGCGTGGTCGG	906
MYO3A	TTTTTGCGTTGTTTCGATACGT	833	GTAACCAACGCCCCCGTAA	870	TTTGGGCGGGAAGTCGGGC	907
NA	TTCGGTTTTGCGGAGTAGTTG	834	ACTCGCTACGCCACGAAAAT	871	ATTCGAAGGGCGGCGCGG	908
FAM38B	GCGTTTTTTTTTAAGGTTTCGGTAT	835	CCTACGACCGACCCATTTAATATAA	872	TTTTGAAGAAGTCGTCGTCGTTGTCGG	909
NA	CGGAGGCGACGGAGATATTA	836	AATAACGACAAACGACAACAACAAA	873	CGAGAATTAGATGTTCGTCGTTCGCGTG	910
DMRTA2	CGTTATGATACGTTGGCGTTTC	837	CAAAAACCACAAACGCTACTATCG	874	CGATGAGCGTGTATTTGGCGTATAGGTAGTTTT	911
LBX2	CGGATTGGGAGTCGAGTATTG	838	TCGCGTCCCGAATTCATAA	875	CGGATAGTCGGATCGTTTTAGTTCGGTCG	912
NA	GCGTGGTGTCGTCGTTGTT	839	ACGCACAACTAAACCGTACAATAACT	876	CGGATTAGCGTTTTGGTTGTCGCG	913
NA	CGTATAGTTGGGTCGTGTAGTGGTT	840	ACTAACGTAATACCGCCGCTACTAA	877	CGCGGTAGTTAGAGCGTTGGTTCGC	914
NA	TTGCGTTAGGATTTTGTAGATTCG	841	CCGTACAACCCTAATATTACAAACGTAA	878	TCGCGGTCGGGTCGAGTGTTTT	915
GDF6	GTTAGTCGGGTTGGAGTTTTGC	842	CCACTCGTATTAAAACCTCGAAACA	879	TTTCGGTTTTTTTGTTTTAGCGTGGTGTTTTC	916
GAD2	GGAAGAGCGTTACGGTTTTAGAGT	843	ACGAAACCTACCCGCTAAATCC	880	TTTTTGGAGTTTCGAGGTTAGGTTCGGG	917
NA	TTATTAATTCGGTTGCGTAAATCG	844	CCGACAACTCACAAATAAAATAATCC	881	TTTGGTTGAGCGGTCGTTGTGCG	918
FOXE1	GGGTAATTATTGGGCGTTTGATT	845	GCTTACGACGACGCAAAAAACT	882	TAACGCGGAGGATATGTTCGAGAGCG	919

Table 12

rxn_name	gene_name	Chromosome	Rxn.Start	Rxn.Finish	Amplicon.Location	Amplicon.Length	Amplicon SEQ ID NO	amplicon_sequence_5_to_3
ML_cg25060829_ii	ZSCAN12	6	28367535	28367599	chr6:28367535-28367599	65	920	GGC[[CG]]GAAG[[CG]]GCCA[[CG]]GGGGGTCTAAGAACCAGCC[[CG]][[CG]][[CG]]GGG[[CG]]CACTTC[[CG]][[CG]]GC[[CG]]CTCT
ML_cg14443519_i	HCG4	6	29760319	29760385	chr6:29760319-29760385	67	921	T[[CG]]ACAG[[CG]]A[[CG]]CCA[[CG]]AGTCCCAGGATGGAGC[[CG]][[CG]]GG[[CG]]C[[CG]]TGGATGGAGCAGGAGGGGC[[CG]]GA
ML_cg15975865_i	GYPC	2	127413797	127413902	chr2:127413797-127413902	106	922	CCTGGCCAGTCCC[[CG]][[CG]]GTCTCTGCC[[CG]]GGCTGA[[CG]]CCCAGGAATGTGGT[[CG]]A[CG]AGAAGCCCCAACAGCA[CG]G[CG]TGGCCTCTCAGCCT[[CG]]GTGAGTACC[[CG]]C[[CG]]
ML_cg27569446_i	RASSF1	3	50378305	50378379	chr3:50378305-50378379	75	923	[[CG]]GGCCC[[CG]]ACTTCAG[[CG]]CCTCCCCCAGGATCCAGACTGGG[[CG]]G[[CG]]GGAAGGAGCTGAGGAGAGC[[CG]][[CG]]CAATGG
ML_cg15768103_ii	GYPC	2	127413858	127413944	chr2:127413858-127413944	87	924	CCCAACAGCA[[CG]]G[[CG]]TGGCCTCTCAGCCT[[CG]]GTGAGTACC[[CG]]C[[CG]]TGGGGAAGGGTCCTGGGGACCCACTGGAGGC[[CG]][[CG]]GCC[[CG]]CA
ML_cg05835982_ii	TRH	3	129693780	129693868	chr3:129693780-129693868	89	925	[[CG]]GTGCACAGG[[CG]]GG[[CG]]CTGTGCT[CG]CACCCC[CG]GGTCCTCCC[CG]AG[[CG]]CAGGC[[CG]]GGGACC[[CG]]A[[CG]]GGAGGCA[[CG]]G[[CG]][[CG]]GGCACATC
ML_cg05971966_i	PTGER4	5	40681071	40681173	chr5:40681071-40681173	103	926	AGGCTG[[CG]]CAC[[CG]]CCAGCCACTATCATGTCCACTCC[CG]GGGTCAATT[[CG]]TC[[CG]]CCTCCTTGAGCCC[[CG]]AC[[CG]]GCTGAACAGCCCAGTGACCATCC[[CG]]G[[CG]]GTG

ML_cg06947913_i	FAIM2	12	50297727	50297790	chr12:50297727-50297790	64	927	GAGGAGAGGGC[[CG]]GGCCTGGGAAGATG CTG[[CG]]GAGGA[[CG]]CTG[[CG]]GATT[[CG]][[CG]]AGCC[[CG]]GGGTAA
ML_cg16732616_ii	DMRTA2	1	50886745	50886828	chr1:508867 45-50886828	84	928	T[[CG]]TAGG[[CG]]GGCCT[[CG]]GGGGGAT GATGC[[CG]]TTGG[[CG]]G[[CG]]GCCAG[[CG]]CCAGCCCCCT[CG]GCAGTGC[[CG]]TAGAG CAGCTGCAGCT[[CG]]
ML_cg22305167_i	N/A	6	29521375	29521459	chr6:295213 75-29521459	85	929	GCC[[CG]]CTG[[CG]]CTATG[[CG]]GGGCT[CG]TCTCCC[[CG]][[CG]]CCTATGT[[CG]]CA[[CG]]CTGGCCAG[CG]CCTCCTGGCTAAG[[CG]]GCCTCACCAACTC
ML_cg05297854_i	N/A	22	50623618	50623686	chr22:50623618-50623686	69	930	GC[[CG]]GGTCCCCCTGGAGGCCTC[[CG]]GA[[CG]]AT[[CG]]GAAGTGACTGAG[[CG]]TC[CG]GGTC[[CG]]TGAGGC[[CG]]GGGGT
ML_cg13423262_i	TCP11	6	35108892	35108990	chr6:351088 92-35108990	99	931	GAAG[[CG]]TGGGAAGGCCCCTTCCTT[CG][CG]G[CG]AGGTGCCCCCCT[CG]CC[[CG]]AAA[[CG]]C[[CG]]GCCCAGGCC[CG]CCTC[CG]GCTCCCAGGC[[CG]]TCACCTCCTCCTC
ML_cg15267232_i	GATA3	10	8097600	8097681	chr10:80976 00-8097681	82	932	[[CG]][[CG]]AGCACAGC[[CG]]AGGCCATGG AGGTGA[[CG]]G[[CG]]GACCAGC[[CG]][[CG]]CTGGGTGAGCCACCACACCC[[CG]]C[[CG]]TGCTCAA[[CG]]GG
ML_cg21632158_i	N/A	6	29521337	29521423	chr6:295213 37-29521423	87	933	GG[[CG]]GTGATGGCTCTGGAC[[CG]][[CG]][[CG]]GC[[CG]]CAGTGTGC[[CG]]CC[CG]CTG[CG]CTATG[CG]GGGCT[CG]TCTCCC[[CG]][[CG]]CCTATGT[[CG]]CA[[CG]]CT
ML_cg14920003_i	SPDYA	2	29033710	29033782	chr2:290337 10-29033782	73	934	GCTGGCTAG[[CG]]AC[[CG]]A[[CG]]AGCAAC[[CG]]TCTGAGGCCAGGAG[[CG]]CTG[[CG]]A[CG]GAGCCTTGAC[[CG]]C[[CG]]TTGCC[[CG]]G

ML_cg21632158_ii	N/A	6	29521288	29521385	chr6:29521288-29521385	98	935	CCCAGCTGTG[[CG]]CAT[[CG]]CTGGCTCTGG GTTC[[CG]]C[[CG]]AATG[[CG]]TCCTCCTGG[[CG]]GTGATGGCTCTGGAC[CG][CG][CG]GC[CG]CAGTGTGC[[CG]]CC[[CG]]CTG[[CG]]C
ML_cg16430166_ii	MAP10	1	232941433	232941501	chr1:232941433-232941501	69	936	GC[[CG]]AAC[[CG]]TGGCC[[CG]]GTGTCATC[[CG]]CTT[[CG]]GT[[CG]]GCAAGTCCTG CCTCTTC[[CG]]CCTGCAGCCTGCT
ML_cg16619425_i	CDH4	20	59828486	59828556	chr20:59828486-59828556	71	937	[[CG]]G[[CG]]GGAGTTGCAGGAACCCCCTCT[[CG]]TGGC[[CG]]ATT[[CG]]GCCT[[CG]]CTGCC TTCTCC[[CG]]GGCAG[[CG]]CTGTTGT
ML_cg24520342_i	N/A	19	15344240	15344316	chr19:15344240-15344316	77	938	GG[[CG]]GGTCCAG[[CG]]GCCT[CG]GCC[[CG]]G[[CG]]C[[CG]]TCCTCCTGCTGGCCCAACA GGCC[[CG]]CCAGCC[[CG]]CCCCTGTA[[CG]] TCTG
ML_cg07552803_i	NEFM	8	24771188	24771260	chr8:24771188-24771260	73	939	TCCT[[CG]]GC[[CG]]C[[CG]]CCTCCA[[CG]]G GG[CG]GGGCCCTGGCC[[CG]]GGACCAG[[C G]]C[[CG]]]]CG]]GCTATAAATGGGCTG[[CG]] G[[CG]]
ML_cg01874697_i	SORCS3	10	106401479	106401574	chr10:10640 1479-106401574	96	940	[[CG]]C[[CG]]GG[[CG]]CAGCCCCCAATCACC CAGGAA[CG][CG]GGGA[[CG]]CCTGGGCCA CTGCTC[[CG]]GC[[CG]]ATGGTTCCAGAGGA AGC[[CG]]TCCCCTTGCTAAGGGT
ML_cg26894523_ii	ZNF718/ZNF595	4	107714	107802	chr4:107714-107802	89	941	AGGGG[[CG]]GGTC[[CG]]][[CG]]G[[CG]]TG[C G]GGGCCCTGG[CG]GCTCCTCTGTGCTG[[CG]]CTGGGCTC[[CG]]GG[[CG]]][[CG]]CG]GGA TG[[CG]]GGCAG[[CG]]G[[CG]]GGA[[CG]]
ML_cg02700891_ii	TRH	3	129693544	129693621	chr3:129693544-129693621	78	942	GGCCCATCTGAAGAGGGCT[[CG]]GCAGG[[C G]]CC[[CG]]GGGTCCTCAG[[CG]]CTGCAGAC TCCTGACCTGC[[CG]]ACTG[[CG]]GATCC[[CG]]

ML_cg07528692_ii	DMRT1	9	842623	842694	chr9:842623-842694	72	943	ACAG[[CG]]G[[CG]]G[[CG]]CTTGGGGTCCTGGGCTCC[[CG]]GCCA[[CG]]CTACAT[[CG]]C[[CG]]GTCTGGGAG[[CG]]C[[CG]]GAGA[[CG]]T[[CG]]T
ML_cg15843567_ii	MYO3A	10	26223207	26223281	chr10:26223207-26223281	75	944	GTAGCCAG[[CG]]CCCC[[CG]]TAAAGAAATAAGGAGG[[CG]]CC[[CG]]GCTTCC[[CG]]CCCAGGTA[[CG]]TGT[[CG]]GGACAG[[CG]]CAGGGG
ML_cg17759274_ii	N/A	19	39260951	39261015	chr19:39260951-39261015	65	945	GCT[[CG]]CTG[[CG]]CCA[[CG]]GAAATCC[[CG]]][[CG]]C[[CG]]CCCTT[[CG]]AGTCCTCCCAGCTGCTC[[CG]]CAGAGC[[CG]]GG
ML_cg03602280_ii	PIEZO2	18	11148842	11148934	chr18:11148842-11148934	93	946	CCTG[[CG]]GC[[CG]]GCCCATTTAGTGTGAATCCTGGATC[[CG]]GCAG[[CG]]G[[CG]]G[[CG]]GCTTCTTCAGGGGTAGCTGATGC[[CG]]GGGCCTTGGAGAGGGA[[CG]]C
ML_cg00370229_i	N/A	6	29521559	29521637	chr6:29521559-29521637	79	947	[[CG]]GAGG[[CG]]A[[CG]]GAGACACTAC[[CG]]AGAACCAGATGTT[[CG]]C[[CG]]CC[[CG]][[CG]]TGGTCATCCTGCTGCTGC[[CG]]TTGC[[CG]]TCATC
ML_cg25191628_i	DMRTA2	1	50886879	50886963	chr1:50886879-50886963	85	948	[[CG]]CCATGACA[[CG]]CTGG[[CG]]CTC[CG][[CG]]ATGAG[[CG]]TGCACTTGG[[CG]]CACAGGCAGTCCTTCCAG[[CG]]ACAGTAG[[CG]]TTTGTGGCCCTTG
ML_cg25040225_ii	LBX2	2	74726648	74726747	chr2:74726648-74726747	100	949	T[[CG]][[CG]]TCC[[CG]]AGTTCATGGT[[CG]]GC[[CG]]GGCTGGGG[[CG]]GTC[[CG]]GCTGTC[[CG]]TTG[CG]CTAGGCTC[CG]CAAA[CG]CCTGGGCCCCAGTGCT[[CG]]GCTCCCAATC[[CG]]
ML_cg10491628_i	N/A	6	29521219	29521300	chr6:29521219-29521300	82	950	G[[CG]]TGGTGC[[CG]]C[[CG]]CTGCTGGCCAACCTG[CG][[CG]]GACCAG[[CG]]CTCTGGCT

									GC[[CG]][[CG]]CAGCCACTGCA[[CG]]GCCCA GCTGTG[[CG]]C
ML_cg10491628_ii	N/A	6	29521215	29521299	chr6:295212 15-29521299	85	951		ACTAG[[CG]]TGGTGC[[CG]]C[[CG]]CTGCTG GCCAACCTG[CG][[CG]]GACCAG[[CG]]CTCT GGCTGC[[CG]]][[CG]]CAGCCACTGCA[[CG]]G CCCAGCTGTG[[CG]]
ML_cg10210594_i	N/A	1	208132750	208132848	chr1:208132 750-208132848	99	952		CTG[[CG]]CCAGGACCCTGCAGACC[[CG]]GC[[CG]]][[CG]]GC[[CG]]GGC[[CG]]AGTGCCTCC[CG]C[CG]GGGCCTTA[CG]CCCA[CG]GTCCA[[CG]]CTTGCAACACCAGGGCTGTA[[CG]]G
ML_cg11073558_ii	GDF6	8	97171863	97171947	chr8:971718 63-97171947	85	953		CCACT[[CG]]TGTTGAGGCCT[[CG]]GAGCAG C[CG]GGAGCACCA[[CG]]CTGGAGCAAAAAA GC[[CG]]GAGGG[CG]CAGGGCTCCAGCC[[C G]]GCTGAC
ML_cg27206674_ii	GAD2	10	26507075	26507154	chr10:26507 075-26507154	80	954		G[[CG]]GGACCTGCC[[CG]]CTGGGTCCAAGC CCC[[CG]]AACCTGGCCT[[CG]]GAGCTCCAA GAGGGCTCTGAGGC[[CG]]TGG[[CG]]CTCTT CC
ML_cg21133153_i	N/A	6	29521450	29521539	chr6:295214 50-29521539	90	955		TCACCAACT[[CG]]GTTG[[CG]]CAAAC[[CG]]I CG]CTCCTGGCTGAG[[CG]]GC[[CG]]CTGTG[[CG]]][CG]CCC[CG]CCTGCTGGACCACTTCATC TGTGAGCTGC[[CG]]G
ML_cg13791254_i	FOXE1	9	100616565	100616638	chr9:100616 565-100616638	74	956		GGGCAACTACTGGG[[CG]]CTTGACCCCAA[[CG]]I[[CG]]GAGGACATGTT[[CG]]AGAG[[CG]]GCAGCTTCCTG[[CG]]C[[CG]]C[[CG]]CAAGC

SEQ ID NO: 501
TGAAGCTGCT[CG]AGG[CG]AGGCCACTG[CG]CACCC[CG][CG]CTG[CG][CG]CTGGCCT[CG]TGCTG[CG]G[CG]TCT
GGGC[CG]TGG[CG]CTGCTGGC[CG]GCCTGCCCTCCCTGGTCTAC[CG]GGGGTTGCAGCCCCTGCCTGGGGGCCAG
GACAGCCAGTG[CG]G[CG]AGGAGCCCTCCCA[[CG]]CCTTCCAGGGCCTCAGCTTGCTGCTGCTGCTGACCTT[
CG]TGCTGCCCCTGGT[CG]TCACCCTCTTCTGCTACTGC[CG]CATCT[CG][CG]C[CG]CCTG[CG]A[CG]GC[CG]C[CG]
CA[CG]TGGGT[CG]GGCC[CG]GAGGAACT[[CG]]CTG[CG]CATCATCTT[CG]CCAT[CG]AGAGCA[CG]TTTGTGGGCT
CCTGGCTGCCCTTCAG[CG]CCCTG[CG]GGC[CG]TCTTCCACCTGG[CG][CG]TCTGGGGG[CG]CTGC[CG]CTGC[CG]
TGCCCCCTGCTGCTGG[CG]CTG[CG]CTGGGGCCTCACCATTGCCACCTGCCTGGCCTT[CG]TCAACAGCTG[CG]CC
AACC[CG]CTCATCTACCTCCTGCTGGAC[CG]CTCATTC[CG]AGCC[CG]GG[CG]CTGGA[CG]GGGCCTG[CG]GG[CG]
CAC[CG]GC[CG]CCTGG[CG][CG]AAGGATCAGCTCAGCCTCCT[CG]CTCTCCAGGG

SEQ ID NO: 502
CC[CG]AGCACCCA[CG]TGCAGCTTC[CG]ATCACAGCCCTGG[CG]TGGCTTCTCTGTCCC[CG]GCTAAGGCC[CG][C
G]GT[CG]CTGCAGGGTGCCT[CG]C[CG]AGGGTG[CG]GGCT[CG]GGGCTCACAGTGCTCCCAGCCTCTCCCACCCCA
ACCC[CG]CCATTAAGGGGAGCCCCAG[CG]A[CG]CCCTGAACCCTGAAAGTCACACTGGGGC[CG]GGGCTGCACTT
GG[CG]TC[CG]CTTCCCCTCC[CG]TCACAGTGACCAGGGCTAGGGC[CG][CG]GT[CG]GGGC[CG]T[CG]GGGAGAG[C
G]GAGGG[CG][CG]TGGGAATGGGGCT[[CG]]CTG[CG]CCA[CG]GAAATCC[CG][CG]C[CG]CCCTT[CG]AGTCCTCCC
AGCTGCTC[CG]CAGAGC[CG]GGGC[CG]CTGCCAT[CG][CG]TCTGCCC[CG]AGGGTG[CG]CAGG[CG]GGTACCTGT
CC[CG]ACT[CG]GGGAACAG[CG]GGAGCC[CG]GAGA[CG]CC[CG]T[CG]GGCTTCCCAGCCCCACCTGGGA[CG]TCT
CTAGGGG[CG]GGAGGCCAGGAGAGAAGAGGGTGGGAGAGATGAGCTGCAGGGGGGATA[CG]GGACCCAGGGACC[
CG]GGATCTTATAACA[CG]CTTTCCACC[CG]TAGGATTGGGGCCCACAAATGACCA

SEQ ID NO: 503
GGTTAGAAAAG[CG]TGGTTCTTG[CG]CAGGAAAGTTGGAGCAAAGAAGAGTTCAGAAGTGGG[CG]GGTGTGTGTT
TAAAAAAAAAAAAGGGGGTGGAAACCCCACCAGCCAAGTCTGCAGAAAAAAAATAAATGAAGTCTGCCTATCTC[
CG]GGCCAGAGCCCCTCCCCT[CG]GCC[CG][CG][CG]GGAGGAGTGTGACCCAGGTGC[CG]CTTCCTCT[CG]C[CG]C
[CG]AGGGTCAGGAGCC[CG]GGAG[CG][CG]ACCCTCCCC[CG]GCC[CG]GCCTGGCC[CG]GCCTGGCCAGTCCC[CG]
[CG]GTCTCTGCC[CG]GGCTGA[[CG]]CCCAGGAATGTGGT[CG]A[CG]AGAAGCCCCAACAGCA[CG]G[CG]TGGCCT
CTCAGCCT[CG]GTGAGTACC[CG]C[CG]TGGGGAAGGGTCCTGGGGACCCACTGGAGGC[CG][[CG]]GCC[CG]CAGC
AGCCAGGGGC[CG]AGCCA[CG]GCCA[CG]GA[CG]CCCTGGTGTCC[CG]GTC[CG]TGC[CG]GGCCTCCAGG[CG]GAG
GAGG[CG]TC[CG]CTGGGCTCAGATCCC[CG]ACTCCAGCCC[CG]GTTCCC[CG]G[CG]CCTGGGCTG[CG][CG]GAGT
CCCTGTCC[CG][CG]TCC[CG]GACCCCTA[CG][[CG]]CAGCCTCCA[CG][CG]CTC[CG]AGC

SEQ ID NO: 504
CCAAGTCTGCAGAAAAAAAATAAATGAAGTCTGCCTATCTC[CG]GGCCAGAGCCCCTCCCCT[CG]GCC[CG][CG][C
G]GGAGGAGTGTGACCCAGGTGC[CG]CTTCCTCT[CG]C[CG]C[CG]AGGGTCAGGAGCC[CG]GGAG[CG][CG]ACCC
TCCCC[CG]GCC[CG]GCCTGGCC[CG]GCCTGGCCAGTCCC[CG][CG]GTCTCTGCC[CG]GGCTGA[[CG]]CCCAGGAAT
GTGGT[CG]A[CG]AGAAGCCCCAACAGCA[CG]G[CG]TGGCCTCTCAGCCT[CG]GTGAGTACC[CG]C[CG]TGGGGAA
GGGTCCTGGGGACCCACTGGAGGC[CG][[CG]]GCC[CG]CAGCAGCCAGGGGC[CG]AGCCA[CG]GCCA[CG]GA[CG]
CCCTGGTGTCC[CG]GTC[CG]TGC[CG]GGCCTCCAGG[CG]GAGGAGG[CG]TC[CG]CTGGGCTCAGATCCC[CG]ACT
CCAGCCC[CG]GTTCCC[CG]G[CG]CCTGGGCTG[CG][CG]GAGTCCCTGTCC[CG][CG]TCC[CG]GACCCCTA[CG][[CG
]]CAGCCTCCA[CG][CG]CTC[CG]AGCTGGAGAAGC[CG]CCAGCC[CG]CCCTCCCAGGG[CG]TGT[CG]CC[CG]CTTTC
TGTTTCTTTGTG[CG]GGGCATGTGAAATGTGTGGGGCCAGAATTGTCTCCCTAAAGAACA

SEQ ID NO: 505
CTCTA[CG]GAGA[CG]C[CG]AGAAGC[CG]G[CG]GAGAG[CG]G[CG]GGAGCCAACCCC[CG][CG]GGC[CG]C[CG]CC[
CG]GAAGGC[CG]CCTG[[CG]]CCTG[CG]ACCAGAAGCCCTGCAGCTGCTCCAAAGTGGATGTCAACTA[CG][CG]TTT
CTCCATGCAACAGGTAAAGACTCAG[[CG]]GGGAGCCC[CG]GGG[CG]CCCCTGCCCCTCTCTCTGCCC[CG]CCCAC[
CG][CG]GC[CG]GTG[CG]GGTC[CG]G[CG]CTGAGAGC[CG]GACAGGGG[CG]T[CG]AGGTGGCAG[CG]GAGG[[CG]]G
GACCTGCCAGAATCTTCAGATAAAAG[CG]AGAAATG[[CG]]GGACCTGCC[CG]CTGGGTCCAAGCCCC[CG]AACCT
GGCCT[CG]GAGCTCCAAGAGGGCTCTGAGGC[CG]TGG[CG]CTCTTCCCCCAG[CG][CG]GCCCTTGGGATGG[CG]G
GTGGC[CG]A[CG]ATCCAGG[CG]CT[CG]TG[CG]CTCACTGAAT[CG]ATGA[CG]GCTGGCTTCCCTAGGC[CG]CTGG
GGCCT[CG]GGTGGGACTCAGTTTCCAAATAC[CG]TGCC[CG]AGAATTCAGAATTGCATTTTTTTTAGGTCTTTAGA
TCA[[CG]]AGAGTGATTTGTAGCTGCAATTGCACAAGAGAA[CG]ATTCCATTCACATGAA

SEQ ID NO: 506
GCA[CG]AGCTGTCCC[CG]GGACCCAGCTCC[CG]GCTTCC[CG]CCCCT[CG]AGGGT[CG][CG]CT[CG]CAGGGG[CG][
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A[CG]ACCCC[CG]CCTCTCCAGGGTGGGA[CG]G[CG]TCCCCCCTTGC[CG]T[CG]CTCCAGGGAGCC[CG]GC[CG]C[C
G][CG]CCCTTCCTC[CG][CG]GGCTCCCACCCCCATTTC[CG]GGGTCTCCTCCCTCT[CG]CC[CG]CACCTTCC[CG][CG
]CTCCCTCCC[CG]CCCTCCC[CG]C[CG]CC[CG]CC[CG][[CG]]CTCACCTGGTTGTTTTTGCAGAGATCAGCCCACATG
CTGGTGC[CG]TCCCCTC[CG][CG]CATCAGGA[CG]TGGTAGGTGAAGAAGTAGATGCC[CG]GGATGGAGCAGGTGA
ACTTGC[CG]GTGGTGGGGT[CG]TAGTGGTTTC[CG]AGGTTGGTGACCA[CG]T[[CG]]T[CG]AACTTGAGCACCT[CG]
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SEQ ID NO: 507
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CCTGGAAGACCAC[CG]CCC[CG]GGCCCCAGG[CG][CG]TCCTGTCC[CG]TGCCTACCTC[CG]ACACCACCTCCAAG
AG[CG]CCAC[CG][CG]GAG[CG]GG[CG]CCTCCTGGA[CG]CTG[CG]GGGCCACT[CG]GGCT[CG]GTAGGCCACT[CG]
GGCT[CG]GTAGACTT[CG]GG[CG]GGCCCTGAGGGCTGAGCCAGGCTTAAGAGGG[CG]GG[CG]GGGC[[CG]][[CG]]
GGGCAT[CG]ACAGGT[CG]AGGGTAGGGAATTGACC[[CG]]GCCCA[CG]CAGATCCC[CG][CG]T[CG]TCTTCTCCC[[
CG]]CCCAC[CG]CAGCCATTGGC[CG]ACTCT[CG]ACT[CG]CCCTCTGTCCCCTGGGGT[CG]CTCACTTAACTCATCA
GTTTTCCAAACCCTCCCTGGGACCCTAGTGG[CG]AGCACT[CG]C[CG]CTGGCCTTCTAGGGCAGGCAGTATTGC[[C

G]]CTCCAGG[CG]TG[CG]GAGT[CG]GGGAGAAAAAAAC[CG]AACA[CG]TGTGCTACCCAGGGCCCCCAGATAAGC CCCTC[CG][CG][CG]CACACACACCCTGAAC[CG]GAGTCCAGAAGGC[CG]GACT[CG][CG]TCC
SEQ ID NO: 508 GGCCCCACTCCCTTCT[[CG]]C[CG]GGCTC[CG]GGCCAAGGAAG[CG][CG]GC[CG]GAGTCC[CG]GGAAGCCCCT[CG]GCAGCCAGCCAAGGGCCCTG[CG]AGGATGTGGATGG[[CG]][CG]GATGG[CG][CG]GCCTCCACCTG[CG]GGCAGT GGAGAGAG[CG]G[CG]AGAGGAAGAATATTCCC[CG][CG]AGC[CG]GGATAAGGGGCCCCTT[CG]GCT[[CG]]GTTG ACCCAGGTCAGATCCTCC[CG]C[CG]ACCTT[CG]GCC[CG]CCCTCTACAGG[CG]GCCCAGTTCTTCCCCTGCT[CG]G CTGCCCCTGCC[CG]CCCCT[CG]AGGGAG[CG]CC[[CG]]TAGCCAG[CG]CCCC[CG]TAAAGAAATAAGGAGG[CG]CC [CG]GCTTCC[CG]CCCAGGTA[CG]TGT[CG]GGACAG[CG]CAGGGGACTGGCTTGGGG[CG]G[CG]GTGGGTAG[CG]G [[CG]]CC[CG][CG][CG]G[CG]CTGGAAA[CG]GCCC[CG]CTTCCTTGGACCC[CG]GGGCTTGCAGGG[CG]GGCC[CG]G GGCTCTCTGAG[CG][CG]AGGCTGC[CG][CG]AC[CG]CC[CG]CC[CG]CCCAGGTCAGATC[CG]GAGGACCTGTGTGT TTGT[CG]GGGCCTGGGGTGAGAGAGGGGACT[CG]AGGGGAGAAGTAGAG[CG]GGAAACCAAGAGGGGG
SEQ ID NO: 509 ACCT[CG]TATTCTGGGGGTCTCT[CG]GGGCATTGGAGGGTCTGGCCAAGGCAGGAATGGGGG[CG]GCTGAGGGGG ACAGT[CG]CATTCACTTGG[CG]AG[CG]GGCCCAGGGATTCTGCAGGAATTGGAGGGAGGGTTGGGC[CG]GGGCTG [CG]CTCACCTGC[CG]AGTAGGG[CG][CG]GGCTGGTGGT[CG][CG]TAGGG[CG]CCAAGTG[CG]CAGTTGGAGGAGC [CG]AG[CG][CG]GGGCAGGG[CG]GCCCTGC[CG][CG]GGGAAAG[CG]GGC[CG]CAGGGGGCTGTATTGGAAGC[CG] C[CG]GGCTGGCTGCAGG[CG]CCAAAGT[[CG]]C[CG]TAGG[CG]GA[CG]CCTCCATGGC[CG]CCA[CG]CA[CG]AGT[CG]TA[CG]AATTGAGGTAGGAGTAGTCCAT[CG]GCC[CG]GGGGG[CG]GGGG[CG]GGGGC[CG]GGCCAGGC[CG]GG T[CG]GGGT[CG]GGGTC[CG]GGTGGAGGT[[CG]]GAAGGGAGGTT[CG]AG[CG]CCAGGCTC[CG]AGGACC[CG]AGG CCAGCTCTGAG[[CG]]CC[CG]AGAGTC[CG]CC[CG]CCC[CG]T[CG][CG]GC[CG]CACTCAGCC[CG]GGTGCAA[CG]C AAGTGCAGCCAGCC[CG]GCC[CG][CG][CG]CCTTTTAA[CG][CG]CAGGACCC[CG][CG]GAGGGGGG[CG]GGG[CG] G
SEQ ID NO: 510 [CG]G[[CG]]CC[CG]GCAGAGCCC[CG]GGACTCCTAGTTTTTGC[CG]C[CG]CTGAGGA[CG][CG]G[CG][CG]GGCTGC TGGC[CG][CG]T[CG]C[CG]AGGGAGGGCC[CG]GACAGCCCTGCAG[[CG]][CG]TCTCAG[CG]GAGCCCTGGGGGC[C G][CG]C[CG]CTCCTCCAAACATGATTCAGAAC[CG]CC[CG]TCAGCCTTGGCTCCAG[CG]CCTGG[CG][CG]AG[CG]A AC[CG]GGCTTGGCTGTCT[CG]GCCC[CG]TCTGAACCCTG[CG]GGC[CG][CG]GGCCAGGG[CG][CG]C[CG]GGATC[C G]CTG[CG]CCAGGACCCTGCAGACC[CG]GC[CG][CG]GC[CG]GGC[[CG]]AGTGCCTCC[CG]C[CG]GGGCCTTA[CG]C CCA[CG]GTCCA[CG]CTTGCAACACCAGGGCTGTA[CG]G[CG]GGTC[CG]CAGCTGGGTCTG[CG]CCTGGGACT[CG] GGGCTCCCTG[CG]CTCCT[CG]TGC[CG]CACCCCTTGCCTTAACCCCAAG[CG]GA[CG]GGTCCTGGGGCTTCAC[CG] GCCAGGC[CG]GAGCCCCAGCCCCACAACTCCCCCCCTCCCAC[CG]CACTGCCCCCTCTG[CG]CTGTGG[CG]GGAGT TGGGGACTGGGGC[CG]GAGAAAGGAGA[CG][CG]C[CG]GTCCTCAAGTCTCTTGAGCCATTT[CG]GTTC
SEQ ID NO: 511 GGAAGATCCCAGCCTGCC[CG]AAGG[CG]G[CG]TCTGACC[CG]CTGGTGGACCTGGTGGGTGTCTGTTCCTGATAC CTGGGGA[[CG]]AGG[CG]GGAG[CG]CCTTGAG[CG]CTGGGAAGCTT[CG]CCT[CG][CG]AGTCCC[CG]GCAGTGACA [CG]TGGGAG[CG]TTGGGCC[CG]GCACCCC[CG]A[CG]CTTC[CG]AGGTTT[CG]GGTGGT[CG]TTTTGCTCTCT[CG]G GGGCTTTTATTCCTTAAGTGGCTTTAAA[CG]AC[CG]AGGATGGGCCTCC[CG][CG]C[CG]C[CG]CAGCTGTCACTTC CTT[CG]GGAAAGGCTAG[CG]ACCTTGGA[[CG]][CG]CAGGCTCTGAAAACCAAGGTCCAGACCCATAC[CG]AG[CG] CCCAAAGAC[CG]CATTTGAATTCTCCT[CG]C[[CG]]GCCATTGAGGGAGAGAAAGGAA[CG]CTTAGTTCCATTCAC ATTCACAGAAAGAAG[CG]C[CG]AGGGTGGGGGAAA[CG]CAGTCTTGC[CG]GGTGAGC[CG]GGACAGGTTCCT[CG]CCTGCCCCC[CG]GC[CG]CTGCTTCCTCTTAGCTGAATGGGGAG[CG]ACC[CG]CCC[CG]GG[CG][[CG]]GCCTT[CG] GGGCTGAAGACTGAGGTGCAGCCTCACCCC[CG]GCCTGGCAG[CG]GCTTGGAAGA
SEQ ID NO: 512 TGGGCTGAGGACAGGGGAGGATTAGGGTGGGTGGCCTGGGCTGGGACAAAGGTTTGAGA[CG]GGGAACCAGGAG GAGAGAGGTGAGGAAAAGGCTAAGTCAGAGTC[CG][CG]ACCTTGC[CG]GCTCTATACCTTCAGAGGGCTGCAGA G[[CG]][CG][CG][CG]TCAAGTC[CG][CG]GAAAGTTTTACTAGTCAGCTCCTCCAG[CG][CG]CACAG[CG]G[CG]A[CG]TTGGACC[CG]GACC[CG]ACTCTGGAAGCTG[CG]G[CG]CAGAGGGTGCT[CG]GGGGACCATG[CG][CG]GGGCTAG GATGTCTG[CG]ATGCTTAAGAGTGTC[[CG]]GGGTGTT[CG]GGGCT[[CG]][[CG]]TCC[CG]AGTTCATGGT[CG]GC[C G]GGCTGGGG[CG]GTC[CG]GCTGTC[CG]TTG[[CG]]CTAGGCTC[[CG]]CAAA[CG]CCTGGGCCCCAGTGCT[[CG]]GC TCCCAATC[CG]GGCCCCCAGCCT[CG]GACC[CG]CCCC[CG]GCTCTGGGCC[CG]AGTCC[CG]TGTGCCCCTCCTCCT G[CG]CCCCCACCTCTCCACCC[CG]GGC[CG][CG]GTGGATCTGGAGCTCCTAGATGTC[CG]GGGAGGGTATTTCTAC AGGCTGGGGCAGG[[CG]][CG]GAGAGCAGAAGC[CG]ACCAAACTACCCACCAGAGCAGG
SEQ ID NO: 513 CAGGAGGAGAGAGGTGAGGAAAAGGCTAAGTCAGAGTC[CG][CG]ACCTTGC[CG]GCTCTATACCTTCAGAGGGC TGCAGAG[[CG]][CG][CG][CG]TCAAGTC[CG][CG]GAAAGTTTTACTAGTCAGCTCCTCCAG[CG][CG]CACAG[CG]G[CG]A[CG]TTGGACC[CG]GACC[CG]ACTCTGGAAGCTG[CG]G[CG]CAGAGGGTGCT[CG]GGGGACCATG[CG][CG]G GGCTAGGATGTCTG[CG]ATGCTTAAGAGTGTC[[CG]]GGGTGTT[CG]GGGCT[[CG]][[CG]]TCC[CG]AGTTCATGGT[CG]GC[CG]GGCTGGGG[CG]GTC[CG]GCTGTC[CG]TTG[[CG]]CTAGGCTC[[CG]]CAAA[CG]CCTGGGCCCCAGTGCT [[CG]]GCTCCCAATC[CG]GGCCCCCAGCCT[CG]GACC[CG]CCCC[CG]GCTCTGGGCC[CG]AGTCC[CG]TGTGCCCCT CCTCCTG[CG]CCCCCACCTCTCCACCC[CG]GGC[CG][CG]GTGGATCTGGAGCTCCTAGATGTC[CG]GGGAGGGTAT TTCTACAGGCTGGGGCAGG[[CG]][CG]GAGAGCAGAAGC[CG]ACCAAACTACCCACCAGAGCAGGGCCA[CG]GGG CTGCTC[CG][CG]CTG[CG]GGG[CG]CTGCAC[CG]TGCACAGTCAGGC[CG]GGCCATACCTCCAGA
SEQ ID NO: 514 CTC[CG]GGTAAGTTGC[CG]CCTCC[CG]CCCC[CG]C[CG]TT[CG]GAAGCCC[CG]GGCAG[CG]GGAGGT[CG]TCCC[C G]GATCC[CG][CG]GGG[CG]CTCACACACC[CG]G[CG]GGGCTCTCC[CG]GGCTCCCC[CG]C[CG][CG]CTCCC[CG]CT GCATCCAGCC[CG]G[CG]CC[CG][CG]CT[CG]G[CG]AAGCTGCCTG[CG]GT[CG]GCAGGAG[CG]GGAAGC[CG]CCTG GGCAG[CG]GGGAG[CG]G[CG]GAGCAGGGTGGGAGTGGGGCT[CG]GTGGAGGACC[CG]GGGAGCTC[CG]CCTGCA

C[CG]GACC[CG]C[CG]AGCCTCCCT[CG]AA[CG]CCCAAAGCC[[CG]]TAGC[CG]CTACC[CG]GAGCT[CG]GCTTGCCT GCATGGGGCAGGCTTCCACTGG[CG]GAGC[CG]G[CG][CG]CCCTCCAT[CG]CC[CG]GGAGC[CG][CG][CG]C[CG][C G]GGAGTTGC[CG]AGCCCAGCCC[CG]GC[CG]TGGCTGAAGG[CG]TGGGG[CG]CC[CG]G[CG]GCTG[CG]GGCCAGG GATC[CG][CG]AGTG[CG]GGG[CG]CCTGCC[CG]ACCTCTCCTGCCCAAGGCCTGGGGGTC[CG]TCTAG[CG]G[CG]C[CG]CTCAGTTCTGTGGGTGC[CG]GCAGGACC[CG][CG]CTG[CG]GGTGGG[CG]G[CG]GGGTAGGACTG[CG]GGGCA CTCTCA
SEQ ID NO: 515
AC[CG]GTGCC[CG]CAGTCCC[CG]CCTCCT[CG]GC[CG]C[CG]CCTCCA[CG]GGG[CG]GGGCCCTGGCC[CG]GGACC AG[CG]C[CG][CG]GCTATAAATGGGCTG[[CG]]G[[CG]]AGGC[[CG]]GCAGAA[[CG]]CTGTGACAGCCACA[CG]CCCC AAGGCCTCCAAGATGAGCTACA[CG]TTGGACT[[CG]]CTGGGCAACC[CG]TC[CG]CCTAC[CG]G[CG]GGTAAC[CG] AGACC[CG]CT[CG]AGCTTCAGC[CG][CG]TCAG[CG]GCTCCC[CG]TCCAGTGGCTTC[CG]CT[CG]CAGT[CG]TGGTC C[CG][CG]GCT[CG]CCCAGCAC[CG]TGTCCTCCTCCTATAAG[[CG]]CAGCATGCT[CG]CCC[CG][CG]CCT[CG]CTTA CAGCT[CG]GCCATGCTCAGCTC[CG]C[CG]AGAGCAGCCTTGACTTCAGCCAGTCCT[CG]TCCCTGCTCAA[CG]G[C G]GCTC[CG]GACC[CG]G[CG]G[CG]ACTACAAGCTGTCC[CG]CTCCAA[CG]AGAAGGAGCAGCTGCAGGGGCTGAA [CG]AC[CG]CTTTGC[[CG]]GCTACATAGAGAAGGTGCACTACCTGGAGCAGCAGAATAAGGAGATTGAGG[CG]GA GATCCAGG[CG]CTG[CG]GCAGAAGCAGGCCT[CG]CA[CG]CCCAGCTGGG[CG]A[CG][CG]TA[CG]ACCAGGAG
SEQ ID NO: 516
GAGGATTAGGGTGGGTGGCCTGGGCTGGGACAAAGGTTTGAGA[CG]GGGAACCAGGAGGAGAGAGGTGAGGAA AAGGCTAAGTCAGAGTC[CG][CG]ACCTTGC[CG]GCTCTATACCTTCAGAGGGCTGCAGAG[[CG]]CG][CG][CG]TC AAGTC[CG][CG]GAAAGTTTTACTAGTCAGCTCCTCCAG[CG][CG]CACAG[CG]G[CG]A[CG]TTGGACC[CG]GACC[C G]ACTCTGGAAGCTG[CG]G[CG]CAGAGGGTGCT[CG]GGGGACCATG[CG][CG]GGGCTAGGATGTCTG[CG]ATGCT TAAGAGTGTC[[CG]]GGGTGTT[CG]GGGCT[[CG]][[CG]]TCC[CG]AGTTCATGGT[CG]GC[CG]GGCTGGGG[CG]GTC[CG]GCTGTC[CG]TTG[[CG]]CTAGGCTC[[CG]]CAAA[CG]CCTGGGCCCCAGTGCT[[CG]]GCTCCCAATC[CG]GGCCC CCAGCCT[CG]GACC[CG]CCCC[CG]GCTCTGGGCC[CG]AGTCC[CG]TGTGCCCCTCCTCCTG[CG]CCCCCACCTCTC CACCC[CG]GGC[CG][CG]GTGGATCTGGAGCTCCTAGATGTC[CG]GGGAGGGTATTTCTACAGGCTGGGGCAGG[[C G]][CG]GAGAGCAGAAGC[CG]ACCAAACTACCCACCAGAGCAGGGCCA[CG]GGGCTGCTCC
SEQ ID NO: 517
TTTCTGTACCCA[CG]CTCCATACC[CG]AGGCTGGG[CG]AG[CG]GTGAACCCTAGCAGT[CG][CG]G[CG]ACTGGAC A[CG]GGGGTTCTACTCTTTCTGAAC[CG]AGACAAGCCCCTGGGCCC[CG]TGCCCCAGAGCTA[CG]ATCCTGCTGCC CCTACCTG[CG]GCCTGGC[CG][CG]CTCTCACCTGAGCCCCCTG[CG]CCAGCTGCTC[CG]CCTC[CG]GTCCC[CG][CG]GG[CG]CTCC[CG]CTCCAGGTCCCC[CG]C[CG]T[CG]G[CG]G[CG]CACACTGAAC[CG]AAGACCT[CG]TAGG[CG]GG CCT[CG]GGGGGATGATGC[CG]TTGG[CG]G[[CG]]GCCAG[CG]CCAGCCCCT[CG]GCAGTGC[CG]TAGAGCAGCTGC AGCT[CG][CG][CG]CCT[CG]TTCTCCTCCTG[CG]CCTGCTGCCTG[CG]CAG[CG]CCACCTG[CG]C[CG]CCATGACA[C G]CTGG[CG]CTC[CG][CG]ATGAG[CG]TGCACTTGG[[CG]]CACAGGCAGTCCTTCCAG[CG]ACAGTAG[[CG]]TTTGT GGCCCTTGAGGGC[[CG]]ACACCA[CG]CCATGGTTG[CG]ACAG[CG][CG][CG]CACTTGGGGGTC[CG][CG]GGTACT TCT[CG]GCTGCC[CG]CAGCAACAGTGG[CG]GCCCC[CG]CAGCAAGC[CG]CCTGCCA[CG]CTCAC
SEQ ID NO: 518
CCTGAGCCCCCTG[CG]CCAGCTGCTC[CG]CCTC[CG]GTCCC[CG][CG]GG[CG]CTCC[CG]CTCCAGGTCCCC[CG]C[C G]T[CG]G[CG]G[CG]CACACTGAAC[CG]AAGACCT[CG]TAGG[CG]GGCCT[CG]GGGGGATGATGC[CG]TTGG[CG]G[[CG]]GCCAG[CG]CCAGCCCCT[CG]GCAGTGC[CG]TAGAGCAGCTGCAGCT[CG][CG][CG]CCT[CG]TTCTCCTCCTG[CG]CCTGCTGCCTG[CG]CAG[CG]CCACCTG[CG]C[CG]CCATGACA[CG]CTGG[CG]CTC[CG][CG]ATGAG[CG]TGCA CTTGG[[CG]]CACAGGCAGTCCTTCCAG[CG]ACAGTAG[[CG]]TTTGTGGCCCTTGAGGGC[[CG]]ACACCA[CG]CCAT GGTTG[CG]ACAG[CG][CG][CG]CACTTGGGGGTC[CG][CG]GGTACTTCT[CG]GCTGCC[CG]CAGCAACAGTGG[CG] GCCCC[CG]CAGCAAGC[CG]CCTGCCA[CG]CTCAC[CG]GTAG[CG]ATGCAG[CG]GC[CG]C[CG][CG]GCTGC[CG]CC AC[CG]A[CG]CCAC[CG]A[CG]CCACAGG[CG]GCCC[CG]T[CG]CTGTTGC[CG]C[CG]C[CG]C[CG]T[CG]C[CG][CG]C[CG]GGCA[CG]CTGGGCAGCTC[CG]AG[CG]CAGCTCCATGACAGGACCTGA[CG]GGAAAGAAGGTGGGAGAGGGG AGAGA
SEQ ID NO: 519
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SEQ ID NO: 520
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SEQ ID NO: 521
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SEQ ID NO: 522
[CG]G[CG]CTGGTGCTGCTGG[[CG]]GTG[[CG]]][[CG]]ACC[CG][[CG]]CCTGCACA[[CG]]CCCATGTACTACTTCCTCTGCCACCTGGCCTTGGTAGA[CG][CG]GGCTTCACTACTAG[[CG]]TGGTGC[[CG]]C[CG]CTGCTGGCCAACCTG[CG][CG]GACCAG[CG]CTCTGGCTGC[CG]][[CG]]CAGCCACTGCA[CG]GCCCAGCTGTG[CG]CAT[CG]CTGGCTCTGGGTTC[CG]C[CG]AATG[CG]TCCTCCTGG[CG]GTGATGGCTCTGGAC[[CG]][CG][CG]GC[CG]CAGTGTGC[CG]CC[CG]CTG[CG]CTATG[CG]GGGCT[CG]TCTCCC[CG][CG]CCTATGT[CG]CA[[CG]]CTGGCCAG[[CG]]CCTCCTGGCTAAG[CG]GCCTCACCAACT[CG]GTTG[CG]CAAAC[CG][CG]CTCCTGGCTGAG[[CG]]GC[CG]CTGTG[[CG]]][[CG]]CCC[[CG]]CCTGCTGGACCACTTCATCTGTGAGCTGC[CG]G[CG]TTGCTCAAGCTGGCCTG[CG]GAGG[CG]A[[CG]]GAGACACTAC[CG]AGAACCAGATGTT[[CG]]C[CG]CC[[CG]]][[CG]]TGGTCATCCTGCTGCTGC[[CG]]TTTGC[[CG]]TCATCCTGGCCTCCTA[CG]GTGC[CG]TGGCC[CG]AGCTGTCTGTTGCATG[CG]GTTCAG[CG]GAGGC[[CG]]GAGGAGGG[CG]GTGGGCA[CG]TGTG

SEQ ID NO: 523
CCC[[CG]]CAGACAGACCCAAGCTCTGGGACAGA[CG]CCCAG[CG]TCCCAGACAG[CG]CCTTCCTCTGGGCCATGCTGGTAGGCC[CG]GGTCCAGGGC[CG]GGTGA[CG]AGAC[[CG]]TAGCCCCCCATTGGTTCT[CG]CAGAAACCA[CG]TGCTAGCTCTGCACCTTCCTCCCCCAG[CG]CTTTCTTCC[CG][CG]CC[CG]T[CG]AATCCTCTCCAGTCCCCAGT[CG]CCTTCCTGGGAGGTTTGGTT[CG]TATTGA[CG]GTTCTCAAAGCAAAGAAAA[CG]TGGAGAGACAGTGCTG[CG][CG][CG]GCTTGGATCTC[CG]TCAATA[[CG]]GTACTAG[CG]GGAGCTTC[CG]AGGTCAACCTAGGGTCCA[CG]GGGACCCTCCTAGTGGACATG[CG]GGGATTGGAGGTGGAGTCCTTGCTGTGCAACC[CG]ATC[[CG]]GTCCATCCAGCCTGGTCTTAGCTCAACTCTGCATTCTTATGG[[CG]]GAGGAAAGCTAAGATAGAGACAGCTGGGACC[CG][CG]GAATTTGAGG[CG][CG][CG]CTGGGATCTTA[CG]TG[CG]CAGAGGC[CG]GAC[[CG]]CAGAGTAGAAGTGAGTCTTGACCCACCAGGGCCTATATTGAGATGGAAACCTCTCTCTTTGAACAGAATCC

SEQ ID NO: 524
TCCCTGCAGC[CG]GTCCTCTT[CG]CCCTTGTCCTCCTGTGCTACCTCCTGACCTTGA[CG]GGCAACT[CG]G[CG]CTGGTGCTGCTGG[[CG]]GTG[[CG]]][[CG]]ACC[CG][[CG]]CCTGCACA[[CG]]CCCATGTACTACTTCCTCTGCCACCTGGCCTTGGTAGA[CG][CG]GGCTTCACTACTAG[[CG]]TGGTGC[[CG]]C[CG]CTGCTGGCCAACCTG[CG][CG]GACCAG[CG]CTCTGGCTGC[CG][[CG]]CAGCCACTGCA[CG]GCCCAGCTGTG[CG]CAT[CG]CTGGCTCTGGGTTC[CG]C[CG]AATG[CG]TCCTCCTGG[CG]GTGATGGCTCTGGAC[[CG]][CG][CG]GC[CG]CAGTGTGC[CG]CC[CG]CTG[CG]CTATG[CG]GGGCT[CG]TCTCCC[CG][CG]CCTATGT[CG]CA[[CG]]CTGGCCAG[[CG]]CCTCCTGGCTAAG[CG]GCCTCACCAACT[CG]GTTG[CG]CAAAC[CG][CG]CTCCTGGCTGAG[[CG]]GC[CG]CTGTG[[CG]]][[CG]]CCC[[CG]]CCTGCTGGACCACTTCATCTGTGAGCTGC[CG]G[CG]TTGCTCAAGCTGGCCTG[CG]GAGG[CG]A[[CG]]GAGACACTAC[CG]AGAACCAGATGTT[[CG]]C[CG]CC[[CG]]][[CG]]TGGTCATCCTGCTGCTGC[[CG]]TTTGC[[CG]]TCATCCTGGCCTCCTA[CG]GTGCC

SEQ ID NO: 525
TGTCCCAA[[CG]]CACTTTGGGGAGGGAGAGCTTCC[CG][CG]GATC[CG]CCTGGGTTTGGGAGGAC[CG]GGGTCCACTCTGCAC[CG]GCCAGGGCCTGAGGGGCCCAGCAGCTGGAATACAGCAATCTCC[CG]CCCACCTGCT[CG]CAG[[CG]]TACAGAGCACAACAT[CG]CTCACCTG[CG]GCCCCCAGGGCCAGAAGAGAACTCCCTCCTA[CG]GAG[[CG]]AAGGCAAGAGGCCT[CG]AACCCTTTTGGGACC[CG]GAACCCATCAAAAGTGACCCACAAAGGC[CG]GAAG[CG]GCCA[CG]GGGGGTCTAAGAACCAGCC[[CG]][CG][CG]GGG[CG]CACTTC[CG][CG]GC[CG]CTCTAGGAAGGGAG[CG]AAAGGGGCTTTCAACT[CG]GTAGTGTTTC[CG][CG][[CG]]TCTA[CG]TGAGAGGAAGGTTGATGGCTTTCAGGCC[CG]CTGGTAAATGGAA[CG]GGTTTATCTTCTCCTCTTCTTTACCCAGCCATTGTCCACACTTCCCC[CG]ACC[[CG]]ATGGGTGGT[CG]AGGCTTGTAGAACTGATCTTAAGACAGGGAAATCCCTTG[CG]TCTCCATTCACTTTGGGATTCTGTGTCTCTGAGGTTAGAGATGCCTCAAAGGGATGTTCTC[CG]GGGGA

SEQ ID NO: 526
CC[CG][CG]GTCTCTGCC[CG]GGCTGA[[CG]]CCCAGGAATGTGGT[CG]A[CG]AGAAGCCCCAACAGCA[CG]G[CG]TGGCCTCTCAGCCT[CG]GTGAGTACC[CG]C[CG]TGGGGAAGGGTCCTGGGGACCCACTGGAGGC[CG][[CG]]GCC[CG]CAGCAGCCAGGGGC[CG]AGCCA[CG]GCCA[CG]GA[CG]CCCTGGTGTCC[CG]GTC[CG]TGC[CG]GGCCTCCAGG[CG]GAGGAGG[CG]TC[CG]CTGGGCTCAGATCCC[CG]ACTCCAGCCC[CG]GTTCCC[CG]G[CG]CCTGGGCTG[CG][CG]GAGTCCCTGTCC[CG][CG]TCC[CG]GACCCCTA[CG][[CG]]CAGCCTCCA[CG][CG]CTC[CG]AGCTGGAGAAGC[CG]CCAGCC[CG]CCCTCCCAGGG[CG]TGT[CG]CC[CG]CTTTCTGTTTCTTTGTG[CG]GGGCATGTGAAATGTGTGGGGCCAGAATTGTCTCCCTAAAGAACAGTTAGGTGAGAGTTCACATCACAAGTTGCTTCTGTGCTGCTCCCCAGCCAGGGTC[CG]AC[CG]GCCAGGCTC[CG]GTGAACTCCAGGCAACTCCAGCCTTGCCCAGGGACTTGCT[CG]CTC[CG]CTGGG[CG]C[CG]CAAAGGCACACAGATG[[CG]]AGGGAATCCTG[CG]GCCTGGATCCTT

SEQ ID NO: 527
CTGGCCTTGGTAGA[CG][CG]GGCTTCACTACTAG[[CG]]TGGTGC[[CG]]C[CG]CTGCTGGCCAACCTG[CG][CG]GACCAG[CG]CTCTGGCTGC[CG]][[CG]]CAGCCACTGCA[CG]GCCCAGCTGTG[CG]CAT[CG]CTGGCTCTGGGTTC[CG]C[CG]AATG[CG]TCCTCCTGG[CG]GTGATGGCTCTGGAC[[CG]][CG][CG]GC[CG]CAGTGTGC[CG]CC[CG]CTG[CG]CTATG[CG]GGGCT[CG]TCTCCC[CG][CG]CCTATGT[CG]CA[[CG]]CTGGCCAG[[CG]]CCTCCTGGCTAAG[CG]GCCTCACCAACT[CG]GTTG[CG]CAAAC[CG][CG]CTCCTGGCTGAG[[CG]]GC[CG]CTGTG[[CG]]][[CG]]CCC[[CG]]CCTGCTGG

ACCACTTCATCTGTGAGCTGC[CG]G[CG]TTGCTCAAGCTGGCCTG[CG]GAGG[CG]A[[CG]]GAGACACTAC[CG]AG AACCAGATGTT[[CG]]C[CG]CC[[CG]][[CG]]TGGTCATCCTGCTGCTGC[[CG]]TTTGC[[CG]]TCATCCTGGCCTCCTA[CG]GTGC[CG]TGGCC[CG]AGCTGTCTGTTGCATG[CG]GTTCAG[CG]GAGGC[[CG]]GAGGAGGG[CG]GTGGGCA[CG]TGTGGGTCCCACCTGACAGC[CG]TCTGCCTGTTCTA[[CG]]GCT[[CG]]GCCATCTACACCTACCTGCAGCC[[CG]][[C G]]CAG
SEQ ID NO: 528 GGCTTCACTACTAG[[CG]]TGGTGC[[CG]]C[CG]CTGCTGGCCAACCTG[CG][CG]GACCAG[CG]CTCTGGCTGC[CG][[CG]]CAGCCACTGCA[CG]GCCCAGCTGTG[CG]CAT[CG]CTGGCTCTGGGTTC[CG]C[CG]AATG[CG]TCCTCCTGG[C G]GTGATGGCTCTGGAC[[CG]][CG][CG]GC[CG]CAGTGTGC[CG]CC[CG]CTG[CG]CTATG[CG]GGGCT[CG]TCTCCC[CG][CG]CCTATGT[CG]CA[[CG]]CTGGCCAG[[CG]]CCTCCTGGCTAAG[CG]GCCTCACCAACT[CG]GTTG[CG]CAAA C[CG][CG]CTCCTGGCTGAG[[CG]]GC[CG]CTGTG[[CG]][[CG]]CCC[[CG]]CCTGCTGGACCACTTCATCTGTGAGCTG C[CG]G[CG]TTGCTCAAGCTGGCCTG[CG]GAGG[CG]A[[CG]]GAGACACTAC[CG]AGAACCAGATGTT[[CG]]C[CG]C C[[CG]][[CG]]TGGTCATCCTGCTGCTGC[[CG]]TTTGC[[CG]]TCATCCTGGCCTCCTA[CG]GTGC[CG]TGGCC[CG]AG CTGTCTGTTGCATG[CG]GTTCAG[CG]GAGGC[[CG]]GAGGAGGG[CG]GTGGGCA[CG]TGTGGGTCCCACCTGACAG C[CG]TCTGCCTGTTCTA[[CG]]GCT[[CG]]GCCATCTACACCTACCTGCAGCC[[CG]][[CG]]CAG[[CG]]CTACAACCAG GCA[[CG]]G
SEQ ID NO: 529 AGTC[CG][CG]ACCTTGC[CG]GCTCTATACCTTCAGAGGGCTGCAGAG[[CG]][CG][CG][CG]TCAAGTC[CG][CG]GA AAGTTTTACTAGTCAGCTCCTCCAG[CG][CG]CACAG[CG]G[CG]A[CG]TTGGACC[CG]GACC[CG]ACTCTGGAAGC TG[CG]G[CG]CAGAGGGTGCT[CG]GGGGACCATG[CG][CG]GGGCTAGGATGTCTG[CG]ATGCTTAAGAGTGTC[[CG]]GGGTGTT[CG]GGGCT[[CG]][[CG]]TCC[CG]AGTTCATGGT[CG]GC[CG]GGCTGGGG[CG]GTC[CG]GCTGTC[CG]TT G[[CG]]CTAGGCTC[[CG]]CAAA[CG]CCTGGGCCCCAGTGCT[[CG]]GCTCCCAATC[CG]GGCCCCCAGCCT[CG]GAC C[CG]CCCC[CG]GCTCTGGGCC[CG]AGTCC[CG]TGTGCCCCTCCTCCTG[CG]CCCCCACCTCTCCACCC[CG]GGC[CG][CG]GTGGATCTGGAGCTCCTAGATGTC[CG]GGGAGGGTATTTCTACAGGCTGGGGCAGG[[CG]][CG]GAGAGCAG AAGC[CG]ACCAAACTACCCACCAGAGCAGGGCCA[CG]GGGCTGCTC[CG][CG]CTG[CG]GGG[CG]CTGCAC[CG]TG CACAGTCAGGC[CG]GGCCATACCTCCAGA[[CG]]CTGTATGC[[CG]]C[CG]ACTCCC[CG]CCTAGC[CG]C
SEQ ID NO: 530 A[CG][CG]GGCTTCACTACTAG[[CG]]TGGTGC[[CG]]C[CG]CTGCTGGCCAACCTG[CG][CG]GACCAG[CG]CTCTGGC TGC[CG][[CG]]CAGCCACTGCA[CG]GCCCAGCTGTG[CG]CAT[CG]CTGGCTCTGGGTTC[CG]C[CG]AATG[CG]TCCT CCTGG[CG]GTGATGGCTCTGGAC[[CG]][CG][CG]GC[CG]CAGTGTGC[CG]CC[CG]CTG[CG]CTATG[CG]GGGCT[CG]TCTCCC[CG][CG]CCTATGT[CG]CA[[CG]]CTGGCCAG[[CG]]CCTCCTGGCTAAG[CG]GCCTCACCAACT[CG]GTTG[CG]CAAAC[CG][CG]CTCCTGGCTGAG[[CG]]GC[CG]CTGTG[[CG]][[CG]]CCC[[CG]]CCTGCTGGACCACTTCATCTG TGAGCTGC[CG]G[CG]TTGCTCAAGCTGGCCTG[CG]GAGG[CG]A[[CG]]GAGACACTAC[CG]AGAACCAGATGTT[[C G]]C[CG]CC[[CG]][[CG]]TGGTCATCCTGCTGCTGC[[CG]]TTTGC[[CG]]TCATCCTGGCCTCCTA[CG]GTGC[CG]TGGC C[CG]AGCTGTCTGTTGCATG[CG]GTTCAG[CG]GAGGC[[CG]]GAGGAGGG[CG]GTGGGCA[CG]TGTGGGTCCCACC TGACAGC[CG]TCTGCCTGTTCTA[[CG]]GCT[[CG]]GCCATCTACACCTACCTGCAGCC[[CG]][[CG]]CAG[[CG]]CTAC AACCAGG
SEQ ID NO: 531 AGA[CG][CG]GGCTTCACTACTAG[[CG]]TGGTGC[[CG]]C[CG]CTGCTGGCCAACCTG[CG][CG]GACCAG[CG]CTCT GGCTGC[CG][[CG]]CAGCCACTGCA[CG]GCCCAGCTGTG[CG]CAT[CG]CTGGCTCTGGGTTC[CG]C[CG]AATG[CG]T CCTCCTGG[CG]GTGATGGCTCTGGAC[[CG]][CG][CG]GC[CG]CAGTGTGC[CG]CC[CG]CTG[CG]CTATG[CG]GGGCT [CG]TCTCCC[CG][CG]CCTATGT[CG]CA[[CG]]CTGGCCAG[[CG]]CCTCCTGGCTAAG[CG]GCCTCACCAACT[CG]GT TG[CG]CAAAC[CG][CG]CTCCTGGCTGAG[[CG]]GC[CG]CTGTG[[CG]][[CG]]CCC[[CG]]CCTGCTGGACCACTTCATC TGTGAGCTGC[CG]G[CG]TTGCTCAAGCTGGCCTG[CG]GAGG[CG]A[[CG]]GAGACACTAC[CG]AGAACCAGATGTT [[CG]]C[CG]CC[[CG]][[CG]]TGGTCATCCTGCTGCTGC[[CG]]TTTGC[[CG]]TCATCCTGGCCTCCTA[CG]GTGC[CG]TG GCC[CG]AGCTGTCTGTTGCATG[CG]GTTCAG[CG]GAGGC[[CG]]GAGGAGGG[CG]GTGGGCA[CG]TGTGGGTCCCA CCTGACAGC[CG]TCTGCCTGTTCTA[[CG]]GCT[[CG]]GCCATCTACACCTACCTGCAGCC[[CG]][[CG]]CAG[[CG]]CT ACAACCA
SEQ ID NO: 532 ACCCCTCCC[CG]CTGACCTCACT[CG]AGC[CG]C[CG]CCTGG[CG]CAGATATAAG[CG]G[CG]GCCCATCTGAAGAG GGCT[CG]GCAGG[CG]CC[CG]GGGTCCTCAG[[CG]]CTGCAGACTCCTGACCTGC[CG]ACTG[[CG]]GATCC[CG]AGT CCC[CG]GATCC[CG]GACCCATCCTGTGGAGCCCACTCCTGGCAGGTAAC[CG]CCCCAACCCCTCTCCTTC[CG]CAG A[CG]GTGTC[CG]GGAGCACTGGAAAGGGAGCCCTCT[CG]GCC[CG]CCCTCACCTT[CG]GTTCTCTGAGAGCTTCCT GGAGAACAGGGC[CG]GTGCACAGG[[CG]]GG[CG]CTGTGCT[CG]CACCCC[CG]GGTCCTCCC[CG]AG[CG]CAGGC[CG]GGGACC[CG]A[CG]GGAGGCA[CG]G[CG][CG]GGCACAT[CG]GAGGCTCT[CG]CTGCTGGGCACTCAGGT[CG]C CAGAGTC[CG]CAG[CG][CG]GGGTGGGAGCTC[CG][CG]GCACCCCCTGCCTGGGTGC[CG]C[CG]GACAGAGCTGGG TATTCAGGG[CG]T[CG]GCCTGAGAACCTGGGAGTT[CG]AATCCCAATCTCAA[CG]CTAGAAATAGAATTTTAG[CG]TTGAAGTTAGGATTTTAG[[CG]]TTAGAATCAGATTCCTGGCTTAGTCATGAAAG
SEQ ID NO: 533 TGTG[CG]CAGCAGG[CG]AGT[CG]GGAGCACCATCCCCTGAG[[CG]]CAACCTGGTGGGCCCCCTGGGGC[CG]CCCC TTTGG[CG]CC[CG]CTAGTG[CG]GGAGGGGCTATGCTCC[CG]GAGGTA[CG]TGG[CG]CCCCTGCCACCCTGAGAGC TATTTTCTATTCCCAGGTGGT[[CG]][CG]TTATCCTCATCCCC[CG]CCCTGCACCTT[CG]TCATCAGCTTTGCCTCTCC [CG]TGTC[CG]TGTGTAGCTCCATCCT[CG]TGCT[CG]CCTTCTTCATTGG[CG]GAAGCTGGGAGC[CG]AGAGAGTGA GC[CG]TG[CG]CAGATGTG[CG]G[[CG]]GTGGAGGTGGCTTTTGTTTCTCCTC[CG][CG]CCCCCTCCCCCCC[CG]CCC[CG]CACATTGCCTGT[CG]CTCTTCCCACCTAGGACCCTCAAACTGGTTCCCCCTGTACACAGAACCTGG[CG]ACCA[CG]GATCATCCCCTCTCTCTTCCTT[CG]ATG[CG]ATCATATAACATTTAGATTTTGCCAGGCCCCTTTAAATCATTGC TTCTTTGAACCCTCCCAACAATCCTAAAGGGAAATACTGTTTATGAACC[CG]TTTTACTAATCTGACAATTATAGC ATAAAGTTTAAGTAACTTGCTCAACATC

SEQ ID NO: 534
T[CG]CTGGCTCTGGGTTC[CG]C[CG]AATG[CG]TCCTCCTGG[CG]GTGATGGCTCTGGAC[[CG]][CG][CG]GC[CG]CAGTGTGC[CG]CC[CG]CTG[CG]CTATG[CG]GGGCT[CG]TCTCCC[CG][CG]CCTATGT[CG]CA[[CG]]CTGGCCAG[[CG]]CCTCCTGGCTAAG[CG]GCCTCACCAACT[CG]GTTG[CG]CAAAC[CG][CG]CTCCTGGCTGAG[[CG]]GC[CG]CTGTG[[CG]][[CG]]CCC[[CG]]CCTGCTGGACCACTTCATCTGTGAGCTGC[CG]G[CG]TTGCTCAAGCTGGCCTG[CG]GAGG[CG]A[[CG]]GAGACACTAC[CG]AGAACCAGATGTT[[CG]]C[CG]CC[[CG]][[CG]]TGGTCATCCTGCTGCTGC[[CG]]TTTGC[[CG]]TCATCCTGGCCTCCTA[CG]GTGC[CG]TGGCC[CG]AGCTGTCTGTTGCATG[CG]GTTCAG[CG]GAGGC[[CG]]GAGGAGGG[CG]GTGGGCA[CG]TGTGGGTCCCACCTGACAGC[CG]TCTGCCTGTTCTA[[CG]]GCT[[CG]]GCCATCTACACCTACCTGCAGCC[[CG]][[CG]]CAG[[CG]]CTACAACCAGGCA[[CG]]GGGCAAGTT[CG]TAT[CG]CTCTTCTACAC[CG]TGGTCACACCTGCTCTCAACC[CG]CTCATCTACACCCTCAGGAATAAGAAAGTGAAGGGGGCAG[CG]AGG

SEQ ID NO: 535
AATG[CG]TCCTCCTGG[CG]GTGATGGCTCTGGAC[[CG]][CG][CG]GC[CG]CAGTGTGC[CG]CC[CG]CTG[CG]CTATG[CG]GGGCT[CG]TCTCCC[CG][CG]CCTATGT[CG]CA[[CG]]CTGGCCAG[[CG]]CCTCCTGGCTAAG[CG]GCCTCACCAACT[CG]GTTG[CG]CAAAC[CG][CG]CTCCTGGCTGAG[[CG]]GC[CG]CTGTG[[CG]][[CG]]CCC[[CG]]CCTGCTGGACCACTTCATCTGTGAGCTGC[CG]G[CG]TTGCTCAAGCTGGCCTG[CG]GAGG[CG]A[[CG]]GAGACACTAC[CG]AGAACCAGATGTT[[CG]]C[CG]CC[[CG]][[CG]]TGGTCATCCTGCTGCTGC[[CG]]TTTGC[[CG]]TCATCCTGGCCTCCTA[CG]GTGC[CG]TGGCC[CG]AGCTGTCTGTTGCATG[CG]GTTCAG[CG]GAGGC[[CG]]GAGGAGGG[CG]GTGGGCA[CG]TGTGGGTCCCACCTGACAGC[CG]TCTGCCTGTTCTA[[CG]]GCT[[CG]]GCCATCTACACCTACCTGCAGCC[[CG]][[CG]]CAG[[CG]]CTACAACCAGGCA[[CG]]GGGCAAGTT[CG]TAT[CG]CTCTTCTACAC[CG]TGGTCACACCTGCTCTCAACC[CG]CTCATCTACACCCTCAGGAATAAGAAAGTGAAGGGGGCAG[CG]AGGAGGCTGCTG[CG]GAGTCTGGGGA

SEQ ID NO: 536
GCAAGGGG[CG]CA[CG]CAG[CG]GGAGCCACTGGGCCCAGCAGCA[CG]CAA[CG]A[[CG]]CCTCCTGCTGTTGAACTTGTTGGGGTCCAGGATGTCCAGTAC[CG]AGAAGGAGGTGGGG[CG]CAGGGG[CG]CTG[CG]GGC[CG]GGC[CG]CTCCAGCCCCCT[CG]GG[CG]C[CG]CAGGCACAGTGT[CG]CTGGC[CG][CG]AG[CG]G[CG]GGGCTCCAG[CG][CG]GGGAAAGGC[CG]GCAGCT[CG]G[CG][CG]CC[CG]TCCATAGCTTCCTGGGCAG[CG]G[CG]G[CG]GGAG[CG]GG[CG]GTG[CG]GGCCC[CG]AACCTGGCTGGGGAGG[CG]G[CG]GTAG[[CG]][CG]GGAATGTCCCCAGGAGCCT[CG]GGGC[CG]CTAG[CG]CTCATGC[CG]GCCTCC[CG]C[CG]CTC[CG]G[[CG]]GCT[[CG]]GGCCC[[CG]]CCACCTACTGGGCTCCCATCCCTGG[CG]GCCCC[CG]CACCTCCACA[CG]ACCC[CG][CG]CAGG[CG]GC[CG]CTGCTC[CG]CT[CG]CTCT[CG]G[CG]C[CG][CG]CCCTG[CG]CTTGGC[CG]GTGCTGCCTT[CG]C[CG]C[CG]CCTTAGG[CG]CC[CG][CG]G[CG]CC[CG]GTC[CG][CG]CATTTATGGCAGCCC[CG]C[CG]GAGG[CG]CCCA[CG][CG]CCCACA[CG]C[CG]AACACA[CG]TG[CG]CC[CG]CAGG[CG]GC

SEQ ID NO: 537
TGCTCACCATTGGCTCAGGGTC[CG]CCCTGAGTGGTCCTAGTCAGAGAT[CG]CAC[CG]TCACCACTACCCTACACACACACACAAG[CG][CG][CG][CG][CG][CG]GTGT[CG]GCTAGCCAGG[CG]GTGAAGGGGTGCTGGCTAGGCC[CG]GAGCACCC[CG]GGGT[CG]GGGGTGGAGTCT[CG]GTGGCCTCACCC[CG]C[CG]CCATGTGCTGCAGGTCTGGTTCCAGAAC[CG]G[CG]CTCCAAGGAG[CG]GAGGATGAAGCAGCTGAG[CG]CCCTGGG[CG]CC[CG]G[CG]CCA[CG]CCTTCTTC[CG]CAGTC[CG][CG]C[CG]GATG[CG]GC[[CG]]CTGGTGGAC[CG]CCTGGAGC[CG]GG[CG]AGCTCATCCCCAATGGTCCCTTCTCCTTCTA[CG]GAGGTGGGTG[CG][CG]C[CG]AATGG[CG]GGGCA[CG]GCCAGGT[CG]GGG[CG]GGCTT[CG]TTGGAAG[CG]GGTGGCAG[CG][CG]GGGGGGCA[CG]CCT[CG]CTCTCTGTAAGCCACTGGAGAGTTGGGG[CG]AGTAGGGAGAAGGCTGGGAGTAAATCAAGGGGAGG[CG]G[CG]AGAC[CG]AGGACCCAATTCA[CG]GCCCTGAATAA[CG]GGGGTAGCTGGTAAGGGGCAGCTCC[CG]GGCTTG[CG]CCCAGCCTCCTCC

SEQ ID NO: 538
CCTCCTGG[CG]GTGATGGCTCTGGAC[[CG]][CG][CG]GC[CG]CAGTGTGC[CG]CC[CG]CTG[CG]CTATG[CG]GGGCT[CG]TCTCCC[CG][CG]CCTATGT[CG]CA[[CG]]CTGGCCAG[[CG]]CCTCCTGGCTAAG[CG]GCCTCACCAACT[CG]GTTG[CG]CAAAC[CG][CG]CTCCTGGCTGAG[[CG]]GC[CG]CTGTG[[CG]][[CG]]CCC[[CG]]CCTGCTGGACCACTTCATCTGTGAGCTGC[CG]G[CG]TTGCTCAAGCTGGCCTG[CG]GAGG[CG]A[[CG]]GAGACACTAC[CG]AGAACCAGATGTT[[CG]]C[CG]CC[[CG]][[CG]]TGGTCATCCTGCTGCTGC[[CG]]TTTGC[[CG]]TCATCCTGGCCTCCTA[CG]GTGC[CG]TGGCC[CG]AGCTGTCTGTTGCATG[CG]GTTCAG[CG]GAGGC[[CG]]GAGGAGGG[CG]GTGGGCA[CG]TGTGGGTCCCACCTGACAGC[CG]TCTGCCTGTTCTA[[CG]]GCT[[CG]]GCCATCTACACCTACCTGCAGCC[[CG]][[CG]]CAG[[CG]]CTACAACCAGGCA[[CG]]GGGCAAGTT[CG]TAT[CG]CTCTTCTACAC[CG]TGGTCACACCTGCTCTCAACC[CG]CTCATCTACACCCTCAGGAATAAGAAAGTGAAGGGGGCAG[CG]AGGAGGCTGCTG[CG]GAGTCTGGGGAGAGGCCA

SEQ ID NO: 539
AG[CG]GC[CG]TCCTTCCCCAGCT[CG]AAGCC[CG]TAGCACATT[CG]CAGGCAAAGCCTCCCAAGT[CG]TCTAGGCAGTTAGGGAGCTCTG[CG]CATTTGCCAGCA[CG]GAGGTACCTCC[CG]GGGCAGGGACACAACACAT[CG]CC[CG]AGAGTTTGTCCCAG[CG]AG[CG]C[CG]ATTT[CG]TC[CG][CG]ATGCAAGTAACTGAGAT[CG]GGAGCTGTCCC[CG]GCAGAG[CG]CACTCACCT[CG]GTCCCAGGTGGACTGAAGTCCAGAG[CG]G[CG]CTGTGCAGCTGGAAGGG[[CG]][[CG]][CG]ATAGCTCAAGTTAGAGG[CG]GCCC[[CG]]GGG[CG][CG]G[CG]CAGGACACAAGACCTCAAACTGGTACTTGCACAGGTAGC[CG]TTGG[CG][CG]CAGGTGGCAT[CG]CATCTCCTTCCAGCCTG[CG]GGCT[CG]ACCCCAC[CG]GTGGCCTGGAGTAC[CG][CG]CATCTC[CG][CG][CG]GTGCAGGAG[CG]TTGGGGCTCCTCCACCCACTGCAG[CG]TGT[CG]CTTT[CG]AGAC[CG]C[CG]GGGT[CG]GAGGACAGCCAGGAGAAACCC[CG]CAAAGGCT[CG]TTCTCCAGGGTGCAGTGGGAA[CG]CCTG[CG]CTCCAGTG[[CG]]ACCCAGAACAGCAGGTCTTTGGAGCCCC

SEQ ID NO: 540
GCTGTCCTTCCCCACTGGTCACACAAGAG[CG]GC[CG]TCCTTCCCCAGCT[CG]AAGCC[CG]TAGCACATT[CG]CAGGCAAAGCCTCCCAAGT[CG]TCTAGGCAGTTAGGGAGCTCTG[CG]CATTTGCCAGCA[CG]GAGGTACCTCC[CG]GGGCAGGGACACAACACAT[CG]CC[CG]AGAGTTTGTCCCAG[CG]AG[CG]C[CG]ATTT[CG]TC[CG][CG]ATGCAAGTAACTGAGAT[CG]GGAGCTGTCCC[CG]GCAGAG[CG]CACTCACCT[CG]GTCCCAGGTGGACTGAAGTCCAGAG[CG]G[CG]CTGTGCAGCTGGAAGGG[[CG]][[CG]][CG]ATAGCTCAAGTTAGAGG[CG]GCCC[[CG]]GGG[CG][CG]G[CG]CAGGACACAAGACCTCAAACTGGTACTTGCACAGGTAGC[CG]TTGG[CG][CG]CAGGTGGCAT[CG]CATCTCCTTCCAG

CCTG[CG]GGCT[CG]ACCCCAC[CG]GTGGCCTGGAGTAC[CG][CG]CATCTC[CG][CG][CG]GTGCAGGAG[CG]TTGG GGCTCCTCCACCCACTGCAG[CG]TGT[CG]CTTT[CG]AGAC[CG]C[CG]GGGT[CG]GAGGACAGCCAGGAGAAACCC [CG]CAAAGGCT[CG]TTCTCCAGGGTGCAGTGGGAA[CG]CCTG[CG]CTCCAGTG[[CG]]A
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SEQ ID NO: 548 TA[CG]AGGGGCAGGGG[CG]TGGCAGGAGCCCTGCCTGGC[CG]CCCCTGGTGGGAAAAGCCCCTAGGGGT[[CG]]AGGC[CG]AG[CG]TGGAG[CG]GAGCTGGGGTG[CG]G[CG]AGGGGCAGCAGGAGC[CG]C[CG]C[CG]CAGA[CG]CC[CG]GGG[CG]CAGAGGATCAAGAGCCC[CG][CG]C[CG]G[CG]AGGAG[CG][CG]CTCAGC[CG]GGCTTGGGAGC[CG]C[CG]C[CG]G[CG]CCAACTTTTCCCAT[CG][CG]GGAG[CG]AAGAGCAG[CG]GAGAGAGGGGTCCCAGAA[CG]AAGGTGG[CG]GCA[CG]AGCTCTG[CG]CTGG[CG]GCTGTGGGGGGC[[CG]]G[[CG]]CTCAGGACCCCAACTCCATCCAAGTTG[[CG]]C[CG][[CG]]C[CG][CG]GTGGGGG[CG]GG[CG]GAGG[CG]G[CG]C[CG]GGCAGGTGG[CG]GC[CG]CTTGCC[CG]GGCTGGGCTTGTGC[CG]AG[CG][CG]GGTC[CG]GA[CG]GAG[CG]AGC[CG]C[CG]C[CG][CG][CG]GGGGTGGAGCTGAGCTGAAGTCACTGG[CG]GAG[CG]GG[CG]GG[[CG]]CTGG[[CG]]GG[[CG]]A[[CG]][CG]GGAGGGAGGGCAGG[CG]CTGC[CG]GGACTC[CG]GG[CG]C[CG][CG]TCC[CG][CG]GC[CG]AGCTG[CG]CTG[CG]CAC[CG]GGTCTC[CG]GG[CG]CTGGAGG[CG]C[CG]C[CG]G[CG]ACCTC
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G]G[CG]TC[CG]AGTCCTGCTTCTTCTTGGC[CG]A[CG]CCATCTCCAC[CG][CG]TGC[CG]CTTG[CG]CCACTTGGTC[CG]GC
SEQ ID NO: 554 CCCCCAAG[CG][CG]TC[CG]AATC[CG]CCC[CG]AGG[CG]AGG[CG]GGC[CG]GGC[CG]TACCTGCTGCTC[CG]TCCC[CG]GCTC[CG]TCC[CG]GGCTCCTGG[CG]GCTGT[CG]CTG[CG]GTTCCTTCC[CG][CG]GGC[CG]GGCCCCTTCCCTG[CG]CCTT[CG]C[CG]CCTCCT[CG][CG]CCTGCC[CG]GGGCC[CG]CAGCCTC[CG]CAC[CG]GGAACC[CG]GAGGACC[CG]AGG[CG]GG[CG]CAGGGG[CG]AAGC[CG]GGGC[CG]GGGAGGGGC[CG]CCT[CG]CTC[CG]GGTT[CG]AGA[CG]GAAGAAACA[CG][CG]G[CG]CAGGCTC[CG]GAG[CG]A[CG]GCTC[CG]A[[CG]]GGGACC[CG]TTAAATAATTTATTGATGATACAAAG[[CG]]ACT[CG][[CG]]CCCACC[CG]GGGC[CG]CCCC[CG]GATTCTGCAAAAATAGATT[CG]CCCCCACCC[CG][CG]GGTCCTCACAAGG[CG]TCCCC[CG][CG]C[CG]C[CG]C[CG]CA[CG]GGCTGACCAG[CG]CCAAGTT[CG]AGGGTTTGTGCTTCTTGAGCAGC[[CG]][CG]TGATCTTCT[CG]T[CG]TC[CG]AGTTGGGGTCCAGGGGC[CG]GTTGTATT[CG]T[CG]T[CG]TCCTC[CG][CG]TC[CG]AGC[CG]CCCACCTTCAGCTTCT[CG]G[CG]TC[CG]AGTCCTGCTTCTTCTTGGCC
SEQ ID NO: 555 AATCAGTGTTTTACTGTCAGTGCAGTGTTAAATGTCAATGCAACACTTAAGTTGCATTGACATTCATGTGTTGAT[CG]GATTGTACAATGTGA[CG]TGTGAGATTTCT[CG]GGAC[[CG]]T[CG]AAGCTCAGACAACTCCAGGGCTGCAATTTACT[CG]TCTGGCTGCCCT[CG]AACCAGGCTCCCTTGG[CG][CG]TGGGGCTCTCC[CG]G[CG]CTTGGTCC[CG]ACC[CG][[CG]]C[CG]CAGTCAGGATACCA[CG]GCAATCTGGGGT[CG]CTTTGTAAGGAGCTC[[CG]]ACCTC[[CG]]GGCAGTGCAGGGATACT[[CG]]A[CG]G[[CG]][[CG]][[CG]]ATGTCC[CG]G[CG]GCTC[CG][CG]AGCCTGG[CG][CG]CTGAGAGCCCCAGCAGTC[CG]AGTCCT[CG]AGCT[CG]GG[CG]TCTT[CG][CG]C[CG]C[CG]CCC[CG]CTCAGTG[CG]CCCAGGCAC[CG][CG]GC[CG]TGA[CG]TCA[CG]CC[CG]GGACTGGC[CG]TTGCAGCAAGA[CG]GC[CG][CG]TTC[CG]GTTC[CG]GTAGGTTGCC[CG]GGAGA[CG][CG]GGTACACAGAGAAG[[CG]]GCTCC[[CG]]T[CG]GAGGC[CG]AGT[CG]T[CG]CCA[CG]AT[CG]CCCCCTTGGTGGACT[CG]CAGGC[CG]AG[CG]GCTTCCC[CG]CAGAGCT[CG]AGGAGGGCAGAC
SEQ ID NO: 556 AGGGG[CG]AGGCT[CG]AGGGTCCCTAGGGGTGGTGGGA[CG]CAAGGCCCATGCC[CG]TCTATGGCCTCT[CG]C[[CG]]C[CG]GCAGCT[CG]CAGCCACC[CG]AGCAT[CG]CCT[CG]G[CG][CG]GGC[CG][CG]A[CG]CTCTC[CG]CCC[CG]AGGGCA[CG]CTCC[CG]GGGCTCTTGGC[[CG]]CCCCT[[CG]]CCCAC[[CG]]GGCTCTGGGTAGCCCCTCACCAGGCTCTTGG[CG]GCCACCTAGCC[CG]G[[CG]]CC[CG]GCCCCCTG[CG]GC[CG]GCCCATTTAGTGTGAATCCTGGATC[CG]GCAG[CG]G[CG]G[CG]GCTTCTTCAGGGGTAGCTGATGC[[CG]]GGGCCTTGGAGAGGGA[CG]CTTTGGGAGGGTCCTGGGAGG[CG]G[CG][CG]G[CG]AGCAAAGGGGGCAAGAAGGG[CG]TGCTGTGCTCC[CG]CCTGGCTCC[CG]GGG[CG]T[CG]TTTGGGGG[CG]GC[CG]GGGAGTTTTCTACTTGGAAGCCCCTCTGAAGCCAC[[CG]][CG]TCTCCTTTGCC[CG]GCCT[CG]TCTC[CG]CTGCCCA[CG]CAGGCTGC[CG][CG]CTCTGGCCT[CG]GCCC[CG]GCTCT[CG]GAGCTGCC[CG]G[CG]GGCTC[CG]GGTCT[CG]CCCTCCAGCCCCCAGG[CG]GCC[CG][CG]G[CG]GATCCC[CG]AGAGGCAGC
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SEQ ID NO: 558 GCAAAGGGGC[CG][CG]CATTGGA[CG]GGGCTCCCAAGCCACAGCCCTGGGGGCCTTGAGGAGT[[CG]]TGGTA[CG]GTCCAGGGCAGT[CG]GGGCTG[CG]GGGCC[CG]TGAAGCCAGA[[CG]]AGGCTA[CG]GACTTAGGGTCCCTGCAACCAAGAC[CG][CG]AG[CG]ACTGTGGACT[CG]GGA[CG]GAT[CG]CACAAAGGAGGAAGGGGGAATCAGAGGGG[CG]TC[CG]GTCCAGGA[CG]TGTCAGGCCTGGG[CG]GGG[CG]GAAAACTGACACCAGGG[CG]AGGACAAGGATTT[[CG]]CTCCTCCAGGGCTGCCAGGGGAGGGGCT[[CG]]CCAC[CG]TCACTCTCCATGGGCTCTGGCCC[CG]A[CG]GTGTTTAAAGGG[CG]GAGGGCTGGGC[CG]GGCTGGT[CG]CACC[CG]GG[CG]CTGCTGG[CG]GCCAAGCTGGATGGGT[CG]CCAGTGAGTTT[CG]GTG[CG]GCAC[CG]CTGGCCCAGGCC[CG]GG[CG][CG]GCTGGACATGGCCACCTACTG[CG]A[CG]ACCTGGGCCCCTCCT[CG]GCCC[CG]CC[CG]GCCAGGCCCAGGCCAC[CG][CG]CACCCCC[CG]GGCTATGAGCCAGGGGATCTGGG[CG][CG]GTGGG[CG]GGGGCCCCCTCCTGTGGGTGAA[CG][CG]CCAGC
SEQ ID NO: 559 AGGGC[CG]CTGTCCAGGCCCAGCCC[CG][CG]TTCTCCACCT[CG]CCACCT[CG]CTCTG[CG]GCTCCAGCCTGGAGATCTA[CG]GACTTCATTG[CG]ATCTCTTG[CG]CAGTGTAGT[CG]CCCTCTATCCCTAGCCC[CG]AGTCC[CG]GGTAACCCAGGGGCCC[CG]G[CG]AGG[CG]AGTTTCTTTGGGG[CG]AGATGTCC[CG]AGC[CG]AGCAAAGGGGC[CG][CG]CATTGGA[CG]GGGCTCCCAAGCCACAGCCCTGGGGGCCTTGAGGAGT[[CG]]TGGTA[CG]GTCCAGGGCAGT[CG]GGGCTG[CG]GGGCC[CG]TGAAGCCAGA[[CG]]AGGCTA[CG]GACTTAGGGTCCCTGCAACCAAGAC[CG][CG]AG[CG]ACTGTGGACT[CG]GGA[CG]GAT[CG]CACAAAGGAGGAAGGGGGAATCAGAGGGG[CG]TC[CG]GTCCAGGA[CG]TGTCAGGCCTGGG[CG]GGG[CG]GAAAACTGACACCAGGG[CG]AGGACAAGGATTT[[CG]]CTCCTCCAGGGCTGCCAGGGGAGGGGCT[[CG]]CCAC[CG]TCACTCTCCATGGGCTCTGGCCC[CG]A[CG]GTGTTTAAAGGG[CG]GAGGGCTGGGC[CG]GGCTGGT[CG]CACC[CG]GG[CG]CTGCTGG[CG]GCCAAGCTGGATGGGTC
SEQ ID NO: 560 GTCTTCCCCTTCTTCTCTTTGCTAAA[CG]ACCCCTCCAAGATAATTTTTAAAAAACCTTCTCCTTTGCTCACCTTTGCTTTCCCAGCCTTCCCATCCCCCCAC[CG]AAAGCAAATCATTCAA[CG]ACCCC[CG]ACCCTC[CG]A[CG]GCAGGAGCCCCC[CG]ACCTCCCAGG[CG]GAC[CG]CCCTCCCTCCC[CG][CG][CG][CG]GGTTC[CG]GGCC[CG]G[CG]AGAGGG[CG][[CG]]AGCACAGC[CG]AGGCCATGGAGGTGA[CG]G[CG]GACCAGC[[CG]][CG]CTGGGTGAGCCACCACCACCC[CG]

C[CG]TGCTCAA[CG]GGCAGCACC[[CG]]GACA[CG]CACCACC[CG]GGCCTCAGCCACTCCTACATGGA[CG][CG]G[CG]CAGTACC[CG]CTGC[CG]GAGGAGGTGGATGTGCTTTTTAACAT[CG]A[CG]GTCAAGGCAACCA[CG]TCC[CG]CCCTACTA[CG]GAAACT[CG]GTCAGGGCCA[CG]GTGCAGAGGTACCCTC[CG]ACCCACCA[CG]GTGAGTG[CG]CC[CG]GGGTGC[CG]GGGCTCC[CG]C[CG]GC[CG]CTTCAGC[CG]TCC[CG]GCT[CG]GGGAGGT[CG]GGAGGGACCTGAGGG[CG]GGGAGAGGTCAAG[CG]AAAGCCCCCATCTGC[CG]TTCCTGGTTCATTTA

SEQ ID NO: 561

GTTTTGCCAGATACCAGGTGGACTAGGGTGAG[CG]CC[CG]AGGGC[CG]GGA[CG]CA[CG]CA[CG]GGC[CG]GGTAGGATGG[CG]CTGG[CG]T[CG]ATGCC[CG][CG][CG]CTTCAGGGCCTGGTCTGGC[CG]CCCCTCCATCCTTGT[CG]GTTTCT[CG]GGT[CG][CG]GACCC[CG][CG][[CG]]G[[CG]]C[[CG]]GG[CG]ATGCTGGCCTGCC[CG]TGGCCACCACCT[CG]CTTCATTCC[CG]TCTCTTTGGGC[CG]C[CG]CATT[CG]TCCA[CG]TGCC[CG]TCTCTCCCTG[CG]CAAAATTCCAAGATGAGCAAATACTGGGCTCA[[CG]]GTGGAG[[CG]]C[[CG]][[CG]]GGGGCCCCCCTGAGC[CG]GGG[CG]GGT[CG]GGGG[CG]GGACCAGGGTC[CG]GC[CG]GGG[CG]TGCC[CG]AGGGGAGGGACTCCC[CG]GCTTG[CG]ACC[CG]G[CG]TTGTC[CG][CG]GTGCTCAG[CG]CC[CG]CC[CG]GG[CG][CG]CCATGGGGAAC[CG]CAGCAC[CG][CG]GA[CG][CG]GA[CG]GGCTGCTGGCTGGG[CG][CG]GGC[CG]GC[CG][CG]GGGGCATCTG[CG]GGGGCATCTG[CG]GGGCTGGCTGGGCAGGG[CG][CG]G[CG]G[CG]CTGGTGGGGGG[CG]TGCTGCTCAT[CG]G[CG][CG]GTGCT[CG][CG]GGGAACT[CG]CT[CG]TGTG[CG]T

SEQ ID NO: 562

AGGTTTTGCCAGATACCAGGTGGACTAGGGTGAG[CG]CC[CG]AGGGC[CG]GGA[CG]CA[CG]CA[CG]GGC[CG]GGTAGGATGG[CG]CTGG[CG]T[CG]ATGCC[CG][CG][CG]CTTCAGGGCCTGGTCTGGC[CG]CCCCTCCATCCTTGT[CG]GTTTCT[CG]GGT[CG][CG]GACCC[CG][CG][[CG]]G[[CG]]C[[CG]]GG[CG]ATGCTGGCCTGCC[CG]TGGCCACCACCT[CG]CTTCATTCC[CG]TCTCTTTGGGC[CG]C[CG]CATT[CG]TCCA[CG]TGCC[CG]TCTCTCCCTG[CG]CAAAATTCCAAGATGAGCAAATACTGGGCTCA[[CG]]GTGGAG[[CG]]C[[CG]][[CG]]GGGGCCCCCCTGAGC[CG]GGG[CG]GGT[CG]GGGG[CG]GGACCAGGGTC[CG]GC[CG]GGG[CG]TGCC[CG]AGGGGAGGGACTCCC[CG]GCTTG[CG]ACC[CG]G[CG]TTGTC[CG][CG]GTGCTCAG[CG]CC[CG]CC[CG]GG[CG][CG]CCATGGGGAAC[CG]CAGCAC[CG][CG]GA[CG][CG]GA[CG]GGCTGCTGGCTGGG[CG][CG]GGC[CG]GC[CG][CG]GGGGCATCTG[CG]GGGGCATCTG[CG]GGGCTGGCTGGGCAGGG[CG][CG]G[CG]G[CG]CTGGTGGGGGG[CG]TGCTGCTCAT[CG]G[CG][CG]GTGCT[CG][CG]GGGAACT[CG]CT[CG]TGTGC

SEQ ID NO: 563

TCCCTTTGCCCCCTACA[CG][CG]TGTTCT[CG]TCAACAGATCTCCAGAGGTGGTGCAGAAA[CG]ACCC[CG][CG]C[CG]G[CG]CCCCATCCTG[[CG]]GCCAGTGCCTC[CG][[CG]]CCC[CG]GCTC[CG]GTCCCCAC[CG]TCCC[CG]CCCCAGATTTC[CG]GAGGAGCAGG[CG]GG[CG]GGGTCC[CG][CG]GGGC[CG]GCTGC[CG]TCAG[CG]CCCCTTCC[CG]G[CG]GC[CG][[CG]]ACCCCTCCC[CG]CTGACCTCACT[CG]AGC[CG]C[CG]CCTGG[CG]CAGATATAAG[CG]G[CG]GCCCATCTGAAGAGGGCT[CG]GCAGG[CG]CC[CG]GGGTCCTCAG[[CG]]CTGCAGACTCCTGACCTGC[CG]ACTG[[CG]]GATCC[CG]AGTCCC[CG]GATCC[CG]GACCCATCCTGTGGAGCCCACTCCTGGCAGGTAAC[CG]CCCCAACCCCTCTCCTTC[CG]CAGA[CG]GTGTC[CG]GGAGCACTGGAAAGGGAGCCCTCT[CG]GCC[CG]CCCTCACCTT[CG]GTTCTCTGAGAGCTTCCTGGAGAACAGGGC[CG]GTGCACAGG[[CG]]GG[CG]CTGTGCT[CG]CACCCC[CG]GGTCCTCCC[CG]AG[CG]CAGGC[CG]GGGACC[CG]A[CG]GGAGGCA[CG]G[CG][CG]GGCACAT[CG]GAGGCTCT[CG]CTGCTG

SEQ ID NO: 564

AAAGTTTTGTGGTGCTTGAGACTGTTGACTTATGCAACTGGGGAGAGGGTTTTTTTAAC[CG]CTTTGAGATATTGGTCCATCCCTTTTCTCTCAGAA[CG]TCCTCAAGGGCA[CG]TAAGAGTTGGAGGTGACCTC[CG]GGAG[CG]CCTAATTTTGAGC[CG][CG]GAACTT[[CG]]GCCCACTTCTC[CG]AGGGGACCAGG[CG][CG][CG]CCAATA[CG]CATGTG[CG]GGCTCTGAG[CG]CTCAGAG[CG][CG]CCTCTTCCTTCC[CG]GCTCCC[CG][CG]GTG[CG]CACC[CG]CTGGCCACTCTG[CG]CA[CG][CG][CG]C[CG]GGTGCCC[[CG]]GCCTAAGGC[CG]TTGACCT[[CG]]GGTTCTCCC[CG]GCACAGT[CG]AATCCA[CG]CCAGGGCCCTCAGGC[CG]GTAGCTGTCCTGCAGTC[CG]AG[CG]GAGCTG[CG]ACCT[CG]GGCAGCTGGAAGCCTGTGGGCTGCTGCTTCTCCAGGCAGG[CG]G[[CG]]GAGGGATGCAGGCAGGATGAG[CG]G[CG]GTCCCTT[CG]C[CG]CCACC[CG]GAGAAC[CG][CG]GCTGGTGCCCTTGAAGGCCCTGGGATGCCTGGGTTGGGTGGGTGAGTGAA[CG]AGAACCCTGAGTGAGTGAGGGGAGGG[CG]GGTCCCCTCCTGGCTT

SEQ ID NO: 565

ACTGTTGACTTATGCAACTGGGGAGAGGGTTTTTTTAAC[CG]CTTTGAGATATTGGTCCATCCCTTTTCTCTCAGAA[CG]TCCTCAAGGGCA[CG]TAAGAGTTGGAGGTGACCTC[CG]GGAG[CG]CCTAATTTTGAGC[CG][CG]GAACTT[[CG]]GCCCACTTCTC[CG]AGGGGACCAGG[CG][CG][CG]CCAATA[CG]CATGTG[CG]GGCTCTGAG[CG]CTCAGAG[CG][CG]CCTCTTCCTTCC[CG]GCTCCC[CG][CG]GTG[CG]CACC[CG]CTGGCCACTCTG[CG]CA[CG][CG][CG]C[CG]GGTGCCC[[CG]]GCCTAAGGC[CG]TTGACCT[[CG]]GGTTCTCCC[CG]GCACAGT[CG]AATCCA[CG]CCAGGGCCCTCAGGC[CG]GTAGCTGTCCTGCAGTC[CG]AG[CG]GAGCTG[CG]ACCT[CG]GGCAGCTGGAAGCCTGTGGGCTGCTGCTTCTCCAGGCAGG[CG]G[[CG]]GAGGGATGCAGGCAGGATGAG[CG]G[CG]GTCCCTT[CG]C[CG]CCACC[CG]GAGAAC[CG][CG]GCTGGTGCCCTTGAAGGCCCTGGGATGCCTGGGTTGGGTGGGTGAGTGAA[CG]AGAACCCTGAGTGAGTGAGGGGAGGG[CG]GGTCCCCTCCTGGCTTCAAATTCAACCCAATCAGCT

SEQ ID NO: 566

[CG]TCAACAGATCTCCAGAGGTGGTGCAGAAA[CG]ACCC[CG][CG]C[CG]G[CG]CCCCATCCTG[[CG]]GCCAGTGCCTC[CG][[CG]]CCC[CG]GCTC[CG]GTCCCCAC[CG]TCCC[CG]CCCCAGATTTC[CG]GAGGAGCAGG[CG]GG[CG]GGGTCC[CG][CG]GGGC[CG]GCTGC[CG]TCAG[CG]CCCCTTCC[CG]G[CG]GC[CG][[CG]]ACCCCTCCC[CG]CTGACCTCACT[CG]AGC[CG]C[CG]CCTGG[CG]CAGATATAAG[CG]G[CG]GCCCATCTGAAGAGGGCT[CG]GCAGG[CG]CC[CG]GGGTCCTCAG[[CG]]CTGCAGACTCCTGACCTGC[CG]ACTG[[CG]]GATCC[CG]AGTCCC[CG]GATCC[CG]GACCCATCCTGTGGAGCCCACTCCTGGCAGGTAAC[CG]CCCCAACCCCTCTCCTTC[CG]CAGA[CG]GTGTC[CG]GGAGCACTGGAAAGGGAGCCCTCT[CG]GCC[CG]CCCTCACCTT[CG]GTTCTCTGAGAGCTTCCTGGAGAACAGGGC[CG]GTGCACAGG[[CG]]GG[CG]CTGTGCT[CG]CACCCC[CG]GGTCCTCCC[CG]AG[CG]CAGGC[CG]GGGACC[CG]A[CG]GGAGGCA[CG]G[CG][CG]GGCACAT[CG]GAGGCTCT[CG]CTGCTGGGCACTCAGGT[CG]CCAGAGTC[CG]CAGC

SEQ ID NO: 567

GCTC[CG][CG]CCCCCTCCC[CG]CCCCT[CG][CG]GCTCCCCCACCCT[CG][CG]TT[CG]GCAG[CG]CCAGGCTG[CG]C
TCTCCC[CG]GTGCACACC[CG]GC[CG][CG]C[CG]AGAACTAAATC[CG][CG]GGCTGAAATTA[CG]TTTTAAAAATTA
ACATGTTGAAG[[CG]]TGTGCCATTTAGTGAGAGGTGTTTTGGGCAAAGAATCAATTTAACTGTGACTGAC[CG]A[C
G]GGCTTGACTGTATTAATTCTGCTAC[[CG]]AAAAAAAAAAAAAAAAAAAAAGCAATGAGC[CG]CAAGCCTTGGAC
T[CG]CAGAGCTGC[CG]GTGCC[CG]TC[[CG]]AGAGCCCCACCAG[CG][CG]GCTCA[CG]CCTCAGTCT[CG]C[CG]CCC
CAAGGTGGGATC[CG]A[CG]CCCAAAGGAGGG[CG]CCCCAAGGTGGGATC[CG]AG[CG]GGC[CG]CCCTAGGAGGA
GTGAACCC[CG]CC[CG]GG[CG]CACAGCTC[CG]TG[CG]CCTGTCCTCCCTCCTCCAG[CG]AAATCACACC[CG]CTTT
GCCTCCTCTTGCAGCAC[CG][CG][CG]TGCCTAGGTTCT[CG]GTCTG[CG]CAGCTGGGAGTCTCCCCCACCAG[CG]C[
CG][CG]GAGC[CG]CC[CG]CTTC[CG]CTCCCTCTTTC[CG][CG]GGTTTGAGCCTCC

SEQ ID NO: 568

CACACACATGCACACATTTTCT[CG][CG]CTCTCTC[CG]GCTCTCCTTTGTTTATTTTCTAATCTATATTTTTACTGGA
AGATTTCCTCTTTATTCTCTCC[[CG]]CCCTCCTACAAG[CG]CTCTTGCTGGC[CG]TCTGGGTGCACACAC[CG]CTCC
CT[CG]ATCACCCCAGCCCCCTTCCTGGTCTCC[CG]AG[CG][CG]GGGTTTGAAGGTCACCTCCTTTCCAGTCCC[CG]T
G[CG]AGC[CG][CG]CTGC[CG]C[CG]CCTCCTCCAGCCAGAGT[CG]GTGGGACTGGCTG[CG]CTGCCCTGAAGTGGT
TCTCCAAGCAG[[CG]][[CG]]GAGGGTGG[[CG]]GA[CG]G[CG]GA[CG]GAGCCCAGGGGC[CG][CG]T[CG]GGTGGGG
AAACC[CG]AACT[CG][CG]GAGGGGAATCCCTCCCCCTC[CG]CCCCAGCCCCCCAGCAGCACC[CG][CG]GTGGGG[
CG]GGGG[CG]CTCTGCCAGCCC[CG]GGAACAGCAGAGG[CG]G[CG]GCACTGGCTGGACCCA[CG][CG][CG][CG]CC
TC[CG]GGGCTGAAGAAGGAAGGAGTGAGC[CG]AGC[CG]AGCACCCCACATCTGGAGGGGACAGCCAGC[CG]TGG
GCCC[CG]CCC[CG]G[[CG]]TC[CG]GAGCAGGAGAACTC[CG]AGCTTCTTGCCCA

SEQ ID NO: 569

GAGAAGAAAAAGGAAAGAG[CG][CG]TTTCCT[CG]C[CG]GGGTTAC[CG]GGGTGG[CG][CG]GGCTT[CG][CG]GC[C
G]AGGGGCTGC[CG]GCC[CG]GCC[CG]CAGCTCCT[CG][CG]GC[CG]GCTGGGAAGTGG[CG]GGTC[CG]GCTAGTC[C
G][CG]GG[CG]GG[CG]GAG[CG][CG]C[CG]T[CG]CTGCCAGTGTCCCCCTTTAACATTCCTTCCC[CG]AGCCTTTCCCT
GCTCCTC[CG]CTCTC[CG]AGCC[CG]GGG[CG]GCCC[CG]CAGACACCAG[CG]CCTCTATCCTG[CG]CTCCTTGG[CG]
TA[CG]CAGC[CG]GG[CG]AGGT[CG][CG]G[CG]GGAATGGG[[CG]]C[CG]AGGCCCTGCC[CG]CCAGGGC[CG]CATCT
G[CG]GCC[CG]AGACTTACTTCTGCTTTGCTTTCCTGCACCTGGCC[CG]GGGCAGGCTTTCTAGTTTCTGCCT[[CG]]G
CCAGAGGAGC[CG]ACTTC[CG]CAGGA[CG]GGCTTGGGGCAGGGGGTGC[CG]GTGGGGGCAG[CG]GGG[CG]AGG[
CG]AGGT[CG]CAGGGAGA[CG]ACCAGGCCTGCTTGGGCCTGGGC[CG]CTCCAGC[CG]CCT[CG]CCTCTTCAGGGAC
CT[CG]CCC[CG]GGACCACC[CG]AG[CG]GACCCACAGCTTCTGAGGAAACAGCTGCCT[CG]GGCCT

SEQ ID NO: 570

[CG]CC[CG][CG]C[CG]C[CG]C[CG]C[CG]CCCC[CG]GACC[CG]GCCCC[CG]CCC[CG]GTCCC[CG]CC[CG]CC[CG][CG]CCCC
TCCC[CG]C[CG]GACCC[CG]CCC[CG]CCCT[CG][CG]CTCCC[CG]GCCCTGGC[CG]GGGTCTCCTCCC[CG]CTG[CG]C
CCCTGGACC[CG]GG[CG]GC[CG][CG]GAGGA[CG]TGGGTGGGAGAGGGC[CG]AGGG[CG][CG]CC[CG]GCTGGGCT
CC[[CG]]C[CG]ATGC[CG]GCCCCCTGGTGGCCTCTGGCCCTCTGGGACCCAG[CG]CAC[CG][CG]AGGGAGGCTC[CG
]GGCTC[CG]CACTCAAGGGCAAG[CG]GAAGC[CG]AGGTGG[CG]G[[CG]]C[CG]GAGCCAGGCATGTCC[CG]CTGCC
CAG[CG][CG]GGGCTGAGGG[CG]CAGA[CG]GGGAC[CG][CG][CG]AGC[CG]CTCTCTACCTGGCCTCCT[CG]GAGTC
CAGGG[CG][CG]GAGGGTACTGGGCTG[CG]GATC[CG]G[CG]CAGG[CG]GCCC[CG]GA[CG]CTGCTAGG[CG][CG]G
G[CG]GATTTCTGTTGCACAAATGGGCCAAACAGGTT[CG]TAAGGCCCC[CG][CG]GGTCCCCTGGCC[CG]GAAGTT
GAGC[CG][CG]GGTGCCTGGTCTGAAGTTC[CG][CG]CCCCACAGTGGCC[CG][CG]GGCCT[CG]G[CG]GCTCCTGCC
CTA[[CG]]C

SEQ ID NO: 571

TGCTGAGGATGACAGGGAGC[CG]GGAGC[CG]GAGGATGGAGGATGGTGCAGGCTGGGGAGATGC[CG]GTACCTT
TCCCTGGGTCATGGTGC[[CG]]TCTCT[[CG]]GGGAAGGGGTCCCTGAGGCC[CG]GGTGGC[CG]CTTGGGTAAC[CG]
CAGCCTGCCTG[CG]TCTCTTCCTTCCTC[CG][CG]TGGGTTCTAGCAACATCCACTGCAGC[CG]GGCCAGG[CG]AGC[
CG]G[CG][CG]TACCAT[CG]G[CG][CG]GGGGGAGGAGAGGGC[CG]GGCCTGGGAAGATGCTG[CG]GAGGA[CG]CT
G[CG]GATT[CG][[CG]]AGCC[CG]GGGTAAGG[[CG]]G[CG]G[CG]CAC[CG]CCCCCTCC[CG]C[CG]CTTCCCCCCCAC
CC[CG]CCCCCCAC[CG]C[CG]CCCTTAGCCCTCCCC[CG]GGATGAGAGAGAGT[CG][CG]CTG[CG]GAGCAACCCCA
GTGGATGGGTC[CG][CG]GGGGCTGAG[CG]GG[CG]GAGGA[CG][CG]GGAACTC[[CG]]TGACAC[CG]ACCAGCTGA[
CG]CTGCC[CG][CG]TGAAACCAGAGC[CG]GGCATCAGGGCCTCATCTCCACTGTCTCTGCACCTCTCTGCAGCTCC
AGCTG[CG]CCTCTGCCTTTTCCTCCTCCCTCTTTGGATG[CG]GCCCTGATTTCTGTCTC

SEQ ID NO: 572

TTCCTCCTTCAAAACCAAACCAAACCACCACCAACAAAAACTTCTGTGCTACTCTGGCTTCTCTGGTTTTGTTTGGG
AACAGTGGAACCAAGTTAGCC[CG]GGCCAGGG[CG]CAGATGATGGACTCAGAG[CG]CCCAGGGACCCTAGAGAG
AGGAGCACTCCTCAAGAGCCCCCTGGCCATCACC[CG]AG[CG]CCCTGGAG[CG]CCATCACC[CG]AA[CG][CG][CG]
CTCCAGGCCCT[CG]AACAAGGCCTCTGGCTGCCAGAG[CG]AGTGAGGGG[[CG]]CAGAGG[CG]GCAGAGAG[CG]G
AGAGCCC[CG]GTGTCTC[[CG]][CG]AGGG[CG]G[CG]G[CG]GCCAGCAGA[CG]G[CG]AT[CG]AGG[CG][CG][CG]CC
A[CG]GCA[CG]GCCAG[CG]CAGACA[CG]C[CG][CG]GGGTCT[CG]GGC[CG]GAGC[CG]TGCAGC[CG]GGCC[CG]CTG
CCTCTTTGCCCCTCATGGCTC[CG][CG][CG]GGAGGAAAC[CG]GGCCTTCTC[CG]CC[CG]CCCTCCTCT[CG]CTG[CG
]GTGTCCCCAGCACCCC[CG]CCC[CG]CCCC[CG][CG][CG]GTCCCCAC[CG]T[CG][CG]CTCCCCTCCCTCCT[[CG]]CC
CT[CG]CTC[CG][CG]CCTCCTGTTGGCAGAGATGGCCT[CG]AAGGCCTCTTCCAATTTGAA

SEQ ID NO: 573

GGGG[CG]CAGAGCTCTTGAGGT[CG]TGGG[CG]GG[CG]CAGGGCCC[CG]G[CG]GATACTTGGCAGAGGCTTGGGGT
[CG]TGG[CG]GGGG[CG]CCTCCCTTC[[CG]]GTG[CG][CG]AAAAAGCAAA[CG][CG]A[CG][CG][CG]GGCTGCAGAGA
CTGGGC[CG]GG[CG]GAGGAGACCCCCAGCCTGGGTTGAG[CG]GGG[CG]GATCTGGGACTC[CG]AGGCTTCCTA[C
G]TGGGG[CG]GGTTCCCAG[CG]GA[CG]CCTCTGC[CG]CACCCCTGG[CG]GGGACCCAGCTG[CG]CCCCTTCC[CG][
CG]GCCCTCCTAGGGCCTGGGTGCTTGGAGGCT[[CG]]AGGCCCCAAGATCCATGT[[CG]]CC[CG]GAATCC[CG]GTG
CCTAGGCCTTGT[CG][CG]GGCCCTGGGACCAACT[CG][CG]GGGGTCAGGAGCTGGGGGTTGAGAGAAAGATGATC
AGGTGGGTTGGAGAAAGGAGA[CG]CTTCC[CG]CTGGG[CG]AGTGAGCCCAGGA[CG][CG]GCAGAAGAGGGCAGA

CCCTAGGGGAC[CG]C[CG][CG]TCCCCAGG[CG][CG]CA[CG][CG]ACCCCTCCC[CG][CG]C[CG]AAAATCCTCTCCC[CG]CCTCAGTCTCCC[CG]CCTC[CG]CCTCCCCACCCATAGTGTCACTC[CG]ACCCTAGCCCT

SEQ ID NO: 574

GGGGATCCAGGAGGGAAAGCC[CG]CAGG[CG]CAGAGGGGACAATC[CG]GGAAGTGGTAAAGGGGACACC[CG]GGCACAGGGCCTGTGCTTT[CG]TTGCAGG[CG]AGGAAGTGGAG[CG][CG][CG]CTGCAGATTCAG[[CG]][CG]GGGCTAGAGGAGGGGACCTGGATCCCTGAACCC[CG]GGG[CG]GAAAGGGAGCCTC[CG]GG[CG]GCTGTGGGTGC[CG][CG]CTCCT[CG]GAGCCAGCAGCTGCTGGGG[CG]G[CG]TC[CG]AACTCCCCAGGTCTG[CG]CA[CG]GCAATGGGGGCAC[CG]GGCCTTCTGTCTGTCCTCAGAATA[[CG]]TAGGATACC[CG][CG]GG[CG]ACAAGC[CG]GGCCAGGCTAGGAGCCTCCTTCCCTGCCCCTCCCCAT[CG]GC[CG][CG]GGAGGCTTTCTTGGGG[CG]TCCCCA[CG]ACCACCCCCTTCTCACC[CG]GTCCCCAGTTTGGAAAAAGG[CG]CAAGAAG[CG]GGCTTTTCAGGGACCC[CG]GGGAGAACA[CG]AGGGCTC[CG]A[CG][CG]GGAGAAGGATTGAAG[CG]TGCAGAGG[[CG]]CCCCAAATTG[[CG]]ACAATTTACTGGGATCCTTTTGTGGGGAAAGGAGGCTTAGAGGCTCAAGCTATAGGCTGTCCTAGAGCAA

SEQ ID NO: 575

GACCCT[[CG]]TAGTGTGGGGAATTTCCTGGGAGGAAGATACTA[CG][CG]GGGC[[CG]]GGAGCAGAATTTGCTCCAGGCACTGGGCCAGTCCATGAGGGCTCCAGGATCCAGGGGCCCCACTCCCTTCT[[CG]]C[CG]GGCTC[CG]GGCCAAGGAAG[CG][CG]GC[CG]GAGTCC[CG]GGAAGCCCCT[CG]GCAGCCAGCCAAGGGCCCTG[CG]AGGATGTGGATGG[[CG]][CG]GATGG[CG][CG]GCCTCCACCTG[CG]GGCAGTGGAGAGAG[CG]G[CG]AGAGGAAGAATATTCCC[CG][CG]AGC[CG]GGATAAGGGGCCCCTT[CG]GCT[[CG]]GTTGACCCAGGTCAGATCCTCC[CG]C[CG]ACCTT[CG]GCC[CG]CCCTCTACAGG[CG]GCCCAGTTCTTCCCCTGCT[CG]GCTGCCCCTGCC[CG]CCCCT[CG]AGGGAG[CG]CC[[CG]]TAGCCAG[CG]CCCC[CG]TAAAGAAATAAGGAGG[CG]CC[CG]GCTTCC[CG]CCCAGGTA[CG]TGT[CG]GGACAG[CG]CAGGGGACTGGCTTGGGG[CG]G[CG]GTGGGTAG[CG]G[[CG]]CC[CG][CG][CG]G[CG]CTGGAAA[CG]GCCC[CG]CTTCCTTGGACCC[CG]GGGCTTGCAGGG[CG]GGCC[CG]GGGCTCTCTGAG[CG][CG]AGGCTGC[CG]

SEQ ID NO: 576

AGGT[CG]AATGAAGAGGGTTGTGTGAGTTTTG[CG][CG]GGCAGG[CG]GGATAA[CG]GAGGAGGGAGGCC[CG][CG]GC[CG]AGGCT[CG]GG[CG]GG[CG]GGGGGCAGGGAGGGG[CG]GGGTT[CG]C[CG]G[CG][CG]CACTCCCAGGCAGGCCC[CG]CCCCCT[CG]GC[CG]GCTGTG[CG][CG]CTGATTGGCCCCTGC[CG]GCCT[CG][CG]CTCCCT[CG]CTC[CG]GGTTGG[CG]GGAGACCTTAGAG[CG]GGTAC[CG]CTGCTGGCTAG[CG]AC[CG]A[[CG]]AGCAAC[CG]TCTGAGGCCAGGAG[CG]CTG[CG]A[CG]GAGCCTTGAC[CG]C[CG]TTGCC[[CG]]GCCCTCTCC[CG][CG]CAGCCC[CG]GGCTTC[CG]CAGGTACCTGTGCT[CG]CCCC[CG]GGAAGGGGCCT[CG]CAGG[CG]AATCTCCAGTTT[CG]AGTGTGCC[CG]GTCCCTGGGTT[CG]CT[CG]C[CG]G[[CG]]ACCCCAC[CG]CC[CG]CCTTAGATGAGAAGGCAG[CG]CTCCAGCCT[CG]TCCTCA[CG]C[CG]CCTCC[CG]TGGG[CG]CCCTCAGCTGCCTT[CG][CG]G[CG]A[CG]ACACA[CG][CG]CTCCC[CG]CAG[CG]GGCTCTGGGCTGAGGGACCTGG[CG]AGGGAGGCAGTGGC[CG][[CG]]CAGGTTGGGGCTTTGGC[CG]CCCTC

SEQ ID NO: 577

ACCTCCTCTCCCTCCCAGC[CG][CG]A[CG][CG]CAGGGGG[CG]GGCTCTACCTCCCCCT[CG]CCCC[CG]CTT[CG]GTTTTAAGC[CG][CG]GAGG[CG]CC[CG]GTGGGACCT[CG]CTGCTGTCCAATCAGGGGGGAC[CG]GGTGAGCTCCTCTTCCTGGAGC[[CG]]GGCTCCACCAG[[CG]]C[CG]CAGGCTCACAGGC[CG]GGGGTGGGGGCTCTGGAC[CG]AGGGG[CG]G[CG][CG]GGG[[CG]]G[CG][CG]GGG[CG]G[CG][CG][CG][CG]GTCCTGGAG[[CG]]CTAGTACTTGCTTCT[CG]ACTCCC[CG]GC[CG]C[CG]CCTC[CG]GC[CG]CCC[CG]GGGATTC[[CG]]CCACCAAA[CG]CA[[CG]][CG]TCCCAGGTGGGCACC[CG]CCT[CG]GTC[CG]TCTTTGAGTCTGACCCTAG[CG]CAAGAGTCCCTGG[CG]ACA[CG]CAGGGGCCAGAG[CG]GGGGGG[CG][CG]C[CG]CAATAGCAGCAG[CG]CCAG[CG]CCAACACCCTGTCC[CG]CTGAGGGGC[CG]CTT[CG]GGT[CG]GGGTCAGGGT[CG]TGGG[CG]CTCTGGTGCAGC[CG][CG]G[CG]CAG[CG]TGTACC[CG]GAGCC[CG]CACACTCCCTGCT[CG]GGG[CG]CCCTGTGGCCAGGCTTGAGGGGCAGAGTGAGAGGGAGTTTCTAGAACCTGTTG

SEQ ID NO: 578

CC[CG]GGCCCACCC[CG]CACAGG[CG]CTCAGAATGTT[CG]ATA[CG]TG[CG]CCTCCTTACACCCCTGCCTCACCAGGC[CG]AGCTCATGGAAATC[CG]TGGGCTT[CG]ACCCTC[CG]C[CG]CA[CG]TTGTCCCTTCACACTGGTCCTATAGAGC[[CG]]ATCCTAATTCCCATGGCCTGACAGTACAAC[CG]CATGGAGATGCA[[CG]]TCTCTAAGA[CG]CCTCACCACTGCCTAAGAAGCAATCAAGGTGA[CG][[CG]]CCCAC[CG]GAAA[[CG]]GAAGTAGT[CG]ACT[CG]AGGTGTGGGACTACCTTTCCCAGAACCCTC[[CG]]CAG[[CG]]CAGTC[CG]ATCCTAGGGG[CG]ATGGTGT[CG]TAAATG[[CG]][CG]TCCACCT[CG]AGTCA[CG]CCCACTG[CG]AGG[[CG]]G[[CG]]GGAGG[[CG]]GCATGCAAGGTGTTTCTGAGTTGAAAAGAATGTCTTTACTCAGTACTAACATATT[CG][CG]TTGTAGCAAACCTGACTATATTCTCAAACAAGCCCATCATCCCCATCACCAGGGATATAAAGCATTATTGATTTTCTGGTGTAAAAGCCAACTAAATATTTATTTCAAAAGTAGTTCATATTACATGTAAAGAATGGTTTAAAAAAAATTCTTACTTAATCC

SEQ ID NO: 579

ATGACTGTTCTCCCACACCC[CG]TTGAGGGGACTGGT[CG]AGATCTACCTTGGGAGAAGCAAAAACCTCAACAAAATCTGCAGAGCAGGAACTAAGTTGTAATACAACCATAAAAGGCAACAAAAAG[CG]GAAGA[CG]GGAGAACCCA[CG]CAGGAA[CG]GCTCCAGGCAACCC[CG]GCTCACTGCCCATTCATTTTGGC[CG]ACTTTGGAGGTGCCTTCA[CG]TCTCCTGCCAATTTGCAGCACACTGGCCCAGTCAGTCAGGTTTGGGGGTTCACAAGCCCCCATTGC[CG]G[CG]AGGGGTGA[CG]GATG[[CG]]CA[CG]AT[CG]G[CG]TTCCCCCCACCAACAGGAAAG[CG]AACTGCATGTGTGAGC[CG]AGTCCTGGGTGCA[CG]TCCCACAGCTCAGGGAAT[CG][CG]C[CG][CG][CG][CG]GGGACT[CG]CTC[CG]TTCCTCTTCCTG[CG]GCCTGAAAGGCCTGAACCT[CG]CCCT[CG]CCCC[CG]AGAGACC[CG][CG]GCTGACAGAGCCCAACTCTT[CG][CG]GTGGCAGTGGGTGCCTC[CG]GAGAAGCCC[CG]GGC[CG]AC[CG][CG]GCCTCCAGG[CG]GGGTT[CG]GGGGCTGGGCAGG[CG]ACC[CG]C[CG]CAGGTCCC[CG]GGAGGGG[CG]AA

SEQ ID NO: 580

GGC[CG]TACT[CG]C[CG]CCTTGTA[CG]GCCACTG[CG]AG[CG][CG]TCCCAC[CG]T[CG]GAGCTGCCTGGACTCAGGGACTTGGAAGC[CG]AGTCTTCCCCTCCCCTCAGGCAGAAGC[[CG]]A[CG]CCAACCC[CG]AAACCCAGCAGTGCA[CG][CG]AGCTAG[CG]GTGA[CG]ACCACCC[CG]AGCAACTGG[CG]ACCCC[CG]GGGCCCTGGGACCAGCTA[CG]CCTGC[CG]CCCTGGCT[CG]TGC[CG]CTGCACTA[CG]ATCTGGAGCTGTGGC[CG]CAGCTGAGGCC[CG]A[CG]AGCTTC[CG]GC[CG]GGTCTTTGCCCTTCACTGGC[CG][[CG]]TGAACATCA[CG]GTG[[CG]]CTGCA[CG]GTGGCCACCTCT[CG

]ACTGCTGCTGCATAGCCTCTTCCAGGACTG[CG]AG[CG][CG]C[CG]AGGTG[CG]GGGACCCCTTTCCC[CG]GGCAC TGGGAA[CG]CCACAGTGGGC[CG][CG]TGCC[CG]TGGA[CG]A[CG]TGTGGTT[CG][CG]CTGGACA[CG]GAATACAT GGTGCTGGAGCTCAGTGAGCCCCTGAAACCTGGTAGCAGCTA[[CG]]AGCTGCAGCTTAGCTTCT[CG]GGCCTGGT GAAGGAAGACCTCAGGGAGGGACTCTTCCTCAA[CG]TCTACAC[CG]ACCAGGG[CG]A
SEQ ID NO: 581 CCCTTTGCTTATAAGGGGTAGTCACCCTTTTTTATTT[CG]ACCTTCCAAACATTCTGGGAGTTTTCCTCCTTTAGGC CAACTACAG[[CG]]CAGAGGAG[[CG]]CTTTCTCCTGCTGGGTTTCTC[[CG]]ACTGGCCTTCCCTGCAGC[CG]GTCCT CTT[CG]CCCTTGTCCTCCTGTGCTACCTCCTGACCTTGA[CG]GGCAACT[CG]G[CG]CTGGTGCTGCTGG[[CG]]GTG[[CG]]][[CG]]ACC[CG]][[CG]]CCTGCACA[[CG]]CCCATGTACTACTTCCTCTGCCACCTGGCCTTGGTAGA[CG][CG]GGC TTCACTACTAG[[CG]]TGGTGC[[CG]]C[CG]CTGCTGGCCAACCTG[CG][CG]GACCAG[CG]CTCTGGCTGC[CG][[CG]] CAGCCACTGCA[CG]GCCCAGCTGTG[CG]CAT[CG]CTGGCTCTGGGTTC[CG]C[CG]AATG[CG]TCCTCCTGG[CG]GT GATGGCTCTGGAC[[CG]][CG][CG]GC[CG]CAGTGTGC[CG]CC[CG]CTG[CG]CTATG[CG]GGGCT[CG]TCTCCC[CG][CG]CCTATGT[CG]CA[[CG]]CTGGCCAG[[CG]]CCTCCTGGCTAAG[CG]GCCTCACCAACT[CG]GTTG[CG]CAAAC[CG][CG]CTCCTGGCTGAG[[CG]]GC[CG]CTGTG[[CG]]][[CG]]CCC[[CG]]CCTGCTGGACCACTTCATCT
SEQ ID NO: 582 AAGGTTTTCCCTTTGCTTATAAGGGGTAGTCACCCTTTTTTATTT[CG]ACCTTCCAAACATTCTGGGAGTTTTCCTC CTTTAGGCCAACTACAG[[CG]]CAGAGGAG[[CG]]CTTTCTCCTGCTGGGTTTCTC[[CG]]ACTGGCCTTCCCTGCAGC[CG]GTCCTCTT[CG]CCCTTGTCCTCCTGTGCTACCTCCTGACCTTGA[CG]GGCAACT[CG]G[CG]CTGGTGCTGCTGG[[CG]]GTG[[CG]]][[CG]]ACC[CG]][[CG]]CCTGCACA[[CG]]CCCATGTACTACTTCCTCTGCCACCTGGCCTTGGTAGA[C G][CG]GGCTTCACTACTAG[[CG]]TGGTGC[[CG]]C[CG]CTGCTGGCCAACCTG[CG]CG]GACCAG[CG]CTCTGGCTG C[CG]][[CG]]CAGCCACTGCA[CG]GCCCAGCTGTG[CG]CAT[CG]CTGGCTCTGGGTTC[CG]C[CG]AATG[CG]TCCTCC TGG[CG]GTGATGGCTCTGGAC[[CG]][CG][CG]GC[CG]CAGTGTGC[CG]CC[CG]CTG[CG]CTATG[CG]GGGCT[CG]TC TCCC[CG][CG]CCTATGT[CG]CA[[CG]]CTGGCCAG[[CG]]CCTCCTGGCTAAG[CG]GCCTCACCAACT[CG]GTTG[CG] CAAAC[CG][CG]CTCCTGGCTGAG[[CG]]GC[CG]CTGTG[[CG]]][[CG]]CCC[[CG]]CCTGCTGGACCA
SEQ ID NO: 583 CCAAACATTCTGGGAGTTTTCCTCCTTTAGGCCAACTACAG[[CG]]CAGAGGAG[[CG]]CTTTCTCCTGCTGGGTTTC TC[[CG]]ACTGGCCTTCCCTGCAGC[CG]GTCCTCTT[CG]CCCTTGTCCTCCTGTGCTACCTCCTGACCTTGA[CG]GGC AACT[CG]G[CG]CTGGTGCTGCTGG[[CG]]GTG[[CG]]][[CG]]ACC[CG]][[CG]]CCTGCACA[[CG]]CCCATGTACTACTTC CTCTGCCACCTGGCCTTGGTAGA[CG][CG]GGCTTCACTACTAG[[CG]]TGGTGC[[CG]]C[CG]CTGCTGGCCAACCTG [CG][CG]GACCAG[CG]CTCTGGCTGC[CG][[CG]]CAGCCACTGCA[CG]GCCCAGCTGTG[CG]CAT[CG]CTGGCTCTG GGTTC[CG]C[CG]AATG[CG]TCCTCCTGG[CG]GTGATGGCTCTGGAC[[CG]][CG][CG]GC[CG]CAGTGTGC[CG]CC[C G]CTG[CG]CTATG[CG]GGGCT[CG]TCTCCC[CG][CG]CCTATGT[CG]CA[[CG]]CTGGCCAG[[CG]]CCTCCTGGCTAA G[CG]GCCTCACCAACT[CG]GTTG[CG]CAAAC[CG][CG]CTCCTGGCTGAG[[CG]]GC[CG]CTGTG[[CG]]][[CG]]CCC[[C G]]CCTGCTGGACCACTTCATCTGTGAGCTGC[CG]G[CG]TTGCTCAAGCTGGCCTG[CG]GAGG[CG]A[[CG]]GA
SEQ ID NO: 584 GTTCCTCCAAAG[[CG]]GTATCATTACAGATTAACTGTAATGTGTAGGATTAGAATAAAAGCATAAGGGATTAGGT AAAAGGG[CG]A[CG]CTCCAGACATAA[CG]CC[CG]AG[CG]CATCT[CG]ACTGAGTCAGCCTAGGGAGACTG[CG]A AGG[CG]CAGGGTGT[CG]GGG[CG]CCA[CG]GGGC[CG]CAAAGC[CG]GACT[CG]GTTCCTC[CG]CTCC[CG]GCCCTG GCCC[CG]GCCCCAGAG[CG]GT[CG]GGACAG[CG]G[CG]C[CG]GAAGGCCAA[CG][CG]GC[CG]AAGGTTT[CG]GAG CCAGGCTTCC[CG]GG[CG]TCAGGGGCTAGGGA[[CG]]GGTCCC[CG]GAGCTGGGGAAGATGAGGGGC[CG]AGAGG C[CG]TGGAGG[CG]GAGGA[CG][CG]GGCAAGCCA[CG]GCC[CG]GCTGGGAGCTT[CG]GGAAG[CG]C[CG][CG]CC[C G]GGA[CG][CG]GTCTC[CG]GG[CG]GGG[CG]AAG[CG]CAGGGAAGG[CG]G[CG]AGGGGGTCCCCACACC[CG]CA[C G]GGGCAC[CG]GGTTTGTCCATGTGGGTGACACTGCCTTCAAGGCCCAGGCC[[CG]]ATGGGGCCCTTCCTGG[CG]T CCTCCTCACCCCCACTC[CG]C[CG][CG]CCTCCCCTGTCCAGCTGGGGCTGGGGACAG[CG]GCAGGGG
SEQ ID NO: 585 GT[CG]TCTGCATG[CG]G[CG]G[CG]AAG[CG]CC[CG]GGCCCC[CG]TC[CG][CG]C[CG]GTGCC[CG]CAG[CG][CG]CA GCAACTTGGC[CG]C[CG]GGTCC[CG]GC[CG]CCC[CG]GTAGAGGCTGGGTACAG[CG]AGGGGGC[CG]GG[CG]CC[C G]GGCAGGA[CG]GG[CG][CG]G[CG]GGTGGGGCCTGGC[CG]TCTCCCCCTGCCCT[CG]GGGC[CG]AACA[CG]CACA G[CG]AGAGTCTAG[CG]T[CG]G[CG]TGGCTG[CG]GCCAGC[CG]GGTCCCCCTGGAGGCCTC[CG]GA[CG]AT[CG]GA AGTGACTGAG[CG]TC[CG]GGTC[CG]TGAGGC[CG]GGGGT[[CG]]GCC[[CG]]CCCTAAGACTCCCACCTGGTCC[CG] GTTCTC[CG]TC[CG]CTAGGCTGGC[CG][CG]GGGCCCCTGGGGCC[CG]ACCTTCC[CG]GGGTGCCCCAACCTG[CG]G CAAGGC[CG]AGGTCC[CG]CTGAGGCATGAGTCC[CG]GGT[CG]GGGAC[CG]CTCTGGGC[CG]ACCCC[CG]GAGGA[CG]GACTAGGC[CG]ATCCCCAGAGGGAAGGGGGCCAGGC[CG]AGGCCATGGCAG[CG][CG]TTCCCTGATCC[CG]T GTTCT[CG]GCTCCT[CG][CG]TCCCACTAT[CG]GCTGTCCCTTT[CG]TG[CG]GGACTGA[CG]GCTCACAGAACAGTT
SEQ ID NO: 586 AG[CG]AGT[CG]TCTGCATG[CG]G[CG]G[CG]AAG[CG]CC[CG]GGCCCC[CG]TC[CG][CG]C[CG]GTGCC[CG]CAG[CG][CG]CAGCAACTTGGC[CG]C[CG]GGTCC[CG]GC[CG]CCC[CG]GTAGAGGCTGGGTACAG[CG]AGGGGGC[CG]GG[C G]CC[CG]GGCAGGA[CG]GG[CG][CG]G[CG]GGTGGGGCCTGGC[CG]TCTCCCCCTGCCCT[CG]GGGC[CG]AACA[CG]CACAG[CG]AGAGTCTAG[CG]T[CG]G[CG]TGGCTG[CG]GCCAGC[CG]GGTCCCCCTGGAGGCCTC[CG]GA[CG]AT[CG]GAAGTGACTGAG[CG]TC[CG]GGTC[CG]TGAGGC[CG]GGGGT[[CG]]GCC[[CG]]CCCTAAGACTCCCACCTGGTC C[CG]GTTCTC[CG]TC[CG]CTAGGCTGGC[CG][CG]GGGCCCCTGGGGCC[CG]ACCTTCC[CG]GGGTGCCCCAACCTG [CG]GCAAGGC[CG]AGGTCC[CG]CTGAGGCATGAGTCC[CG]GGT[CG]GGGAC[CG]CTCTGGGC[CG]ACCCC[CG]GA GGA[CG]GACTAGGC[CG]ATCCCCAGAGGGAAGGGGGCCAGGC[CG]AGGCCATGGCAG[CG][CG]TTCCCTGATCC[CG]TGTTCT[CG]GCTCCT[CG][CG]TCCCACTAT[CG]GCTGTCCCTTT[CG]TG[CG]GGACTGA[CG]GCTCACAGAA
SEQ ID NO: 587 A[CG]GCCT[CG]CACAGCCAGGGGTG[CG]CACTCACCTT[CG]TACT[CG]GGGG[CG]GG[CG]C[CG]GGGCTGG[CG]G [CG]GGGAGGGCT[CG]GAGCCTTCCT[CG]GG[CG]CCTTGGGGCAGG[CG]GGC[CG][CG][CG]CCCAGCCTCCTATCC[CG]CTCCTT[CG][CG]CCC[CG]GG[CG]CCC[CG]CTC[CG]C[CG]GGAAGGTGC[CG]AGGATCC[CG]T[CG]TCCTTGGT

AAACCCCAGGATGGCCT[[CG]]ATGCTGTGAAGT[CG][CG]AGGTGCTCC[CG]CC[CG]GGCTG[CG]GAGCAGGTGGC [CG]GCAAG[CG]AGAAGCTCC[CG]T[CG]GCCATGGCTGG[[CG]][CG]CAGCC[CG]GCAGGTGCATGGGGAG[CG]C[C G]GGAGG[CG]GGAGGG[[CG]]CTTTGGAGA[CG]GAGAGGAGAGGCT[CG]AAGC[CG]GGTCTTCC[CG]AGTG[CG]G[CG]GTGCAACC[CG]A[CG]GGTCC[CG]ACCCTAGGTCAAGCTC[CG][CG]GG[CG]AAGCC[CG]CC[CG]GGCTG[CG]C A[CG]CTGGGGGTGGC[CG]AG[CG]CTCAGCC[CG]CTGC[CG]CCTTAGTCCCAGAAGT[CG]GAAGTT[CG]GGCT[CG] GGGTAGCTGGGGCTCT[CG]G[[CG]]CTAAAGG[[CG]]GGGAGCCAACTGGCCCT[[CG]]GCTCCTCCCCTCT[CG]CCCT GGAC
SEQ ID NO: 588
GA[CG]AGAAAGTCTCAACAGTCTGCTAAACTAACA[[CG]]GCCTT[CG]AATCCCAATCTGAACACAGTAGCTGAAA CAAGCTGTCCACAAAGAGGAAAGCCAGAGGGGGCCAATTAGGAAGGAAGAAATTAAAGAAAAGAGAAAAGCCA AGATGAAAGGTCCAG[CG]CAAAGTGAATGACT[CG]ACTGGAGAATGGCAGCCCTGGCAGGGTCTG[CG]GC[CG]G CTG[CG]GAGGTGGGGA[[CG]][[CG]]GC[CG][CG][CG]GA[CG]AGTGACAGGTTGGTC[CG]G[CG]CAGCAAAGGGAG[CG]GGTG[[CG]]G[[CG]]GTAGGGCCTCTC[[CG]]GGGGCAG[[CG]][CG]AGGGCCTCCCC[CG]GGGCAG[CG][CG]GGC CAAGG[CG]GGGCCTCCAGAG[CG]GGGGCAGCAGAGGAGGGAG[CG]GAA[CG]GGAGC[CG]GG[CG]GAGG[CG]GC TG[CG]GCAGGGGGAGG[CG]GGAGG[CG]GG[CG][CG]CTAGCTCCCATGCTGGCCT[CG]GTGCCACT[CG][CG][CG]C [CG]GC[CG][CG]CTC[CG]GGCTTCTCTTTTCCCTC[CG]A[CG][CG]CCA[CG]GCTGCCCAGACATTC[CG]GCTGC[CG] GGTCTGGAGAGCTCCC[CG]AACCCCTC[CG][CG]GAGAGGAG[CG]AGG[CG]G[CG]CCAGGGTGGCCCC
SEQ ID NO: 589
TCTCCTTCAACATTTTGAGCATACTGGAATGCCAACCCCCTAGGTAGGTGCCAGGGCCACCACAGGAACCTGACT[[CG]]CAGGAGT[[CG]]TCCTC[[CG]]TCTCTA[CG][CG]AAG[CG]CCCCCT[CG]AGGTGGGCAGGGGGTGG[CG]G[CG]G[CG]A[CG]GTGG[CG]GAGC[CG]CAGAG[CG]AGCTAGAGAG[CG]AGAG[[CG]]GTGAGACTCTG[CG]GA[[CG]]TCTTC C[CG]CC[CG]C[CG][CG]CTC[CG]CCCCACCCAGCCTC[CG]CAGCCT[CG]GGC[CG]GAT[CG]CC[CG]G[CG]GGGAAG ATG[CG]CCTCAAGAACCAGGTAGAAG[CG]CCT[CG]G[[CG]]CAGGCCC[CG]CACCCC[CG]ACTCTGCC[CG]CCCTC TGTTA[CG]GACACC[CG]CTGGGCCA[[CG]]TGGT[CG][CG]ACTGGCTTCTCCCAG[CG]GCCAGCCTGGCCACCC[CG] ACTCCCAGGGAGGGGGAGAGGGCCCTTGCAAGAGGATCCTGCCCC[CG][CG]CTGCCCAGACCTGAGGGCTCCTGG [CG]ACCCCACC[CG]CAGCCCATCTGG[CG]GCTCTGGCCC[CG]CAGGTCAGGGTCACACCCCTGC[CG]GCCTCCTGA GACTTCC[CG]GCCCCAGGGGAGAGAGCTGAAACTTGGGTTGA[CG][CG][CG]CCCCCTC
SEQ ID NO: 590
AGGGTCC[CG]ACTTCTAGCCCCCAATTTCTTGCCCACATCAC[CG]CCCCCTGC[CG][CG]TTTAG[CG]GCTG[CG]TA GGCCTGCTCAC[CG]G[[CG]]TGCCTCAGCCCTCTCAG[CG]TACAGCATGAGCTGGCTGAAGCAGCCCCAAAAGGGG CAG[[CG]]TGTGAGCAGCAC[CG]AACCCAACTGCATGATCAGCTGCAACATCCAC[CG]TCT[CG]AACCTATCTT[CG] A[[CG]]CCATCTTGGGAAAGGGCAGTC[CG]CTG[CG]GCCTCACCCCAGTCAGAGAAGCAGG[[CG]][CG]GGGATGG GACA[CG]CAGCTTC[CG]GGTCAAG[[CG]]CTTTTTCTTTTTCCTCC[CG]GAAACAA[[CG]]GTGTCATTCTCTAGTTC[[CG]]GATCTAAGGTGACCCAGTTG[[CG]]AAGTCCAGCCTTCT[[CG]]TCTGCTCATGGAGCCTTCAGGGCCATATTTG TCCCTG[CG]AATTTGAAAACTAGACTAGAGGAAGGAACAGTGGGTTCAGGATAGCAGAAGTCTTGGAC[[CG]]TAG TATGATGTATTGAAGCAAACTGGTCTTTGAATGCAGCC[[CG]]ATCAGGGCCCTAATCCTGATTCCAACCCTGTGTG ATTCTGGGCACATCACCTAAACTTTATGAGACTCAT
SEQ ID NO: 591
CCTCCCAGGGAGGTCCCAATTCCTCCCAGTTCAAGGGTCC[CG]ACTTCTAGCCCCCAATTTCTTGCCCACATCAC[C G]CCCCCTGC[CG][CG]TTTAG[CG]GCTG[CG]TAGGCCTGCTCAC[CG]G[[CG]]TGCCTCAGCCCTCTCAG[CG]TACA GCATGAGCTGGCTGAAGCAGCCCCAAAAGGGGCAG[[CG]]TGTGAGCAGCAC[CG]AACCCAACTGCATGATCAGC TGCAACATCCAC[CG]TCT[CG]AACCTATCTT[CG]A[[CG]]CCATCTTGGGAAAGGGCAGTC[CG]CTG[CG]GCCTCAC CCCAGTCAGAGAAGCAGG[[CG]][CG]GGGATGGGACA[CG]CAGCTTC[CG]GGTCAAG[[CG]]CTTTTTCTTTTTCCTC C[CG]GAAACAA[[CG]]GTGTCATTCTCTAGTTC[[CG]]GATCTAAGGTGACCCAGTTG[[CG]]AAGTCCAGCCTTCT[[C G]]TCTGCTCATGGAGCCTTCAGGGCCATATTTGTCCCTG[CG]AATTTGAAAACTAGACTAGAGGAAGGAACAGTG GGTTCAGGATAGCAGAAGTCTTGGAC[[CG]]TAGTATGATGTATTGAAGCAAACTGGTCTTTGAATGCAGCC[[CG]] ATCAGGGCCCTAATCCTGATTCCAACCCTGTGTGATT
SEQ ID NO: 592
GTCTGGCATTTTGCTGATGGTATCTGGGTGAGGGAGAAAGG[CG]TGTTGTTGG[CG]T[CG]GGGAAGGGGCCTCCC CAATTGCCAAGGGGGTCCCTGGGGG[CG]G[CG]GGAAGGGGGGTAG[CG]GCCTCAGGGTCTTGGGGGTGCTGAGG GGCAGAAAGGGGCAAAGGAG[CG]TGGAGGAG[CG]GAAGT[CG]AGAGTGGGACAGAAGTGGAG[CG]CTGGG[CG] GCAA[CG]AGGAAACTAAAGCCACAGAAGCC[CG]G[[CG]]CAGGG[CG]GGAAG[CG]TGGGAAGGCCCCTTCCTT[CG][CG]G[[CG]]AGGTGCCCCCCT[CG]CC[[CG]]AAA[CG]C[CG]GCCCAGGCC[CG]CCTC[CG]GCTCCCAGGC[CG]TCAC CTCCTCCTCCCC[CG]C[CG][CG]GGTCATCCACTGG[CG]TC[CG]CT[CG]GTGGGCCT[CG][CG]GCCTGG[CG]GCCTG GAG[CG]TACCAC[CG][CG]G[CG]GAG[CG]G[CG]GGTTGGGG[CG]T[CG]CA[CG]GTGAGAAAGGC[CG]GGGCCTGA GAACAAAC[[CG]]C[[CG]][CG]GT[CG]C[CG]GGGCAA[CG]GGA[CG]GGGCA[CG]TGCCCCCCC[CG]CCAGAGC[CG] GAAG[CG]GCAGGCT[CG]TG[CG]TCCCTCCTGAGCT[CG]AAGCCAACCAGGCCT[CG]AG[CG]GCT[CG]CTGC
SEQ ID NO: 593
GGGCACACTCTCCTTGA[CG]TCTGGCATTTTGCTGATGGTATCTGGGTGAGGGAGAAAGG[CG]TGTTGTTGG[CG]T [CG]GGGAAGGGGCCTCCCCAATTGCCAAGGGGGTCCCTGGGGG[CG]G[CG]GGAAGGGGGGTAG[CG]GCCTCAGG GTCTTGGGGGTGCTGAGGGGCAGAAAGGGGCAAAGGAG[CG]TGGAGGAG[CG]GAAGT[CG]AGAGTGGGACAGA AGTGGAG[CG]CTGGG[CG]GCAA[CG]AGGAAACTAAAGCCACAGAAGCC[CG]G[[CG]]CAGGG[CG]GGAAG[CG]TG GGAAGGCCCCTTCCTT[CG][CG]G[[CG]]AGGTGCCCCCCT[CG]CC[[CG]]AAA[CG]C[CG]GCCCAGGCC[CG]CCTC[C G]GCTCCCAGGC[CG]TCACCTCCTCCTCCCC[CG]C[CG][CG]GGTCATCCACTGG[CG]TC[CG]CT[CG]GTGGGCCT[C G][CG]GCCTGG[CG]GCCTGGAG[CG]TACCAC[CG][CG]G[CG]GAG[CG]G[CG]GGTTGGGG[CG]T[CG]CA[CG]GTGA GAAAGGC[CG]GGGCCTGAGAACAAAC[[CG]]C[[CG]][CG]GT[CG]C[CG]GGGCAA[CG]GGA[CG]GGGCA[CG]TGCC CCCCC[CG]CCAGAGC[CG]GAAG[CG]GCAGGCT[CG]TG[CG]TCCCTCCTGAGCT[CG]AAGCCAACCAGG
SEQ ID NO: 594

C[CG]GTGTTTCAGGCAGCTCTTGGG[CG]C[CG]G[CG]GGCT[CG]GGG[CG]GG[CG]C[CG]TGGAGGGCT[CG]GTCCC
AATTCTCT[CG]GGCT[CG]GTCCC[CG]CTCCTCTCT[CG]GGCTC[CG]TCTC[CG]CTTCTCTCT[CG]GGCTCAGG[CG]C[
CG]GCCCTGGGGGCCCCTTCTCCTCATC[CG]GGAGCA[CG]GG[CG]G[CG]T[CG]GCTC[CG]CTTCCTT[CG]GGACAC
TG[CG]TTCTGGCC[CG]T[CG][CG]AGCAGAGGG[CG]CCTCTGAGGTGG[CG]G[CG]GGGTCAGTCT[CG]GGGGGAGT
[CG]TGTCCCCCTCAGGGATGG[CG]GTGGGAAA[[CG]]GGCT[CG][CG]A[CG]TCTT[CG]GGAGCACAGACCACCTCC
TC[CG]CCTTGTC[CG]TGGC[CG]GGGCACA[CG]GGCCTG[CG]GGGGG[CG]CCTCCCCATCCTGCTTTC[CG]C[CG]T[C
G]GGAC[CG]GGATT[CG]GGGGGCCCTC[CG]G[CG]GGGA[CG]GGGGCTCCA[CG][CG]GAGAGTGGGGGC[CG]ACT[
CG]GGCT[CG]G[CG]AGCTC[CG]GGGTGGC[CG]GG[CG]GCTTGAGGGGTCCTCCC[CG]GGGA[CG]CCCCCCTCCTCC
A[CG]CTGGC[CG]TGAG[CG][CG]GAGGAGTGCTGCAGG[CG]GG[CG][CG]TCTGGCA[CG]GGCCCCTC[CG]GG

SEQ ID NO: 595

[CG]GTCTCCAGGG[CG]GAAAGGGGTGGAAGCTGACCCT[CG]CCCTTCCCTCCAG[CG]CTGGCTTCAGGTGTGCCTT
CTGCTACCTCCTGTACTG[CG]AACAGGGGCC[CG]C[CG]AGCTC[[CG]]GGAGCCCCTAGAAGAGGAAGACTCCTCT
GGCCCCACTAGGTATCATC[CG][CG]CTCTCC[CG]CTTTCCACCTG[CG]CCCT[CG]CTTGGGCCAATCTCTGC[CG]CA
[CG]TGTCCATCCCTGAACTGCA[CG]CTATCCTCCACCCC[CG]GGGGGTTCCTG[CG]CACTGAAAGAC[CG]TTCTC[C
G]GCAGGTTTTGGGATC[[CG]]G[CG]A[CG]GCTGAC[CG][CG][CG]C[CG]CCCCCA[CG]CC[CG]GTTCCA[CG]ATGCT
GCAATACAGAAAGTTTA[CG]T[CG]GCCC[CG]ACC[CG][CG][CG]GGACTGCAGGGTC[CG]C[CG]GAG[CG][CG]G[C
G]CAGAGGCTTTTCCTG[CG][CG]TT[CG]GCCC[CG]GGAAAGGGG[CG]GGAGGGCTGGCTC[CG]GGAG[CG]CA[CG]
GG[CG][CG]G[CG]GGGAGGGTACTCACTGTGAAGCA[CG]CTG[CG]CCCATGGATCATGTCTGTG[[CG]]TTACACCA
GAGGCTC[CG]GGCTCCACTAATTCCATTTAGAGA[CG]GGAAGACTTCCAGTGG[CG]G

SEQ ID NO: 596

[CG]GAGCAACCA[CG]AGGAGGAGGTGGC[CG]ACCTTCTGGCCCAGATCCAGGCAT[CG]CACATCA[CG]GTGGAG[
CG]CAAAGACTACCTGAAGACAGACATCT[CG]A[CG]G[CG]CTGAAGGAAATC[CG]CTCCCAGCT[[CG]]AAAGCCA
CTCAGACCAGAATATGCACCAGGC[CG]AAGAGTGGTTCAAATGC[CG]CTA[CG]CCAAGCTCAC[CG]AGG[CG]GC[
CG]AGCAGAACAAGGAGGCCATC[CG]CTC[CG]CCAAGGAAGAGAT[CG]C[CG]AGTAC[CG]G[[CG]]CCAGCTGCAG
TCCAAGAGCAT[CG]AGCTAGAGT[CG]GTG[[CG]][CG]GCACCAAGGAGTCCCTGGAG[[CG]]GCAGCTCAG[[CG]]AC
AT[[CG]]AGGAG[CG]CCACAACCA[CG]ACCTCAGCAGCTACCAGGTAGGAAC[CG][CG]GCTG[CG][CG]GCCAGCCT
G[CG]CCAG[CG]CCAG[CG]C[CG][CG][[CG]]CCCC[CG]ACACTTGGGCT[CG]TGCCCAGG[CG]CCCTCTC[CG]C[CG][
CG]CTCCCTGGTGGC[CG]CT[CG]CTAGAGCA[CG][CG][CG]C[[CG]]CAGACCTAGGGTATTTG[CG]GATCAG[CG]TC
CT[CG]CCCATCTCATCCTCCACACTC[CG]CCCCCACCCACCTGCCCCAGCTGCTAAGGGTCTTGACC

SEQ ID NO: 597

[CG]TCTGTGGGGAGTAGCTAGGGGCCTGCC[CG]G[CG]GGGG[CG]CAGGAACC[[CG]]GTTG[[CG]]GTGC[CG]GGAG
GAGGGT[CG]GGAGGGTCTCAGCCCCCTCCTTGCTCCCAGGCTTCCACTCCTTGAGGTATTTCCACACCACCATGTC
C[CG]GCC[CG]GC[CG][CG][CG]GATCCC[CG]CTTCCTCTC[CG]TGGG[CG]A[CG]TGGA[CG]ACA[CG]CAGTG[CG]T
G[CG]GCT[CG]ACAG[CG]A[CG]CCA[CG]AGTCCCAGGATGGAGC[CG][CG]GG[CG]C[CG]TGGATGGAGCAGGAGG
GGC[CG]GAATATTGGGAAGAGGAGACAGGGAC[[CG]]CCAAGGCCAAAGCACAGTTTTAC[[CG]]AGTGAACCTG[[
CG]]GACCCTGAG[CG]GCTACTACAACCAGAGTGAGGCCTGTGAGTGACAC[[CG]]GC[CG]GGGG[[CG]]CAGGTCAC
TACCCCTCCACATCCCCCA[CG]GAC[CG]CC[CG]GGTCTCCC[CG]AGTCTCTGGGTC[CG]AGATCCA[CG]C[CG]AGG
CAG[CG]GGACCTGGAGACCCTTGACC[[CG]]GGAGAGGCCCAGGAGC[CG]TTACC[CG]GTTTCATTTTCAGCCAAA
ATCCC[CG]CAGGTTGGTCCTGG[[CG]]AGGG[CG]GGGCT[[CG]]GTGGG[[CG]]GGGCTGGC[CG][CG]G

SEQ ID NO: 598

CCCTGTAGCAAAGCAGGGAACTGGACCTCAAAGGGCTGCTGGGGAAGA[CG]GGATCTGAATAGAGGTCTGAAGG
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CTGGAGACCTGGGAACCTGGGGCAGAGT[CG]GCAG[CG]GGGAGGGGG[CG]AC[CG]AGGTGGGAAAA[CG]GGG[C
G]GGGC[CG]GAGA[CG]ACTCCAGGGCTGGGTGAGG[CG]CTGACCCCCAGGAGCTGGGGTGC[[CG]]AGGGG[[CG]]][[
CG]]GGCCACAG[CG]GTG[CG]AGCCAGT[[CG]]GG[[CG]]CC[CG][CG][CG]GTGGGG[CG][CG][CG]G[CG][CG]GGGA
TTGG[CG]GG[CG]CTCCC[CG]GTGCC[CG]CAGCTCTTCAG[CG]TAGC[CG]GGAAGAGC[CG][CG][CG]TCTG[CG][CG
]CCAGCCCC[CG]CCCTGGGCC[CG]C[CG]CC[CG]AGCTCTCTGG[CG]CAG[CG]CTAGCTC[CG]C[CG][CG]CTCAGCT
GCCCTG[CG]C[CG]GCACCCCTGGTCATGAG[CG]CCCCCT[CG]A[CG]CTGCCCCC[CG]GGGG[CG]AGGAAGGGCTG
GGGA[CG]GCCTGGCCCTCTGCAGCCAATGCCAGTAG[CG]CTC[CG]G[CG]GAGG[CG]GAGGAGG[CG]GTGG

SEQ ID NO: 599

GTAGCAAAGCAGGGAACTGGACCTCAAAGGGCTGCTGGGGAAGA[CG]GGATCTGAATAGAGGTCTGAAGGAAAG
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AGACCTGGGAACCTGGGGCAGAGT[CG]GCAG[CG]GGGAGGGGG[CG]AC[CG]AGGTGGGAAAA[CG]GGG[CG]GG
GC[CG]GAGA[CG]ACTCCAGGGCTGGGTGAGG[CG]CTGACCCCCAGGAGCTGGGGTGC[[CG]]AGGGG[[CG]]][CG]]
GGCCACAG[CG]GTG[CG]AGCCAGT[[CG]]GG[[CG]]CC[CG][CG][CG]GTGGGG[CG][CG][CG]G[CG][CG]GGGATTG
G[CG]GG[CG]CTCCC[CG]GTGCC[CG]CAGCTCTTCAG[CG]TAGC[CG]GGAAGAGC[CG][CG][CG]TCTG[CG][CG]CC
AGCCCC[CG]CCCTGGGCC[CG]C[CG]CC[CG]AGCTCTCTGG[CG]CAG[CG]CTAGCTC[CG]C[CG][CG]CTCAGCTGCC
CTG[CG]C[CG]GCACCCCTGGTCATGAG[CG]CCCCCT[CG]A[CG]CTGCCCCC[CG]GGGG[CG]AGGAAGGGCTGGGG
A[CG]GCCTGGCCCTCTGCAGCCAATGCCAGTAG[CG]CTC[CG]G[CG]GAGG[CG]GAGGAGG[CG]GTGG[CG]GGGC

SEQ ID NO: 600

[CG]GGGCT[CG]GGGCTTTGGTACAGAGGAGCAGCAGAAGC[CG]C[CG]C[CG]CAGA[CG]CC[CG]GATG[CG]GAGG
ACCCAGAG[CG]CTG[CG]CAGCTGAGGAGCACCTGGGGAGCCAC[CG]C[CG]G[CG]CCAACTTTTGCCATCC[CG]GG
AGCCATAG[CG]GCAGAGAGGGGGTCC[CG]GACC[CG]AGGTGGCAG[[CG]]AGGGGCTCTGCTTTGGCAGCTGT[CG]
GGGCTGGAGCTCAGGACCCCAACTCCAGCCAAGT[CG]GGC[CG][CG]G[CG]GGGCAGG[CG]TAGGCTG[CG]CAGG
CAGGGGTGGC[CG][CG]GGTGCTGAGCCAGT[[CG]]C[CG]C[CG][CG]CAGG[CG]GG[CG]CTGGAGTCTCAGCTACCT
GG[CG][CG]AC[CG]CCAGCAGCACCCAG[CG][CG]GGGC[CG]GGAGCTGCTGGGGGCCCAGGCTC[[CG]]CTCTCCCC
AC[CG]CTCTGCAC[CG]CTGC[CG]GCTG[CG]GACAGACC[CG]ATG[CG]CCACCACCAC[CG]CAGTTGCCA[CG]ACC

CCCATGGAAT[CG]CTGG[CG]CCTC[CG]CTC[CG]GTTCTCTAACC[CG]G[CG]CACTCTGGGATCCCAAAGCTTGC[CG]TGGGTTGGAGGCTTCCTACTCTTTGTG[[CG]]TTGAGGCTTTGACCTGACCCAGAG[CG]CAG

SEQ ID NO: 601

GCTGGGG[CG]CCCCT[CG]GACCTG[CG]GGAT[CG]CCCCTACACTCTGG[CG][CG]CTGAGGG[CG]GTGAG[CG]AGGG[CG]CCAAGGCACAGGTGGGG[CG]GGAGT[[CG]]AG[[CG]][[CG]]GAGGCT[[CG]]GGGGG[CG]GGA[CG][CG]GGGCCTGGGAG[CG]GCCAGGGAC[CG][[CG]]GCAG[CG]CCTCAGTGCCAGCCTGG[CG]CC[CG][CG]ACTGCCTGCCCCAGCCCCTCAGTGG[CG]GCTTGCTCTCTTCTCT[CG]CTC[CG]AACCAGACACAGC[CG]CTGC[CG]CTGC[CG]TC[CG]G[CG][[CG]]CTACAGACTCC[CG]AGAACAGCCCTGGCTGTCAG[[CG]]AGCACCAGC[CG]CTTCCTGTCCCCAT[CG][CG]GAGACTGGAGGGG[CG]CACCA[CG]GCCATGGAGCCAGAGG[CG]CTTCAGGAGGCAAGAGAAGTCCC[CG][CG][CG]CTC[CG]CAGCC[CG]G[CG]CAGCTCATGGTGAG[CG]CCCTCTGGGGCT[CG]AGGGTCCCTTGGCTGAGGGGG[CG]CATCCT[CG]GGGTGCC[CG]ATGGGGCTGCCTGGGGGT[CG]CAGGGCTGAAGTTGGGAC[CG][[CG]]CACAGAC[CG]CCCCTGCAGTCCAGCC[CG]AAATGCTGC[CG]CCAGGCAGCAA[CG]GCAC[CG][CG]TACC[CG]GGGCAGTT

SEQ ID NO: 602

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SEQ ID NO: 603

TC[CG]GAGACCC[CG]GGGCCACTTAC[CG]ATCTTGGCCAAGCTGGCCA[CG]AGGATCCAGAG[CG][CG]ATGA[[CG]]TAGGGATCCTGCA[CG]TGGGCCCACT[CG]AAGGTGACCACCTGGAAGCCCC[CG]CTCT[CG]C[CG]TG[CG][CG]C[CG]C[CG]GGCTCCACCT[CG]A[CG]CCCC[CG]GCC[CG][CG]CCAGCC[CG]CCCAG[CG]CCAG[CG]CCAGCAGCAGCCCC[CG]GT[CG]GGGCCC[CG]GGCCC[CG]AGTCCCCACATTGC[CG]CCTGCTCAG[CG]CAGGGCTGGGA[CG][CG]CATGT[CG][CG]GGGGGTCC[CG]GCTGGGCTGGGC[CG]A[[CG]][CG][CG]GGGCTGGGACC[CG]G[CG]AGGACC[CG]G[CG][CG]CTC[CG]GTGC[CG]GTAC[CG]GCTACAGTC[CG]ATCCC[CG]CC[CG]C[CG]GGGTGGCCTTTAATCC[CG][CG]GCCCCCTCC[CG]CCC[CG]GGG[CG]GAGCCTGCC[CG]CCCC[CG]C[CG][CG]CACT[CG][CG]AG[CG]CAGACAC[CG]C[CG]CAGCTCC[CG]GCA[[CG]]CC[[CG]]CCC[CG]CC[CG][CG]CA[CG]CCCACCC[CG][CG]CTCCCTGGTGCCCACCCTCCCC[CG]GAGCC[CG][CG]GCCTGGAGGTC[CG]GGAGGT[CG][CG]GCAAGAG[CG]AGCC[CG]GGACTG[CG][CG]GC[CG]CCTTCCT

SEQ ID NO: 604

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SEQ ID NO: 606

GGAGAGGCAGGACTTTAGAAGGGCTCAAAGTAGATGAACAAAA[CG]GAGGTCTCCTGGAAGCAGGTGACTGAGTTAGGCAAC[CG]AGATGCCCACATATCTGTG[CG]G[[CG]]TT[[CG]]CCCCAAGAGGCCAGC[CG]GCTC[CG]CTCAGCTCCC[CG][CG]G[CG]TGGC[CG]CATCCC[CG]C[CG]CC[CG]ACTCCCAGCC[CG]CTTCCTCTCTC[CG][CG]AG[CG]GGGGGGGAGCTGCAGG[CG]GGGCC[CG]AAG[CG]CCC[CG]GGGGCA[[CG]]TGGAG[CG]GCCTCTGGCTCACCTG[CG]CCTCC[CG]GGCCCCAGCCCAG[[CG]]C[CG]C[CG][[CG]]TCAC[CG]CCCCTCC[CG][CG]GCCC[CG]CCCCAGCC[CG]GCTCATTGGCTGC[CG]CT[CG]GAGGGGAGGGGAAGGGG[CG]GCTG[CG]GGGGTCTCATTAG[CG]ATG[CG]GACTCT[CG]CCTC[CG]CTC[CG]TAGTT[CG]GGGCC[CG]GCAG[CG]G[CG][CG]AGGGCTGGGAACTG[CG][CG]G[CG]GGGACTG[CG]GG[CG]ACTC[CG]GCATC[CG][CG]CTGG[CG]GCAG[CG]GT[CG]C[CG][CG]C[CG]TGGGAAGCTATGGGGA[CG][CG]CCCTTTCT[CG]GGGTGCCCATTCAG[CG]G[CG]GCT[CG]GAGCTCCCTGCCC[[CG]]CTGCTTTAGGAAG[[CG]]

SEQ ID NO: 607

CTGGGGAGCCAC[CG]C[CG]G[CG]CCAACTTTTGCCATCC[CG]GGAGCCATAG[CG]GCAGAGAGGGGGTCC[CG]GACC[CG]AGGTGGCAG[[CG]]AGGGGCTCTGCTTTGGCAGCTGT[CG]GGGCTGGAGCTCAGGACCCCAACTCCAGCCAAGT[CG]GGC[CG][CG]G[CG]GGGCAGG[CG]TAGGCTG[CG]CAGGCAGGGGTGGC[CG][CG]GGTGCTGAGCCAGT[[

CG]]C[CG]C[CG]|[CG]CAGG[CG]GG[CG]CTGGAGTCTCAGCTACCTGG[CG][CG]AC[CG]CCAGCAGCACCCAG[CG]|CG]GGGC[CG]GGAGCTGCTGGGGGCCCAGGCTC[[CG]]CTCTCCCCAC[CG]CTCTGCAC[CG]CTGC[CG]GCTG[CG]GACAGACC[CG]ATG[CG]CCACCACCAC[CG]CAGTTGCCA[CG]ACCCCCATGGAAT[CG]CTGG[CG]CCTC[CG]CTC[CG]GTTCTCTAACC[CG]G[CG]CACTCTGGGATCCCAAAGCTTGC[CG]TGGGTTGGAGGCTTCCTACTCTTTGTG[[CG]]TTGAGGCTTTGACCTGACCCAGAG[CG]CAGCTTATGCCCTGGCTTGGGCAGAAAATAATATTAATTACTGATCCTTTGTGCTCC[[CG]]GTCCTGGCTTCCTAAAGCACTCCTCTCTCATTCAGCACC

SEQ ID NO: 608

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SEQ ID NO: 609

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SEQ ID NO: 610

GTCTGTGGGTAATCCAAGGCTGCCC[[CG]]CTTACCCTTCAAATGCTCTTTCCCCCTC[CG]GAAGCCCT[CG]|[CG]TCCTCATCCTTACCCCACCTCTTGTTCCCCAAG[CG]TGGCCAGGGCTAAGGCTCCAGGGATG[CG]CCAAGCACCCTT[CG]GTTTTCC[[CG]]GGGAGAATTTTCCC[CG]GCC[CG]GGGACTAGGGTCTGG[CG]CTGGGG[CG]CCCCT[CG]GACCTG[CG]GGAT[CG]CCCCTACACTCTGG[CG]|[CG]CTGAGGG[CG]GTGAG[CG]AGGG[CG]CCAAGGCACAGGTGGGG[CG]GGAGT[[CG]]AG[[CG]]|[CG]]GAGGCT[[CG]]GGGGG[CG]GGA[CG]|[CG]GGGCCTGGGAG[CG]GCCAGGGAC[CG]|[CG]]GCAG[CG]CCTCAGTGCCAGCCTGG[CG]CC[CG]|[CG]ACTGCCTGCCCCAGCCCCTCAGTGG[CG]GCTTGCTCTCTTCTCT[CG]CTC[CG]AACCAGACACAGC[CG]CTGC[CG]CTGC[CG]TC[CG]G[CG]|[CG]]CTACAGACTCC[CG]AGAACAGCCCTGGCTGTCAG[[CG]]AGCACCAGC[CG]CTTCCTGTCCCCAT[CG]|[CG]GAGACTGGAGGGG[CG]CACCA[CG]GCCATGGAGCCAGAGG[CG]CTTCAGGAGGCAAGAGAAGTCCC[CG]|[CG]|[CG]CTC[CG]CAG

SEQ ID NO: 611

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SEQ ID NO: 612

GCCAGCAAGGAGC[CG]G[CG]|[CG]GGGGGCATGTCC[CG]CAGGCTCACAGC[CG]|[CG]|[CG]|[CG]TCCCACTGCAG[CG]CC[CG]G[CG]GC[CG]C[CG]C[CG]CCTCCTCCTC[CG]C[CG]C[CG]C[CG]C[CG]C[CG]C[CG]CCTCCAAGTTGTAAG[CG]G[CG]G[CG]GCAGCAGCAGCAGCAGCAG[CG]GGGAGG[CG]GGGGG[CG]GGGAGGCTGGGGGGGGCCCCCTC[CG]CTGGGGC[CG]CCACAGCCAC[CG]CCAC[CG]|[CG]AGG[CG]GCTGG[CG]GGGCAGGGG[CG]G[CG]|[CG]GGCC[CG]GGCTCAGC[CG]AGAAGG[CG]GACAGGCACAGGAGGCTGCT[CG]AG[[CG]]C[CG]GGGCCAGG[CG]TC[[CG]]GGAACCC[CG]ACACCCTG[CG]CCAGACC[CG]GC[CG]AAGCAGCC[CG]CCCCACTG[CG]CAGGGCCATGCAGGG[CG]GCCC[CG]CTGGGTAC[CG]|[CG]|[CG]]GGCCTTGCTGCCCTC[CG]CACCC[CG]CCCCC[CG]CTCC[CG]|[CG]GGAAA[CG]CAGGGA[CG]GGAAC[CG]GAGCCAGAAAG[CG]GC[CG]GAGGG[CG]GC[[CG]]|[CG]GGGCC[CG]GTACCCCTGTGGGTCCAGCT[CG]|[CG]GGTGG[CG]GTGCCCAGCAAGGAGCCTGCAGGTC[[CG]]|[CG]|[CG]CCCAG[CG]GAACCTGCTTCCCCTTTTACCCCTC

SEQ ID NO: 613

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SEQ ID NO: 614

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SEQ ID NO: 624 [CG]CTGCAGATCAA[CG]C[CG]GTGGCAAGAAGGGGC[CG]CAAGGGTTTC[CG]CAGACACCCACACATGCAGG[[C G]]TTCCCACAGAGGGTACCAGGGATTTCCCAGACCCCCACCAGCCCTCAGGAATAG[CG]TAGAGAGAGGAA[CG]T [CG]CCTGGCTGAGAAAGGTGGATGGGCATACCCATGTACCTTTGTGTATTAAGTACCCACAACCTC[CG]AACTTAG C[CG]TCCCTGTCC[[CG]]GCC[CG]CCCAACTGCTGC[CG]C[CG]CATCTGCAGAAACCACT[CG]TGTTGAGGCCT[CG] GAGCAGC[CG]GGAGCACCA[[CG]]CTGGAGCAAAAAAGC[CG]GAGGG[CG]CAGGGCTCCAGCC[CG]GCTGACCAT CCCACCCAG[CG]CAGGGACCAA[CG]GAAAACC[CG]|[CG]|[CG]G[CG]CCAGGACCAGGGGGCTGCC[CG]A|[CG]]C[C G]CT[CG]|[CG]GACTAGTTCCTCAGACTGTGGGACTCCCTAGTGC[CG]GCTTTGCCCAGGGCTTTCCAAGGCTGTCTC ATGCCCTAGATCTGCCCCAGCAGCTCAGGCCTTGGACTG[CG]AACCCAGTATCC[CG]AGACAC[CG]ATTCCATCA GTCCCCATCC[CG]ACCCCTCTCCAGC[CG]GGTTCATC[CG]CCT
SEQ ID NO: 625 CCTGAA[CG]G[CG]GAA[CG]|[CG]|[CG]GCT[CG]GGGGATCCCCTCTCCCTGGGAC[CG]GCCCTGTCC[CG]GGT[CG]C CTCCACCTCC[CG]CAGC[CG]C[CG]|[CG]CCC[CG]GCT[CG]C[CG]|[CG]CTCC[CG]C[CG]GCACCATGGAGGAATTCCT GGGACAAC[[CG]]CCTGCAGC[[CG]]G[CG]ACTTTTCCCCAGGAATCTCTGGCCTGG[CG]CCCTTTGGGTGAGATGA[CG]GGGTGCTGGCATCCCTGT[[CG]]GTCCCAGATTACC[CG]GAAAAGCCCTGGCAGGTAAAGAGAGGACC[CG]|[CG]CAGGCTGGGAGCTCCCACTCCTCCTCCAG|[CG]]TCA[CG]CT[CG]CCCTC[CG]C[CG]CTGCCT[CG]|[CG]]TC[CG]GG TCTGTTTATATAG[CG]TCTGGAGGC[CG]GGAGGCATTGCCCACCCC|[CG]]CCAGG|[CG]]GCC[CG]CCCTCCCCTCC TGGGCTC[CG]GGCTGC[CG]CA[CG]TGGCAGACACCAG[CG]A[CG]TCTC[CG]|[CG]GAAGGCAGG[CG]C[CG]GGGA GTGGGG[CG]|[CG]GG[CG]AC[CG]TGTGCAGC[CG]|[CG]G[CG]CATCTC[CG]CCTTC[CG]CTCCTCCT[CG]CAG[CG]CC CT[CG]TC[CG]CTTCCAAGCCCAGCACAGACTT[CG]GTTTCTC[CG]CCTCCATCCCCTTTA[[CG]]AGAAGA
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SEQ ID NO: 631 TATTC[CG]CTCCCCCCTAGACCTCTATTCCTCCCACTTCTTGTTGCCAAACTT[CG]C[CG]ATTCTCACCAC[CG]CTC CATACTTCTGG[CG]AGTAG[CG]G[CG]G[CG]GGAA[CG]GTG[CG]GGAGG[CG]G[CG]G[CG]G[CG]|[CG]GGAGG[CG] GCAG[CG]G[CG]G[CG]GGAA[CG]GTG[CG]GGAGG[CG]G[CG]GTGCTGG[CG]GAGCAGG[CG]G[CG]G[CG]G[CG]G[CG]G[[CG]]GCTCCAGGGCCCCCC[CG]GAAGAGTTGTCCATGTTCCAGCTGCCCACCCTCAACTTCT[CG]C[CG]GAG CAGGTGGCCAG[CG]TCTGTGAGA[CG]CTGGAGGAGA[|[CG]]GG[CG]ACAT[CG]AG|[CG]]GCTGGGC[CG]CTTCCTC TGGT[CG]CTGCC[CG]TGGCCCC[CG]GGG[CG]TG[CG]AGGCCATCAACAAACA[CG]AGT[CG]ATCCTG[CG]|[CG]|[CG]|[CG]|[CG]C[CG]TGGT[CG]CCTTCCACA[CG]GGCAACTTC[CG]|[CG]ACCTCTACCACATCCTTGAGAACCACAAGTT CACCAAGGAGTCTCA[CG]GCAAGCTGCAGGCCATGTGGCT[CG]AGG[CG]CACTACCAGGAGGC[CG]AGAAGCTG[CG]|[CG]GC[CG]CCCACT[CG]GCC[CG]GTGGACAAGTAC[CG]|[CG]TG[CG]CAAGAAGTTCC[CG]CTGCCA[CG]CA
SEQ ID NO: 632 C[CG]|[CG]GGG[CG]GG[CG]GG[CG]G[CG]C[CG]CAAG[CG]CCCCCTGCAG[CG]|[CG]GGAAGC[CG]CCCTACAGCTAC AT[CG]|[CG]CTCAT[CG]CCATGGCCAT[CG]|[CG]CA[CG]|[CG]CC[CG]AG[CG]C[CG]CCTCA[CG]CTGGG[CG]GCATCT ACAAGTTCATCAC[CG]AG[CG]CTTCCCCTTCTAC[CG]|[CG]]ACAACCCCAAAAAGTGGCAGAACAGCATC[CG]CC ACAACCTCACACTCAA[CG]ACTGCTTCCTCAAGATCC[CG]|[CG]|[CG]AGGC[CG]GC[CG]CC[CG]GGTAAGGGCAAC TACTGGG[CG]CTTGACCCCAA[CG]|[CG]GAGGACATGTT|[CG]]AGAG[CG]GCAGCTTCCTG[CG]C[CG]C[CG]CAAG[CG]CTTCAAG[CG]CT[CG]GACCTCTCCACCTACC[CG]GCTTACATGCA[CG]A[CG]|[CG]G[CG]GCTGC[CG]CAGC[CG]C[CG]C[CG]C[CG]C[CG]C[CG]C[CG]C[CG]C[CG]C[CG]C[CG]CCATCTTCCCAGG[CG]|[CG]GTGCC[CG]C[CG]|[CG]|[CG]CC CCCCCTACC[CG]GG[CG]C[CG]TCTATGCAGGCTA[CG]|[CG]C[CG]C[CG]T[CG]CTGGC[CG]|[CG]C[CG]CCTCCAGTC TACTACCC[CG]|[CG]G[CG]T[CG]CC[CG]GCCCTTGC[CG]|[CG]TCTT[CG]GCCTGGTTCCTGAG[CG]GC[CG]CTCAGC CCAGAGCTGGG
SEQ ID NO: 633 TCAGCAGCCTGCTGAGGAGTGGGGA[|[CG]]AAGAGCAGCCTAAACTTAGGGCT[CG]GGATATTT[CG]ATGCCACCC AAATTGC[CG]TCCTACCCCAA[CG]AGGCAGGGAAAGGAG[CG]GAG[CG]|[CG]|[CG]|[CG]|[CG]AGCTGAGTGAGTGC TTA[CG]T[CG]CAG[CG]AGATCTGTGCTGGGATAATTAGAGAGGAGTTGGGCTGAGC[CG]AGTCCTCTTTCAGCAG CAGCAGC[CG]GAGC[|[CG]]C[|[CG]]C[CG]CAGCC[CG]GTGGGGCAACCCTGACT[CG]GAC[CG]CT[CG]GGAGAGCCC CAGGAGAGGCCAG[CG]C[CG]|[CG]CAGCAGC|[|[CG]|CCC[CG]CTG[CG]CCCACCTCCC[CG]GCTGCTCC[CG]GAGGG CTCACAAAGG[CG]GTGGC[CG]CC[CG]AGTGGCCTTCTCCATCCAGG|[[CG]]TT[CG]|[CG]TCCTCCTCCCCACCTTCT CTCC[CG]AAGG[CG]AAAATGGCAGGGCCAGG[CG]AGAACCTGGGACAG|[[CG]]GTGGCCCTAGCCCTG|[[CG]]ATC CTCACCCCTCCTGCTAGGAGAGGCTG[CG]GGCTGCC[CG]|[CG]GA[CG]ATGTGGC[CG]|[[CG]]GCTGCTCC[CG]AG[C G]CATCTT[CG]GCC[CG]GGTCCC[CG]C[CG]CCACCCCTCTTCTCTGCTCCTTCCATCC[CG]CCC
SEQ ID NO: 634 GGTGTCTTCCC[CG]AGACTCTGGTACTGTGAAGGGTC[CG]GGT[CG]|[CG]|[CG]GGG[CG]T[CG]TC[CG]GAGCAGGG[CG]GACT[CG]GGCTTTGG[CG]|[CG]GCCTTTGCCC[CG]GTTTTTGG[CG]|[CG]GGAGGACTTT[CG]ACCC[CG]ACTT[C

G]GC[CG]CTCATGGTGG[CG]G[CG]GAGGCAGCTTCAAAGACA[CG]CTGTGACCCTG[CG]GCTCCTGA[CG]CCAGCT
CT[CG]GT[CG]GGAC[CG]AG[[CG]]GGTCTCTCCA[CG]GCAAC[CG]C[CG]A[CG]TCA[CG]AA[CG]TACAACTGTAC[C
G]T[CG][CG]AGAGGA[CG]TGATG[CG]CC[CG]GTGATTGG[[CG]]C[CG]C[CG]CTG[CG]GCTG[CG]CAGGAGA[CG]A
CCCC[CG][CG]GG[CG]CTCCCACCCCCATCT[CG][CG][CG]GACT[CG]CTTTAGGTCT[CG]G[[CG]]AGTTTCTCTGAT
ATG[CG]CT[CG][CG]GGGGTGCTGCCATTTCATCTCTTC[CG][CG][CG]GGCTCAT[CG]TGCTCTCAGGGTCT[CG]TTG
AACAAGGCAA[CG]CTAAGAGCCATCACCACCTGTCCCCCATCACCTGTTTTCTAAACTAAACATCTTCAGCTCCTC
CAGTTATCTCTTGTGGCATCTGTCATGAAGAAAGTGCT[CG]GG[[CG]]TGTGTGTCTCTCTTTGA

SEQ ID NO: 635

TCTCTGACACCTTGGGGATCTTCTGCAGCCCCACCTTGT[CG]CAGATGA[CG]TGCTGCAGGT[CG]CTGTGGCAGTG
GCAGTTCTGGGGGCAGG[CG]GCCAG[[CG]]C[CG]GCAGCAGACCAGCCAGGAGGC[CG]AGGCTGAGCAAGAGCAT
TGGG[CG]GACCATGGCTGGGA[CG]CCTGGGGC[[CG]]GGGCTGGGGGCAGCAG[CG]G[CG]G[CG]GGG[CG][CG]GG
CAG[CG]G[CG]AGTCCTAGG[CG]CT[CG]GGTCTGC[CG]CCCTCTTTATA[CG]GTGGCCCTGAC[CG]CAGC[[CG]]GCA
GC[[CG]]AGCCAGCTCCTA[CG]TGGAGCAT[[CG]]AGGCCACTGGGCTTAACT[[CG]]CT[CG][CG]CCCAGAGATG[CG
]CCCC[CG]CCCTCCA[CG]GGGAAGGGGG[CG]GGGC[CG]TTCCCCCAGC[CG]GCTAC[CG]TGCATGAGGGGGTGGG
AC[[CG]]TGGCCCC[CG]AGCCC[CG]AGCCCTGAGCCC[CG]GCTGTAGCCCCC[CG]CTCTCCTATGGTGCTCCTCTGC
CTAC[[CG]]CCTTTCC[CG]GGGCTTTTCTGGGAAGGGGGAATAGTTATGTCTGGAGCCC[[CG]]AGTTTACAT[CG]GA
GAGAGGGAGG[CG]TTCCCTCAACTTATTTGTTTGCTCAGGTTTGAGCCTCCA[[CG]]

SEQ ID NO: 636

CCACACAGGGTG[CG]GG[CG]GGG[CG]GG[CG]GGGCTGGGGTGT[CG]GGGGCT[CG]GATT[CG]GAGCCAGCTCTG
C[CG]TGGGG[CG]GGCTGGGGCAGGCTTCC[CG]CTCTGGGAAATTTGCCCCTGCTCTCCCTGCCAGTTG[CG]GT[CG]
TGGG[CG]GCCT[CG]CCTTGGAGCCCTGGCCA[CG]GAGC[CG]CA[CG]GGG[CG]GTAGAGAGGCTGGTGGGGAGGG
ACCAG[CG]GG[CG]GTGGAGGGG[CG]GCCCTGCAGG[CG]A[CG][CG]GGGACTGGAAAGGG[CG]CCTGGGTGGGAA
GAGG[CG]CTGG[CG]GGTGAT[CG]TCCCCAC[[CG]]GGCCAGTCCC[CG]GGATCTGCTGC[CG]CCCCTCTC[CG]AAAT
TCACAGCCAGAG[CG]GG[CG]CACTGGTGTGTGTGG[CG]CCTGGAG[CG]CTAGGGTCCCCACCCAAGTG[CG]AGGC
CCC[CG][CG]GGGAGCCCAGCCCAGGGG[CG]TCCACAGTCCAGGCCCCAGACCCCAGGTCCTGGCTAGATT[CG]CC
AAAGTCAGAGGCTGGAATCTGGAGGG[CG]GATGTGAGGGTGCCAGCTAAGCCCAGCCCCTGCC[CG]G[CG]GTGG
CCAGCATAA[CG][CG]GTGACACTCTCTGGAGCCCCCACTGCCACCACTC

SEQ ID NO: 637

ACCAGAG[CG]CCCAGCTAAG[CG]AGCTGCCTCCACCCCCACTGTGT[CG]GG[CG]G[CG]CAAACTG[CG]GG[CG]CA
GGCAGAGGAGC[CG][CG]GCTCTG[CG]C[CG]GG[CG]GGAGC[CG]AAGCCCAGAGCCT[CG]CCAGGGCCTCCC[CG]
C[CG]AG[CG]CACTTAC[CG]T[CG]CTGAGGCAGAG[CG][CG]GTCAGCA[CG]AGGACCAGCA[CG]ACCA[CG]ACCTT
GG[CG]TTCATGG[CG][CG]GG[CG]GG[CG]GG[CG]GG[CG]GG[CG]GG[CG]GA[CG]AG[CG][CG]GGT[CG]GGGGC[CG]GA[CG
]C[CG]AG[CG]GGCAATG[CG]GCTGA[CG]GAGAGTGAAAGTG[[CG]]G[[CG]]GTGGGAGG[CG][CG][[CG]]C[[CG]]GG
[CG]CTTTAGAGGGGAGAGCCAGG[CG]GGG[CG]GGG[CG]GGG[CG][CG][CG]GTGAGGGG[CG]GGCC[CG]GAGC[C
G]AGTGCTGGC[CG]TGGC[CG]GGGTCTCTGA[CG][CG][CG]ACTCCCT[CG]G[CG]GCACCCCCCACCCATCCCCTT[C
G]CCCCTCCTC[[CG]]CTCCCTCTGTGCTCC[CG]AGG[[CG]]CAGTG[CG]CTC[CG]GCCTTTGACCTTCTCAGGCTC[CG
]CTGGGCCC[CG]CAC[CG]CTGGCC[CG]GTCTGCAGTGAGGTC[CG]CAGCCTGAG[CG]A[[CG]]C[CG]GCTGGAGGG
C[CG]CTTATTGTC

SEQ ID NO: 638

G[CG][CG]GTCAGCA[CG]AGGACCAGCA[CG]ACCA[CG]ACCTTGG[CG]TTCATGG[CG][CG]GG[CG]GG[CG]GG[CG]
GG[CG]GG[CG]GA[CG]AG[CG][CG]GGT[CG]GGGGC[CG]GA[CG]C[CG]AG[CG]GGCAATG[CG]GCTGA[CG]GAGAG
TGAAAGTG[[CG]]G[[CG]]GTGGGAGG[CG][CG][[CG]]C[[CG]]GG[CG]CTTTAGAGGGGAGAGCCAGG[CG]GGG[CG]
GGG[CG]GGG[CG][CG][CG]GTGAGGGG[CG]GGCC[CG]GAGC[CG]AGTGCTGGC[CG]TGGC[CG]GGGTCTCTGA[CG
][CG][CG]ACTCCCT[CG]G[CG]GCACCCCCCACCCATCCCCTT[CG]CCCCTCCTC[[CG]]CTCCCTCTGTGCTCC[CG]A
GG[[CG]]CAGTG[CG]CTC[CG]GCCTTTGACCTTCTCAGGCTC[CG]CTGGGCCC[CG]CAC[CG]CTGGCC[CG]GTCTGC
AGTGAGGTC[CG]CAGCCTGAG[CG]A[[CG]]C[CG]GCTGGAGGGC[CG]CTTATTGTCCCTGTGACAGGGCCCCACTG
GAGAGACTGAGGACCTTAGG[CG]TAAAGTGGGG[CG][CG][CG]TGGAAAGCTG[CG]GGA[CG]GGGCCTTT[CG]AT
GG[CG]GGAACTGAATGAGAACCAATGAAAAGCAAACAAGTTAGTCC[CG]GG[CG]GAGGGCCTGCTGG[CG]GTGG
[CG]GCCC

SEQ ID NO: 639

TCCCCACCC[CG]CAAGAACCAGACCCTCTTCAGGACTGGGGGGGTTAC[CG]CTT[CG]CCTCCTCTACC[CG]GACTC
AGAAGCCCCAACCCAAGACC[CG]CCTAG[CG]T[CG]CTTGTCAGAACCCCTCTGTGGCA[CG]ACTTTGAGCAGAGG
G[CG]AGGGAAAGGAGGGTCAG[CG]TT[CG]GCCC[CG]TCCCCTGCCTGGGCTTTCTCCCC[CG]CTTCCC[CG]TCCCT
CCCCCCT[CG]C[CG]GTTCAC[CG]CATCCCCACAGGAGTCATAAAGATCAGGCCCCAG[CG]C[CG]GACACAAAGGC
CAAGGGTTCC[CG]GGAGC[[CG]][CG]GGTATTCAGAGCCAGGAGAGGGGTCC[CG]G[CG][CG]GAGGGTGCTG[CG]
GCCCAGCCTCCTGGCCACAGAG[CG][CG]C[CG]GC[CG][CG]AGGGAGGACCAAGGTCCCCAACCA[CG]CC[CG][CG]
TCCACC[CG]TGAATCC[CG]G[CG]CT[CG]CAGCCCC[CG]GG[CG]G[CG]CAGC[CG]CCAC[CG]C[CG]C[CG]TCTTCTC
TGGAG[CG]CAGAGGGGTGTGCTTGGGAGGGGG[CG]GGAGGGCACTTTCCTCTGTGT[CG]GTGAAAGGAAGAGCTT
CCAGCTCCCTCCTC[CG]CACAAACCTTCACTTCCTCTCTTGTT[CG]ATC

SEQ ID NO: 640

CA[CG]ACCA[CG]ACCTTGG[CG]TTCATGG[CG][CG]GG[CG]GG[CG]GG[CG]GG[CG]GG[CG]GA[CG]AG[CG][CG]G
GT[CG]GGGGC[CG]GA[CG]C[CG]AG[CG]GGCAATG[CG]GCTGA[CG]GAGAGTGAAAGTG[[CG]]G[[CG]]GTGGGAG
G[CG][CG][[CG]]C[[CG]]GG[CG]CTTTAGAGGGGAGAGCCAGG[CG]GGG[CG]GGG[CG]GGG[CG][CG][CG]GTGAGG
GG[CG]GGCC[CG]GAGC[CG]AGTGCTGGC[CG]TGGC[CG]GGGTCTCTGA[CG][CG][CG]ACTCCCT[CG]G[CG]GCAC
CCCCCACCCATCCCCTT[CG]CCCCTCCTC[[CG]]CTCCCTCTGTGCTCC[CG]AGG[[CG]]CAGTG[CG]CTC[CG]GCCTT
TGACCTTCTCAGGCTC[CG]CTGGGCCC[CG]CAC[CG]CTGGCC[CG]GTCTGCAGTGAGGTC[CG]CAGCCTGAG[CG]A
[[CG]]C[CG]GCTGGAGGGC[CG]CTTATTGTCCCTGTGACAGGGCCCCACTGGAGAGACTGAGGACCTTAGG[CG]TA
AAGTGGGG[CG][CG][CG]TGGAAAGCTG[CG]GGA[CG]GGGCCTTT[CG]ATGG[CG]GGAACTGAATGAGAACCAAT

GAAAAGCAAACAAGTTAGTCC[CG]GG[CG]GAGGGCCTGCTGG[CG]GTGG[CG]GCCCAAGGCAGC[CG]AGGGGGT CCTGC
SEQ ID NO: 641 CC[CG]GGGAGCAG[CG]CAAGGAGGAGGGT[CG]GA[CG]GGTCTCAGCCCCTCCT[CG]CCCCCAGGTACCCACTCCA TAAGGTATTTCAGCAC[CG]C[CG]TGTCC[CG]GC[CG]GGT[CG][CG]GGGAGCCC[CG]GTACAT[CG]CAGTGGGCTA[CG]TGGA[CG]ACA[CG]CAGTT[CG]TG[CG]GTT[CG]ACAG[CG]A[CG][CG]G[CG]ACTC[CG]AGGATGTAGC[CG]CA GT[CG]C[CG]TGGTTGGAGCAGGAGGGAC[CG]GAGTATTGGGAC[[CG]]GAGCACA[CG]GAACATCAGGCC[CG][CG]CACAGACTGACAAGAGTGAACCTGCCCATGC[CG][[CG]]C[CG]CTACTACCACCAGAGCTAGGC[CG]GTGAATGA CCC[CG]GCCTGGGG[CG]AAGGTCA[[CG]]ACCCCTCCTCATCCCCCA[CG]GA[CG]TCC[CG]GGTCCCCCC[CG][CG]A GTCTC[CG]GCTCCAAGATCCACCC[CG]AGGCTG[CG]GGACC[[CG]]CCAGATCCT[CG]ACC[[CG]]GGAGAGGCCCA GG[CG]CCTTTACCAGGTTTCATTTTC[CG]TTTAGGCCAAAATCCC[CG][CG]GGTTGGT[CG]GGG[CG]GGGG[CG]GG GCT[CG]GTGGG[CG]GGGCTGAC[CG][[CG]]GGGG[CG]GGGCCAGGGTCTAACACCCTCCAGATAATGT
SEQ ID NO: 642 CCTCCAGCCCCCAGG[CG]GCC[CG][CG]G[CG]GATCCC[CG]AGAGGCAG[CG]CAGCTCAGCCCCTG[CG]CCCCCCA GCTT[CG]GGC[CG]GAGAGAC[CG]GGGTGGGAGCTGCCAGG[CG][CG]CAGAACCATCCC[CG]CCACCA[CG]GGGC T[CG]CCTTGTGGGTC[CG]GTG[CG][CG]GG[CG]G[CG]CTG[CG]AGTCCCTCCCTCACT[CG]AAGGAA[CG]G[CG][CG]AG[CG]TGGGGAGAAATGGAGACCAGAG[CG]CATAT[CG]GGTGAGTGGGTCTCCCACTCCCTCCTCCAC[[CG]]CCT CAATTTAAAACTCAAGAGAAAAACCAG[CG]C[[CG]]TCC[CG]T[CG]CCCAG[CG][CG]ACCAC[CG]CCTGC[CG]CCT TGCAGCCT[CG]CCCT[CG][CG]G[CG]CAGC[CG]GGGCTCCC[CG]G[CG]G[CG][CG]CTTCTCCACCTTCAATGAA ACTTT[CG]AAGCCCTCACT[CG]GGGA[CG]GG[CG]TGTCCCC[CG]GCCAATGGGATGG[CG]GCTC[CG]GGGCCTG[C G][CG][CG][CG]GAGCC[CG]CCCCTGAG[CG]GCTGGGGAAGTGAGAGCCTTGCAC[CG]G[CG][CG]GAGGGCAAGCC CCCACC[CG][CG]GCTCC[CG][CG]CCTGGGAGAGACC[CG]GCCTGGCCTGCCAGTGGGCTG[CG][[CG]]CCTTG
SEQ ID NO: 643 CCCCATCTC[CG]CAGTTTCTCTTCTCCCTCTCCCAACTTATGTAGGGTCCTTCTTCCTGGACACTCAGGATGTGGAC TCAGTTCTCACCCCCATTTGGTGT[CG]GGTTTCTAG[CG]AAGCCAAT[CG]G[CG]T[CG]CTGGGGTCCCTGTTCCAG AAGTCCC[[CG]][CG]AACCCATTGGGACTCAGATTCTCCCCAGA[CG]C[CG]AGGATGGGGTCATGG[CG]TCC[CG]A ACCCTCCTCCTGCTGCTCTTGGGGGCCCTGGCCCTGAC[CG]AGACCTGGG[CG]GGTGAGTG[CG]GGATC[CG]GAG GGAAATGGCCTCTG[[CG]]GGGAGGAGGTAGGGGCC[CG][CG]CACTGGGG[CG]CAGGACC[CG]GGGAGCAG[CG]C AAGGAGGAGGGT[CG]GA[CG]GGTCTCAGCCCCTCCT[CG]CCCCCAGGTACCCACTCCATAAGGTATTTCAGCAC[C G]C[CG]TGTCC[CG]GC[CG]GGT[CG][CG]GGGAGCCC[CG]GTACAT[CG]CAGTGGGCTA[CG]TGGA[CG]ACA[CG]C AGTT[CG]TG[CG]GTT[CG]ACAG[CG]A[CG][CG]G[CG]ACTC[CG]AGGATGTAGC[CG]CAGT[CG]C[CG]TGGTTGGA GCAGGAGGGAC[CG]GAGTATTGGGAC[[CG]]GAGCACA[CG]GAACATCAGGC
SEQ ID NO: 644 TCTGTGCTGGGATAATTAGAGAGGAGTTGGGCTGAGC[CG]AGTCCTCTTTCAGCAGCAGCAGC[CG]GAGC[[CG]]C[[CG]]C[CG]CAGCC[CG]GTGGGGCAACCCTGACT[CG]GAC[CG]CT[CG]GGAGAGCCCCAGGAGAGGCCAG[CG]C[C G][CG]CAGCAGC[[CG]]CCC[CG]CTG[CG]CCCACCTCCC[CG]GCTGCTCC[CG]GAGGGCTCACAAAGG[CG]GTGGC[CG]CC[CG]AGTGGCCTTCTCCATCCAGG[[CG]]TT[CG][CG]TCCTCCTCCCCACCTTCTCTCC[CG]AAGG[CG]AAAAT GGCAGGGCCAGG[CG]AGAACCTGGGACAG[[CG]]GTGGCCCTAGCCCTG[[CG]]ATCCTCACCCCTCCTGCTAGGAG AGGCTG[CG]GGCTGCC[CG][CG]GA[CG]ATGTGGC[CG][[CG]]GCTGCTCC[CG]AG[CG]CATCTT[CG]GCC[CG]GGT CCC[CG]C[CG]CCACCCCTCTTCTCTGCTCCTTCCATCC[CG]CCCAGAGGAGTTGATGC[CG]CTGT[CG]C[CG]C[CG]C [CG]C[CG]CTGCTGAAGC[CG][CG]GCTGATGGATGCCAGGGAGTGC[CG]CATTGCTTAG[CG]ACCC[[CG]]CCTCTG GGTTTGCTGGTAGGAG[CG]GCTGCTCTTTCTTCTTTCTTGCTTTGGGGTTTTATAGAA
SEQ ID NO: 645 GCCCCTT[CG]GAAGGTCCCAGTCCCTGTCCATTCTTCTGTCC[CG]CAGCTCTCTC[CG][CG]CAGG[CG]GGGCAGAG C[CG]GGGAAGAAGA[CG]CTGGA[CG]AGGGGTCTTGGGGC[CG]CCT[CG]CTGGCTG[CG]GTTGGAAGCACC[[CG]]T TTTCC[CG]CC[CG]CC[CG][CG]CAGG[CG]CTGCTCTGTGGCCACCAGCAGAGGTTTCC[CG]GC[CG]CTGTGAGT[CG] CCCA[CG][CG]AG[CG]A[CG]TGGGGATA[CG]GGG[CG]CA[CG]GAGTCTCAGCTGC[CG]CCA[CG]CAG[CG]CTTGCC CTGCC[CG]AGCTT[CG]GCTCACTGGCAG[CG]G[[CG]]AGGCCAC[CG]ACCACCCTC[CG]CCTTCCAGTCCTAAACT[CG]GGGCTGGAGAC[CG]CAGGAGCTAAACCAGGAAGAAGAAAGAGGGCAGGGCCTGAGGC[CG]GGAAGAG[CG] GCC[CG]GGGGTCAA[CG]GTGAG[CG]GGTGCATA[CG]AGGCAAGAGCCAGAGTGACATTAAGTGGGGC[CG]CC[CG]GGCAAACCTTG[CG][CG]TGCACCC[CG]GCCCACCTGCAGGGCATTCTCCCCTGCCTTTTCTCCTTGGCTTGAGTG[CG]GG[CG]GCTGACTCCTGTGGG[CG]GGGAGGAGAGGGTGGTCTTCCCAGGGCT
SEQ ID NO: 646 T[CG]GTTTCTC[CG]GG[CG]CAACCAGCAG[CG]CCACAAGC[CG]GTTGGGTCCCCTGGCTCCCTCTCCAAGGCCAG[CG][CG]GTCATG[CG]GG[CG]GG[CG]GG[CG]GTGTTCCCCAGAGAC[CG]CCCATCC[CG][CG]GTGGGGGTGGTGGA AC[[CG]]CAGAGGCCAC[CG]GATACAG[CG]ACCTCAGGCCTGGCAG[CG]CCCATGG[CG]GGCCCTGTGGCC[CG]GG TACTG[CG]AAT[CG]C[CG]GGGCTTGG[CG]GCCTCTGGAACAGGGGCCTC[CG]CCT[CG]AGGAGG[CG]G[CG]GGAC CTGAGGGGC[CG]TGGT[CG]CTGCACTTTGTC[[CG]]AGACCCCTAGATTGGCCAATAGGAGAC[CG]GAAAGGTGCA GGGAGGGCCAGTGGGGC[CG]ATGGGC[CG]GGGCCC[CG]GACAGGCTGG[CG][CG]GGGTT[CG]GGGGTTCTCTCCT GTCTCTGA[CG]CCTGCCCC[CG]AGGAGGCAGAGCTGGGCAGCCCTGGGCCTC[CG]C[CG]AGCCCAGCTTTCCTAA GC[CG]GGAAGT[CG]GGGGTTCCTGGGC[CG]GGTGGGAACTGT[CG]TCCCTGGAGGACCC[CG]CCCCTGAGATCCC[CG]CCCCACATC[CG]GGTAG[CG]TGGGGGCACCTGGGGTTCC[CG]AGATGAGA
SEQ ID NO: 647 CAGCTC[CG][CG]AATGCCCCTCC[CG][CG]A[CG]GGGCCT[CG]CTCTGGGCTCCC[CG]CCTAGATCTGGGC[CG]CTG GGGCCAGGGGTG[CG]GTGGGG[CG]ATGGTCTGTGACCCCTG[[CG]][CG]GCTCAGAGCCTAGGGGACAGGGGCAG GAG[CG]GAAAG[CG][CG]GGCCTGATTAC[CG]GA[CG]TGGAGA[CG]CTGT[CG]CTG[CG]CTTCTGG[CG]GC[CG]AG [CG]CAGG[CG]G[CG]GA[CG]GCTGGGAGCCAG[CG]GGGCAG[CG]GGCT[CG]GGGCCCCTGGG[CG]GCAGGAA[CG] GCA[CG]TC[CG]CTAGGAGCAGGCAGGGTGCT[CG]AG[[CG]]GC[CG]C[CG]G[CG]GCTG[CG]TGC[CG]AAGCCACAG

AGGAGGC[CG]AGTCCCAG[CG]GTAGGGCCCCA[CG][CG]CCAGGCTGGAGC[CG]TCAAGCCC[CG]GGCC[CG]GGC A[CG]G[CG][CG]ACTGC[CG]GACCCT[CG]CAGCCAGATCCCTGTCCTGGGCCAG[CG]GG[CG]C[CG]GCAGCT[CG]G CCTCCAAGCCCAGCAGGTC[CG]TGATGG[CG]AAGCCC[CG]GGGG[CG][CG]AGCCCCTAGGGGAAC[CG]CCAGGC ACCAG[CG]CCCTGCTGCTAGTG[CG]CC[CG]T[CG]GAAAG[CG]AGTCC[CG]GC[CG]GTCATGGTTCCTTAGCAAG
SEQ ID NO: 648
TTTGCAAGGTTGTTGTAAGGGCTGAATGAAGTAA[CG]GGAAATCTGGGGTA[[CG]]TGGGAGATAGTAAATGGCAG C[CG]TCCCTGTG[CG]CCCCCTGACACCTCC[CG]CC[CG]GTCCTAGCCCTGTACTGGGTCAGTGTCAGCATCCTTCC A[CG][CG]TGCTCTCTCTCTGCCAC[[CG]]CACACCCAAAGAC[CG][CG]CCTCT[CG]CTGCTCTCACCTG[CG]GGGCA G[CG]GAGGG[CG]CAGAGGTCAGGCAGCTG[CG]GGAGGGCT[CG]TGAGAGCCAATGAGAG[CG][CG]GAAGG[CG]G [CG]AG[CG]AGCCAATGGA[CG][CG]G[[CG]]GTGGGGCAGGGGG[CG]GGGCCTGGG[CG]AGGC[CG]GGGG[CG]GAA TGGGCTGAGTGCCCTGTCTGAATG[CG]GGGAA[CG]TCTGGGCCTCCC[CG]CCTGGCC[CG]CTCTTTTAC[CG]T[CG][CG]CAGGCCC[CG]CTCCAGGCCAGCCACTGGCCCCACCAAGCCC[CG]CTT[CG]CAGCC[CG]AGAGAG[CG]GGAAT AAATTAAGCTATTCTTAGTAGGGCCTGAAAAGGAGCCCTTTCTGACTACTAAGAAAACAAAGTTG[CG]TC[CG]TCT CTAGTTCTCAAACCCAAGCACAGTGATGTGGGT[CG]CC[[CG]]GTGCT
SEQ ID NO: 649
CTTGGAAGAGGAGAGAAAGAGAGT[CG]AAGA[CG]CCCTGTCAAGATGCCACTCACCTAAA[CG]CCAGGAACATC TCCC[[CG]]ACTAAGGACAGGC[CG]ACCCCCAGCAGGACCAG[CG]CCA[CG]AGCTTCCCCATGGTCT[CG]GGGTGC CCAG[CG]G[CG]ACTG[CG][CG]G[CG]C[CG]AGAGCTCT[CG]GGGG[CG][CG]G[CG]GG[CG]GTTCCTGCCT[CG][[CG]]TA[CG]GATTGGGGCC[CG]CT[CG]GCCC[CG]CC[CG]CACA[CG]CCTCCTACTTACCTGAG[CG]GCC[CG]GGTGC[CG]CAGCAGGG[CG]CTGA[CG]AGTCC[CG]C[CG]AGCCC[[CG]]C[CG]CC[CG]GGTTCAAGGC[[CG]]CCTTCA[CG]CCCA [CG]ATTCCTTGTTTTTTGGGCAGAGGTCAAGGCTCAA[[CG]]GAGAGGGAGCC[CG]GGAC[[CG]]AGTTGTGGTGGG AGTTTGCTCCTAACACC[[CG]][CG]AAATCCTACCTCAATTCCTCAGATGGCCTGAGGGAGAAAC[CG]GAGGGCC[C G]GGAATGG[CG]GGGAGCTCCAGTTCAGAGC[CG]GAACTC[CG]GACTTCTGCAAGGCCAGA[[CG]]TGAGG[[CG]]A CACTGAATTGCTCC[CG]AGA[[CG]][[CG]]GGAAGGG[[CG]]AAGGCAAT[CG]AAG[[CG]]AAGAGCTTTAACT
SEQ ID NO: 650
GGG[CG]G[CG]GTAGGAAGCCACCACCA[CG]GCCAGCTTGCCAAGG[CG][CG]TGTG[CG]GGAAGCAGGACAG[CG] CCTGCTG[CG]AGAGCA[CG]AAG[CG]GCTGC[CG]CCCA[CG]TTGAC[CG]TGAAGCAGTCCC[CG]AG[CG]CCAAGGG CTCCCCTTCACCCT[CG]CTGCAGAAGACACTAGAGTCCAGGGAGGTCAGGGAGC[CG]CTGTCCAG[CG]G[CG]AGT CCAGCAG[CG]CTCTGC[CG]CTGGAAGGCATCTCTAACCCAGT[CG]C[CG][CG]GCCTGAGGG[CG]CCACAAAGTTG GGGACA[CG]C[CG]GAAGCTTTGGTCC[CG][[CG]]AGGG[CG]GTGGCA[CG]GCCCCTGGTGG[CG]GC[CG]GGATTCC C[CG]GGCTCC[CG]AAGGGGTTACCTCTCCTTGG[CG]CACCCTCTCCACC[CG]CTGTG[CG]CCTTCCTCCTCCTGC[C G]CTAGGGAGC[CG]GGAGTG[CG][CG]GAAGCAG[CG]CACAAGTGGCAGAAAGAGGAGACAGGGAGCAGAGGAA GGGT[CG][[CG]]CTAAGAGAGAGGATCAGGTGAGGTCCAAGCC[CG]ACACAGTCCCTGTGCACACTGC[CG]GT[CG] CCCTGGCCCTTCCCAAA[CG]TTGTCACCC[CG]CCTCCCAACTT[[CG]]CAATTG[[CG]]A
SEQ ID NO: 651
AGAAGTTTCAGACCCAGGCATATTTGGGAAGG[CG]AGTGCTTTACATGATTCCCCATTTCCCAAT[CG]GACCAGCT TAGCCTGGGCAGGCAGCCT[CG]TGCTGAGGTGCCTGGAGAC[[CG]]CCCACCCCCTAGGTGCT[CG]CTTCCCCC[CG] GGTCTGACCTGAT[CG]AAGTAAATGATG[CG][CG]TCTTGTTGCTCATCT[CG]GATGGCT[CG]TGGTTGGTGCTC[CG]CAC[CG]C[CG]AGAAGG[CG]ACCTTGGAGTTGGC[CG]CC[CG]GAC[CG]ATATCCCCAG[CG]GGGAGGAAGAGGAG CCCTTGGAGTC[CG]TGGC[[CG]]GGTT[CG]AGT[CG]CACACCACCAGACACTTGCCCTCCAGCA[CG]ATGGGCTC[C G]TGT[CG]TTCTGTGCCCAGA[CG]GGCAGCCC[CG]GCAG[CG]TGAGGACCAGCAGCA[CG]GC[CG]GCAC[CG][CG] GACAG[CG]CC[CG]G[CG]CC[CG]GAGCCCATGGTGAGC[CG]TGTGGGCAGC[CG]CAGC[CG]GCTGG[CG]CTGGTGC T[CG]CC[CG][CG]T[CG]CCTCCTACCC[CG]GGATCC[CG]GTGCT[CG]GGAAGATGCTAG[CG]GCTAGGT[CG]ACAG[CG]CTGCAGGAG[CG]A[CG]G[CG]G[[CG]]G[CG]G[CG][CG]CACACTTCCACCAATTCTG
SEQ ID NO: 652
TGAGATT[CG]CTTTCCTCC[CG]TGTAGAA[CG]ATAATAAAAAGTGGTACTAATTTCA[CG]AGCTTTAATAGGATTG AATGTGAGCCCAG[CG]CTTGGCACAGGGCAAG[[CG]]CCCCATAAAATGGCAGTTAGGATTAAAAT[CG]AGGTTGC [[CG]]GGGGACCCCCAGGCAGGAGCTGAGATTTGTGTGGAG[CG]G[CG]AAGTGGGG[[CG]]G[CG]G[CG][CG]TTTG GCTTTGACTTCTGATCCCC[CG]AAG[CG]CTCTGGGGTCCTTTGGGCCCCACCCCCACCCACCCCAC[CG]G[CG]GGT CTTGGGCTC[CG]AACCCAGGG[[CG]]CCC[CG][CG]CAC[CG]AGC[[CG]]TTG[CG]TTTGAAACCCACAGAAAGAATT CCCC[CG]CT[CG]A[CG]A[CG]G[CG]AGGGTGTGGGAGCTACTGGCAGGCAAATTGGTGGGAGC[[CG]]CC[[CG]]GCC CAGCCTGCCTTGC[CG]AGTCAG[CG][CG]CTCTTGAGC[CG]CTGGGCCCTTCC[CG]GTGCC[CG]CCTGGCAG[CG][C G]G[CG][CG]GCTGGGGCAGGGGTCTGCTGGGGGC[CG]GGGACTAAGGGCTGTGGGCCCATCCACACA[[CG]]CCTC ATCCCTTCTTTC[CG]GGGGCAGCAGAGCAGCAG[CG]GGAGAC[CG]GGAGCAGGA
SEQ ID NO: 653
TCATCTG[CG]CCATGAGTGT[CG]AG[[CG]]CTACCTGGCCATCAACCATGCCTATTTCTACAGCCACTA[CG]TGGAC AAG[CG]ATTGG[CG]GGCCTCA[CG]CTCTTTGCAGTCTATG[CG]TCCAA[CG]TGCTCTTTTG[CG][CG]CTGCCCAAC ATGGGTCT[CG]GTAGCT[CG][CG]GCTGCAGTACCCAGACACCTGGTGCTTCAT[CG]ACTGGACCACCAA[CG]TGA[CG]G[CG]CA[CG]C[CG]CCTACTCCTACATGTA[CG][CG]GGCTTCAGCTCCTTCCTCATTCT[CG]CCAC[CG]TCCTCT GCAA[CG]TGCTTGTGTG[CG]G[CG][[CG]]CTGCTC[CG]CATGCAC[CG]CCAGTTCATG[CG]C[CG]CACCT[CG]CTGG GCAC[CG]AGCAGCACCA[CG][CG]GC[CG][CG]GC[CG]CCT[CG]GTTGCCTCC[CG]GGGCCACCC[CG]CTGCCTCCC CAGCCTTGC[CG][CG]CCTCAG[CG]ACTTT[CG]G[CG]C[CG]C[CG]GAGCTTC[CG]C[CG]CAT[CG][CG]GG[CG]C[[CG]]AGATCCAGATGGTCATCTTACTCATTGCCACCTCCCTGGTGGTGCTCATCTGCTCCATCC[CG]CT[CG]TGGTGAGT GAC[CG]GGGCTGGGGCCCTACT[CG]GCCTTTTTCT[CG]CATCCACCTCC[CG][CG]TC
SEQ ID NO: 654
GCAATCCCTAGATTCCCTGGGGACCA[CG]AAACTCCCATTC[CG]AGGAAACCTCCCCCCATTCCCCAGC[CG]CCCA CC[CG]TTTCCCCCCCTTACCTCAGCA[CG]CAGCCCCTCCCTG[CG]TGATGATGCAAACCAGTGGGGAGGGCTGG[[C G]]CTGGGAAGGGTGGGGAGAGAAGGAGAGCCAG[CG]AGGGAGGGAGGGAGTGGGAGGAGGAGGAGAGGGAGC[

CG]AA[CG]ACCATTTAAAG[CG]ATAGCAGTCCCTGCCCTCTCCCCAGTGCTGGGCTGTTGGAGAGAG[[CG]]AGCAG CAAGC[CG]GTGAG[[CG]][[CG]]AG[CG][CG]G[CG][CG]C[CG]GC[CG]GCTAACC[CG]AGAG[CG][CG]AGG[CG]CCC CAGGCTGGCAGG[CG]C[CG][CG]GGACCCCTCACCCTCTCTGGT[CG]CCCCTCCC[CG]GATTCCCCCACCCTC[CG]T GCCTGCAGGAGCCCCTGGGCTTTCC[CG]GAGGAGCT[[CG]]CCCTGAAGGGCC[CG]GACCT[CG]G[[CG]]AGCCCAC CAC[CG]TTCCCTCCAG[CG]C[CG]C[CG]C[CG]C[CG]CCAC[CG]CAGCAGC[[CG]]GAGCAGCATGGTCCAGCTGAGGAAGC TGCTC[CG][CG]TCCTGACTTTGATGAAGTTCCCCTGCTG[CG]TGCTGGAGGTG
SEQ ID NO: 655
TAAGAGAGAAGGAG[CG]AAGGAG[CG]GGG[CG][CG]ACTCTTACCCCCCAGCCAGTTGT[CG]GAAATGTTCTGGA GCATGGTGA[CG]GGAATGCAGAAGAAGGTGATGAGCAGGTCACTGAG[CG]CCAAGGAGCAGATAAAGATGTTGG TGA[CG]GTG[[CG]]CATGGCCTTGCTG[CG]GGTCACCA[CG]TAGAACACCAGAGCATTGCCAAAGAG[CG]CCAGGG [CG]AAGATGAGCA[CG]C[CG]GTGAGCA[CG]AGGGCCAGCTTGG[CG][CG]TCC[CG]GCAGCTCTGGGGTGTAGA[C G]AG[CG]GT[CG]CAGC[CG]GTACAGAG[[CG]]ATGAACTGCTCC[CG][[CG]]TCAGGTTGTGGTCC[CG]CAGCAGC[C G]AGAGAACTGCTC[CG]GGGTAATGTTAAG[CG]CCTGCATTGCTGTG[CG]CTCC[[CG]]GGA[CG][CG]GGGCCAC[C G]CC[CG]CTACTGGCTGGCCATC[CG]CATCTG[CG]GGGCAG[CG]AGGGCTT[CG]GGGGACCAGC[CG]GAGGC[CG] CCTCCCTTCCTCTACTCTGGAGTCAGC[CG][CG][CG]GGAGGGCTCTAGGCTGCACCC[CG]GGAGGTT[[CG]]GGAA AGGAGAGCAGCTCAGGGATCAAACCCA[CG]ATAAAGAGG[[CG]]GGAAGCCAAAGCACT
SEQ ID NO: 656
CTTACAGGACCTGCCCTCTGAGT[[CG]]CCAGGATATTT[CG]GGGGCACACTCTCCTTGA[CG]TCTGGCATTTTGCT GATGGTATCTGGGTGAGGGAGAAAGG[CG]TGTTGTTGG[CG]T[CG]GGGAAGGGGCCTCCCCAATTGCCAAGGGG GTCCCTGGGGG[CG]G[CG]GGAAGGGGGGTAG[CG]GCCTCAGGGTCTTGGGGGTGCTGAGGGGCAGAAAGGGGCA AAGGAG[CG]TGGAGGAG[CG]GAAGT[CG]AGAGTGGGACAGAAGTGGAG[CG]CTGGG[CG]GCAA[CG]AGGAAAC TAAAGCCACAGAAGCC[CG]G[[CG]]CAGGG[CG]GGAAG[CG]TGGGAAGGCCCCTTCCTT[CG][CG]G[[CG]]AGGTG CCCCCCT[CG]CC[[CG]]AAA[CG]C[CG]GCCCAGGCC[CG]CCTC[CG]GCTCCCAGGC[CG]TCACCTCCTCCTCCCC[CG]C[CG][CG]GGTCATCCACTGG[CG]TC[CG]CT[CG]GTGGGCCT[CG][CG]GCCTGG[CG]GCCTGGAG[CG]TACCAC[C G][CG]G[CG]GAG[CG]G[CG]GGTTGGGG[CG]T[CG]CA[CG]GTGAGAAAGGC[CG]GGGCCTGAGAACAAAC[[CG]]C[[CG]][CG]GT[CG]C[CG]GGGCAA[CG]GGA[CG]GGGCA[CG]TGCCCCCCC[CG]CCAGAGC[CG]GAAG[CG]G
SEQ ID NO: 657
GGCTCACAGGCAGTCACACACCTATA[[CG]]GGCTGACAC[CG]CTAAGTGAACAGGTGCAGACACAATGGCACT[C G]GGGA[CG]GGCTCACA[CG][CG]GTCACACACCTGCAGGAACA[CG][CG]CACACTACACAC[CG]TTGCTCT[CG]CC TCC[CG]GTATCACCTT[CG]AA[CG][CG]CTGGC[CG]GCCCCCTCCTAGCCTGGTGCAGT[CG]GCTC[[CG]]CTTCTAC TCAGTCT[CG]GGTCCTCCTGGGCCAA[CG]CAGACCCTGGTGCCTCCTTCCTTAGA[CG]AGCTAAGGTCAAGACTTC TGCTGCTG[CG]GAGGAGCC[CG][[CG]]CACCAGGC[CG]GGGTGGACTG[CG]CCTG[CG]CAT[CG]GGCC[CG]CCTGG TTCTTAGGAACTA[CG]ACTCCCAGGGGG[CG]CTG[CG][CG]CT[[CG]]C[[CG]]GCAC[CG][[CG]]ACTAAAGCTTGCA AAGCCTGGGTCAT[[CG]]AAACTACAACTCCCAGAAGGCTAAG[[CG]]TCTGCACA[CG]CTAGGTC[CG]CAGGG[CG] CTGACCCCTGGGGGCC[CG]AGGAG[CG]C[CG]GGCTGCTGCCC[CG]AGCCC[[CG]]CCCACTACAGCCTCAGTGCAT GG[CG]GTGGG[CG]CTTCCAGTAACTCAGGGGTGGGACTTTTTTCTTGCTCAGGGG
SEQ ID NO: 658
C[CG][CG]GCTTGGGGTGCAC[CG]CTGCCCACC[CG]GCTCTTGGT[CG][CG]GGGTCCTGGGGAGC[CG][CG]G[CG]G C[CG]CCAC[CG]CAGGAGCCTGCTGGAGGGTGGTGGTGATGATGGTGGCCT[CG]CC[CG]CCT[CG]CTCATGCCTCCT CCTCCTCTGCTCT[CG]CTCATG[CG]CCT[CG]GTGG[CG]GTTGGT[CG]G[CG]GTTAGTG[CG]GCTGGTGGT[[CG]]C[C G][CG]GC[CG]GGGCT[CG]CTCT[CG]GGGAGGC[CG]GGGCTGATCT[CG][CG]G[CG]CAGG[CG]G[CG]G[CG]GCAGA GGTGGGGT[[CG]][CG]CAG[CG]GAGGCAGCT[CG]AGCTT[[CG]]GGATG[CG][CG]CT[CG]CTTCTTGGGCTCCT[CG]C T[CG]ATCTTACTGCCCCCTTTTTTCTCTCCCTCCCTCCCTTCCTTCCTCCCTCCCTCCCTCCCTCCCTCCCTTCC TTCCTTTCCTTTCTTTT[CG]TCTTTTTTTTTCTTTCCTTTTCTTTCAGAGTCT[[CG]]CTCTGTCACCCAGGCTGGAGTGC AGTGGCA[CG]ATCT[CG]GCTCACTGCAGCCTCCATCTCCTGGGTTCCAG[CG]ATTCTCCTGCCTCAGCCTCTTGGGT AGCTGAGATTACAGGCATG[[CG]]CCACCACACCAAGGCTAAT
SEQ ID NO: 659
GCCCCACCATC[CG]CTGACCTT[CG]CC[CG]GTC[CG]GCCTGGAGCC[CG]GC[CG][CG]GCCTCCCTAGGCCTCTCTA GGC[CG]GG[CG]C[CG]GTTCAG[CG]AGGAC[CG]GAAG[CG]CC[CG]C[CG]TC[CG]CCCTTC[CG]CCTCCAGGC[CG][C G]GG[CG]CCAGGC[CG]GGGG[CG]GGCTGGGGA[CG]CCCTGGGAGTGCCC[CG]GGGGC[CG]CCTTCTTCCC[CG]CA AGCC[CG]GAG[CG]GG[CG]T[CG]CTCC[CG]CCCC[CG]CCT[CG]TCTTCAGTTCCCC[CG]T[CG]CTTC[CG]C[CG]C[CG]TGGGTAGAACAGACC[[CG]]AGCTGGGAGCCAGGCCTG[[CG]]GCCCCT[CG]AACACTAGCCACATCTGGCC[CG]C[CG]GGCCTAGCA[CG]GAGAGAGGCCCTGGGGCTTGG[CG]GC[CG]GGGC[CG]GGAGAGGT[CG][CG][CG]GCCAAG GACACC[CG]AGGGCCTGGGCTGCCTCCC[CG]CCCTTCCC[CG]CCCCTCCCCT[CG]GCCCTGGAATCAATAGTGGC[CG]CTGACTTTTCA[CG]ACAATTGCAGCTGTCTAATTCATCAG[CG]AATAATTAAATCAGAGGC[CG]C[CG]GGCCT GCCTGGAGT[CG]GAGA[CG]AGGGGT[CG]CTCCTCTCAAATCCTGTCAAATTGGGGAGCCAGT
SEQ ID NO: 660
TTCCCAGTC[CG][CG]GAAGCCAGGTC[CG]GGAGA[CG]G[CG]GGGCTCACTGTGCCTT[CG]GACCTACACTCTGCT[CG]GGGGC[CG]GATTTCTGCAAAG[CG]TCCACTTGGAAAGAAGTTTCACTTGCAGGGAAGG[CG]GGTGTA[CG]CA ATGATGGTC[CG]TGTGTC[CG]GGATGTGAATGCCAACCAAGACTG[CG]TC[CG]TTGGTGGAGTGTG[CG][CG]GGT CCTC[CG]TGAGGGTGCTTCTGGCAGTCACAGTTCA[CG]AGTTAG[CG]AGAAGATGGCTGGGAGG[CG]G[CG]AGCC CC[CG]CTCC[CG]GGG[CG][CG]CATTT[[CG]]AACTCCATAGGTATGGGTGAGTTGGTTAGCATTGGATT[CG]AGTGC TTGTTCTTATCTGAGTACAGACACCTGGTAACCTT[CG]GGCCTGCAGAGGCCCCTGTGCTCCTTTGGAGGG[CG]CT GCAGGA[CG]GGCTGGGTTGCATC[CG]GGCCTTTACCCCAGGTAGC[CG]GCAGCAAGTGAACTGGCCTGGATTGGC [CG]GCCCAGGGCACCTCCACACACAGAGCCC[CG][CG]GCACAAGGCAGCTGTGCAAAA[CG]GTCTCTAGAGGGG CTGCCCT[CG]CCCTGGTGAATGGGCAGGAAGG[CG]TGTG
SEQ ID NO: 661

C[CG]TGCTAAGCCCCTGAGT[CG]CCTGTAGATCC[CG]TCTATTC[CG]TTCTTCAATTCTTCCCTTT[CG]ACCTCTAA GGCAACCCAAAACTCCTTGCCCTC[CG][CG][CG]CCCCCAACCCCACTTCCCAAGCAGGCCCAGGCTGGGCTCCAA GTCAGC[CG]CCTG[CG][CG]GTTTTCC[CG]C[CG]AAA[CG][CG]TCCC[CG]G[CG]TGTGGGA[CG]G[CG][CG][[CG]]G GC[CG]GGCACTCACCAGCTGCAGCAAGCCAGGGACCACCA[CG]AGGGGCAG[CG]GC[CG]CAGG[CG]CATGGTGC[CG]GCTGG[[CG]]][CG]]GCTTTTCA[CG]AGCTG[[CG]]][CG]]CCCT[CG]CCTGCCTCT[CG][CG]CATCTCCACTT[CG][C G]GGGCAGGACTGAGGA[CG]CCAGGGACACAG[CG][CG]G[CG]CTTCCCTCC[CG]GAATC[CG]AG[CG]CTG[CG]C[C G]TGC[CG][CG]CAGCTCTGGC[CG]GGTGGG[CG]GGCAGGGAAGGGGGAGGGTGGG[CG]GAC[CG]GAGGTGCCTCT CC[CG]GCCCCC[CG][CG][CG]CCCCTCCT[CG]GAGGGGGC[CG]GCAAAGAGCCTG[CG]GGGCAGCT[CG]AGCTC[C G]GCA[CG][CG]G[CG]GGGGGCTTCAGT[CG][CG]CCTTGGACTCTCC[CG]CTTGGC[CG]GGCTTGGGGTGAG

SEQ ID NO: 662

CCCCTCATCTGGTGG[CG]G[CG]GCTGGAGAAGGG[CG]CACCC[CG]CC[CG][CG]GAGACCCA[CG][CG]CTCACCTT C[CG]GGGGC[CG]AGGTC[CG]GCT[CG]T[CG]TC[CG]GCTCAAGGCTC[CG]GGC[CG]TGGTCC[CG]C[CG]G[CG]GTG TAGAAG[CG]GC[CG]C[CG]CTCTTGTGCCCTC[CG]GGTGGGACCA[CG]TGGGGAGGCAG[CG]GTGACCC[CG]GAGG GTGA[CG][CG]GCC[CG]GGGTC[CG]GATTGGC[CG]G[CG]C[CG]CC[CG]CCCCCTCCC[CG]CCCAGC[CG]ACCCTCCC [CG]GCAGGAG[CG][CG]GGC[CG]TGCAGGGTCT[CG]GGGGT[[CG]]AAC[CG]TCCTGGAGGTCACA[CG]GCCCCAGA GTTGCCTGTCCCAGGGGT[CG]CCCAGTC[CG]GAGGGT[CG]CTCCATCCC[CG]GGTCACA[CG]TCCCC[CG]ATTGCC [CG]GCCCAGGGCTGCAGCATCCCAGCCTTGCAGAGG[CG]AT[CG][CG]CCACCCACCCCAGA[CG]GGC[CG]CTCCC TG[CG][CG]GA[CG]CAC[CG]GGTT[CG]G[CG]CCTTGCAGGCTGCTGG[CG]ACCC[CG]CTGC[CG]GGTTTCTCCC[CG] GACCTCA[CG]GCCTGGACAGCACACT[CG]GAA[CG]G[CG]GCATGCATTTGAAGCCAT[CG]CTGCCTG

SEQ ID NO: 663

TTTTG[CG]GCTTTTTGC[CG]C[CG][CG]GCTTTTGGCCCC[CG]C[CG]C[CG][CG]ACTTTTTTCCCCTGT[CG]C[CG]CA GGTTTCTCCTGCCC[CG]GCTTCTTGCCCCCAC[CG]CC[CG]AGCTTTTTGCCCCCAC[CG]C[CG][CG]GCTATTTG[CG] GCTATTTGCACCTGCCAC[CG][CG]GAGTTTTGCCC[CG]TATG[CG]GCTTC[CG]GCCCC[CG]C[CG]CCA[CG]GCTTTT TATCACCCC[CG]C[CG]CTTTTTGCCCC[CG]C[CG]C[CG][CG]GGTTTTTGCCCC[CG]CCCC[CG]TTGCTTTTTACCCC[CG]C[CG]C[CG][CG]GCTTTCTGCCCCTGC[[CG]]A[CG]AGGGTTTTTG[CG]GCTTTATATCCC[CG]CTGTCATGGCTT TTTG[CG]GC[CG]TGGCTTTTTGCCCCCTCAGC[CG]TGGTTTTTTTTG[CG]GCTTTTGGCACC[CG]T[CG]C[CG]CAGCT TTTTCAGGCTTTTGGTGAC[CG]C[CG]CCA[CG]GCTTTTTTCCCC[CG]C[CG]C[CG]CAGATTTTTCC[CG]C[CG][CG]G CTTTTTGC[CG]CCCCTGCTTTTTGC[CG]CCCCCCCC[CG]CAGC[CG]CTTTCTGCCCC[CG]C[CG]C[CG]CATCTTTTTG C[CG]C[CG][CG]GCTTTTTGCCCC[CG]C[CG]T[CG][CG]GCTTTTTGCCCCCAATGC

SEQ ID NO: 664

CAGGAGATTTG[CG]GGGG[CG]GGCTG[CG]TCTCCAAGAGAG[CG]AG[CG]TCTCCAAGAGAG[CG]AGCTCCCTGTC ATGGG[CG]GTGTCCACAAAATG[CG]CCTCTGTGGG[CG]ACAGAGGGGTG[CG]GTGGGGCCTAGGAGGCT[CG]TGG G[CG]ATTC[CG]AGCAC[[CG]]GGT[CG]GTCC[CG]AGTGAGGGGCCAGCCCTGGGGCTGGGAGGAAGG[CG]AGAGG CAG[CG]CCACTGCTCCTGACTCCC[CG]GG[CG]ACTCCA[CG]AAGGAAGGCAGAGGGCTGAGCCCCAG[CG][CG]GA TCAGCCAAACT[CG]A[CG]GGCCCTTGC[[CG]]GTCACC[CG]TCCCTAACCCTGGTTGGGCTGGGAGGGGTCTTCT[C G]CAAGTCTTCT[CG]CC[CG]G[CG]GAGGCTTCTCCTTCCCAACCCC[CG][CG]A[CG]GG[CG]CATGCCTTAAGCTGCT CT[CG]CC[CG]C[CG]GGCTCCTCTCT[CG]CTCCCAGGGCCTGGTGGCC[CG][CG]GTGGCC[CG][CG]TCCAT[CG]TGT[CG]GTCCCAC[CG]ACCC[CG]ATTAA[CG]CAGGTT[CG]AGATG[CG]G[CG]GCTTC[CG]C[CG]AGTGGG[CG][CG]G[C G]TT[CG]GGGTCCTC[CG]GGAGCAGGTG[CG]AAGGA[[CG]]TGTCTGGAGTCTGT[CG]TCTGG

SEQ ID NO: 665

[CG]C[[CG]]CCCAGGGCAAAGAAAGTAAGTGGCC[CG]AA[CG]G[CG]G[CG]G[CG]GCAG[CG]G[CG]GCCTCAGCAG[CG]G[CG]G[[CG]]T[CG]GGAATGAGCTCCTC[CG]GCTTGTCC[CG]ACCACA[CG]CATCTTCCAGGGAAGCC[CG]GGA AAATCAGCCAGAGGAGAAATGAGGCAGCAGTTTTGTTTTGCTTTTCCTTGAAGGGGGTTTAAAATAAAATCAAAT CCTATCTGCTCCC[[CG]]CA[CG]AGC[CG]GCAGCAGGCACCAGAGA[CG]CAGGGACCTG[CG][CG]T[CG]CATCCAG [CG]CCCCCTCCCTCTCC[CG]TCC[CG]G[CG]C[[CG]]G[CG]GTGTG[CG]GCAGGCAGGAGCCCCCACAATCATCTGA[CG]AGCCCACAGTG[[CG]]CC[CG]G[CG]GCTGCCTGGG[CG]TCATCC[CG][CG][CG]AGCATC[CG]CAGGCTGGGCTG GGAGAGGG[CG]GGGAGGGGGAG[CG]GCTGGGGCTCTCTCTGCATCCCCCCCTCCAG[CG]TCCCCC[CG]GTCCCTT GCAGCCTTGGAAGGTGGC[CG]GTGGC[CG]GT[CG]GGGAGGGGTGGGGGCTCCCTGGCAGAGGACTCAGGACATT T[[CG]]GTGTTAAAGCCCCTGAGGACACCAGCCCCCTCTGGGGATGATGAATTCA

SEQ ID NO: 666

CTTGGAGATTAGCCACCC[CG]TG[CG]CCCAGGTGAAAGATATCATTCTTC[CG]TG[CG]ATC[CG]AAGTGC[CG]TGG AAGTTAGTGCCCTAGCCCAGTCCAGGAGGAAGGGG[CG]T[CG]TGC[CG]G[CG]GTTTTAAGCT[CG]GAAGGGGCAG GGGAATGAGCCCAGGGACCCCAG[CG]GGG[CG]CAGGTAGGAGGCTGTG[[CG]]CT[CG]C[CG]GGTG[CG]CTC[CG] GCCC[CG]ATTCCCAG[CG]CAGCCAGTAAGTGG[CG]CTGGGCCT[CG]GGTTTGG[CG]GCC[CG]GAGGAG[CG]GGCT G[[CG]]GATTACCTGCAGCAG[CG]GGGAGC[[CG]]C[CG]AGCTCCTCCC[CG]CC[CG]CCCCCACACCCCACCCCCAC[[CG]]CTGCACTAACCC[CG]GCTCAGCTGGCTC[CG][CG]CACTTGCT[CG]GAGGAGC[CG]GGGC[CG]AG[CG]GAC[C G]C[CG]GCTGCAGGCAG[CG]AG[CG][CG]GCTGGGCTG[CG]GGGCTGCTTCCC[CG][CG]TCCTC[CG]GGCC[CG]GGC [CG]CCCTCCTCC[CG]CACAGTG[CG]GAGCAGGGAGGCCC[CG][CG]CCT[CG]ACCACC[CG][CG]CC[CG]AG[CG]TC[CG][CG]CCTCCTCCTC[CG]CTCTGCAGG[CG]GGGAC[CG]CC[CG]G[CG]CT[CG]GCACC[CG]GCAG[CG][[CG]]GC

SEQ ID NO: 667

CCCCAGGAAAGTGGGATTTGGGTGTT[CG]GGTCA[[CG]]AGTGGGCTGAAGG[[CG]]CCTCTACTCACCTGCA[CG]T AGTCCAC[CG]AATCTC[CG]AG[CG]CCTTGAAGGCTGTGTACATGACCT[CG][CG]CTTGC[CG]CCCCAG[CG]CTG[C G]CCA[CG]CACA[CG]CACCTG[CG]AGTCCTCACCAG[CG]CCTCCACTGCCAGC[CG]CCCAGGATCCTC[CG]CCTCC ACCTCC[CG]ATAGGCTC[CG]G[CG]CCCAC[CG][CG]CC[CG]C[CG]C[CG][CG]GGTTCCCAGGGCTGGTGGTAGTTGC [CG]TCCCACA[CG]TA[CG]TGG[CG]GGGTCCT[[CG]]TCAG[CG]AAGACCT[CG][CG]GAACATGT[CG]ACCATGTAG AGGTCCT[CG]G[CG][CG]GTTGCCATCCACCACCATGAGGA[CG][CG]CAGC[CG][CG][CG][CG][CG]GGTACAGCAG GG[CG][CG]GG[CG]GA[CG]CCAGGCACTGG[CG]CAGGTA[CG][CG]GGGTCCTCCTGGTAGG[CG]GAGATGGTCAG[

CG]CCACACTG[CG][CG][CG]GTGGCTGCATCCAG[CG]GCCCC[CG][CG]C[CG]C[CG]C[CG]CCACC[CG]C[CG]GTGC TCCAGGTA[CG][CG]AAGAGGCTCTG[CG]CCACCAGGTG[CG]CTGAAAGGAAGGCCC[CG]TAGAGGC[CG]AAGG
SEQ ID NO: 668 TTA[CG]CCCTGGCACAGGTTCC[CG]G[CG]ACTGGTGTTCCCAAGGGAGCCCCCTGAGCCTAC[CG]CCCTTGCAGGG GGT[CG]TGCTG[CG]GCTTCTGGGTCATAAA[[CG]]C[CG]AGGT[CG]GGGGTGG[CG]GAGCTGTAGAGGCTGCC[CG][CG]CAGAAAGCTCCAGGATCCCAATATGTGCTTG[CG]TGGAGCAGGGAG[CG]GAAGAGGCAGC[CG]GTCCTCACC CTCCTCTCC[CG]CCA[[CG]]CACATATCCTTCTTGACTT[CG]AAGTGGTTTGCAATC[CG]AAAGTGAGACCTTGAGT CCTCAGATGGC[CG]GCAA[CG][[CG]]C[CG]AGGTCA[CG]CTCCCCAGAAACACCCCTCTCCCCTCCCCTACCCCAGC TCCCCCTGGGG[CG]GGTGGTAATTGGGGGAGGAGAGGC[CG]CAGGCAGGGAAGGGGTGGGAAAGCCAGAGAGG GAGGCACAAAGTGATGGCAGCC[CG]GCAAACACTGGGGCTT[CG]GGCTGGGC[CG][CG]CT[CG]TTTAATCCCACA AAAATCCCATTTTGGAGGTGAGAAATAGAGGTTAGAGGT[CG]GGCCCTTCTGGAGATCAGAC[CG]AGGAGA[CG] GGCCCAGCTGG[CG]TCTTAAAGCAAGGAGGGGGAGT[[CG]]
SEQ ID NO: 669 [CG]AGG[CG]CTCATGAACAAGTT[CG]GCTTCCAGTGGCC[CG]AG[CG]GCTG[CG]CTG[CG]AGAACTTCC[CG]GTG CA[CG]GTG[CG]GG[CG]AGATCTG[CG]TGGGCCAGAACA[CG]T[CG]GA[CG]GCTC[[CG]]GGGGCCCAGG[CG]G[CG]GCCCCACTGCCTACCCTAC[CG][CG]CCCTACCTGC[CG]GACCTGCCCTTCAC[CG][CG]CTGCCCC[CG]GGGGCCTC AGATGGCAGGGGG[CG]TCC[CG]CCTTCCCCTTCTCATGCCCC[CG]TCAGCTCAAGGTGCCCC[CG]TACCTGGGCTA C[CG]CTTCCTGGGTGAG[CG][CG]ATTGTGG[[CG]]CCC[CG]TG[CG]AAC[CG]GGC[CG]TGCCAA[CG]GCCTGATGT ACTTTAAGGAGGAGGAGAGG[CG]CTT[CG]CC[CG]CCTCTGGGTGGG[CG]TGTGGTC[CG]TGCTGTGCTG[CG]CCT[CG]A[CG]CTCTTTAC[CG]TTCTCACCTACCTGGTGGACATG[CG]G[CG]CTTCAGCTACCCAGAG[CG]GCCCATCATC TTCCTGT[CG]GGCTGCTACTTCATGGTGGC[CG]TGG[CG]CA[CG]TGGC[CG]GCTTCCTTCTAGAGGAC[CG][CG]C[C G]TGTG[CG]TGGAG[CG]CTTCT[CG]GA[CG]ATGGCTAC[CG]CA[CG]GTGG[CG]CAGGGCAC
SEQ ID NO: 670 [CG][CG]G[CG]G[CG]TTTCCTGGGGCAACAGCAATGG[CG]GCCT[CG]CTGTC[CG]AG[CG]GCTCTTCT[CG]CTGGAG CTGCTGGTGGACTGGGTG[[CG]]TTTGGAAGCC[CG]GCTGCTGC[CG]TCCCC[CG]CTGC[CG]CAGTGGAGCAGGAG GAGGAAGAGGAGGAAAAGGAGCAGGGGGAGGCCT[CG]T[CG]C[CG][CG][CG]GTCTGTGCCC[CG]C[CG]TGGCCT TC[CG]CCTGCTGGACTTCCCCA[CG]CTGTTGGTTTACCCTCCTGA[CG]GCCC[CG]G[CG]CTCC[CG]C[CG]C[CG]AA C[CG]TGGCC[CG]GTGTCATC[CG]CTT[CG]GT[CG][[CG]]GCAAGTCCTGCCTCTTC[CG]CCTGCAGCCTGCTACCCT GCACTGC[CG]GCTCCTG[CG]GACCC[[CG]]CTTGCCACCTTGCTGCTGCAGCTGCCCCCTGGG[CG]CC[CG]A[CG]CC CACCCCACAGCTCCTGGGGGCCTG[CG]ACATTT[CG]CTGGCCAC[CG]CAG[CG]CACAGGGT[CG]TGGGGC[CG]GC[CG]CCTC[CG]GATGCTCCCAC[CG]TCAC[CG]GGGA[CG]TTTCCCCCTGCATAAT[CG]AGTGGG[CG]AG[[CG]]GACT GGGGACATTGCACTGGCCTAC[CG]CCTGACTGACCTGGGAAGC[CG]CCTGCTGAGCCA
SEQ ID NO: 671 GGAGAGGCAAGTTG[CG]AGTT[CG]CAGGGCTTGGGAGTTTTTTG[CG]G[CG]GAAGAAGCTGAATCTAGGGGCTGA GTCCC[[CG]]GGAAGGGATGGC[CG]CCTCTTAGCTTT[CG]CCAGGAGATTATCTTGGAGCCCAG[CG]GC[CG]AGAT TGAGAGCTCTTTCTG[[CG]]GAACCTGCCTC[CG]GAGTCAGATGAGCAAGGGGAC[CG]CCA[[CG]]TCCTCAC[CG]A GCTCCCAG[CG]GCCTTTGGGG[CG]GGTC[CG]GGGACAAGC[CG]GAGGACTAGGCTTCTCCCAGAG[CG][CG]GCTG TCTTTCC[CG]GAAAGACCCAAGTG[[CG]][CG]ATGTCAGCC[CG]CCTGCACTTCATCTGAGTTGTCCTTATGTGGCC ATTTCTGTTTCAAATTTCAGATTTTTCTACTAAAAAAGGATGGGTTAAAACAGCTGAGAG[CG][CG]CCTGCTCTTT CC[CG]CCCTGGGTTCTACATCTCTCTAGC[[CG]]CCCACCAGACTGCATCTCCAATCTGGGAGCTATCCTCACCTTG GGAGGGTGGGGCAACAATGTTATTCT[[CG]]TTTCC[CG]ATAAGGAAACCAA[CG]TCCCTACAACTTGA[CG]TTAA ATGGTCCCAGGTTCCTGAGCCTCAAATCTAGGACT
SEQ ID NO: 672 CACC[CG]GCCTCACCTG[CG]CTTCCCCACCAGGCCCTGTAGCAGC[CG]CTGGAGC[CG][CG][CG]CCCTCC[CG]CAG G[CG]GCTGAGCT[CG]CTGGTGAA[CG]TCC[CG]TCTGAGTGT[CG]C[CG]GGCCCTG[CG]GG[CG]GT[CG]GGGGT[CG]GGGTCAGGG[CG]CACTGGGGG[CG]GGTGGGGCC[CG]GGGGG[CG]GG[CG]GGCCTGG[CG]GG[CG]GCTCACCTGG GGGG[CG][CG]GGG[CG][CG][CG]G[CG]GAGCCCC[CG]AGGAGCAGCAGCAGCAGCAGGAGGGGC[CG]GGGGGCC ATGG[CG]GGGT[CG]GGG[CG]CAGGAGCTGAG[[CG]]CTG[[CG]]GCCA[CG]GCCC[CG]GGCCCC[CG]CAAGGCCCCT TTATGG[CG]G[CG]CC[CG]GAAAGGGGA[CG]GCC[CG]GC[CG][CG]CCCAG[CG]ATCC[CG]GGAAGGTCAGGGC[CG]CCCCCCCAGCTGT[CG]CCC[CG]GCC[CG]GCCTCC[CG]CCCCCTC[CG]C[CG][CG]CTGG[CG]CCCCT[CG]GC[CG]GC TGGGGGAGGGGGA[CG]TCC[CG]GCCTGGGGGG[CG]AA[CG]GAG[CG][CG]GGCCTGGGACC[CG]CAGAGGGAAC[CG]CAC[CG][CG]AAGCCT[CG]GAGCCTG[CG]GGGG[CG]GAGGGGC[CG]GAGGGCTTGGGGGAGGGTTTGGGGGG GGAC
SEQ ID NO: 673 CACCCCACC[CG]GCCTCACCTG[CG]CTTCCCCACCAGGCCCTGTAGCAGC[CG]CTGGAGC[CG][CG][CG]CCCTCC[CG]CAGG[CG]GCTGAGCT[CG]CTGGTGAA[CG]TCC[CG]TCTGAGTGT[CG]C[CG]GGCCCTG[CG]GG[CG]GT[CG]GG GGT[CG]GGGTCAGGG[CG]CACTGGGGG[CG]GGTGGGGCC[CG]GGGGG[CG]GG[CG]GGCCTGG[CG]GG[CG]GCTC ACCTGGGGGG[CG][CG]GGG[CG][CG][CG]G[CG]GAGCCCC[CG]AGGAGCAGCAGCAGCAGCAGGAGGGGC[CG]G GGGGCCATGG[CG]GGGT[CG]GGG[CG]CAGGAGCTGAG[[CG]]CTG[[CG]]GCCA[CG]GCCC[CG]GGCCCC[CG]CAA GGCCCCTTTATGG[CG]G[CG]CC[CG]GAAAGGGGA[CG]GCC[CG]GC[CG][CG]CCCAG[CG]ATCC[CG]GGAAGGTCA GGGC[CG]CCCCCCCAGCTGT[CG]CCC[CG]GCC[CG]GCCTCC[CG]CCCCCTC[CG]C[CG][CG]CTGG[CG]CCCCT[CG] GC[CG]GCTGGGGGAGGGGGA[CG]TCC[CG]GCCTGGGGGG[CG]AA[CG]GAG[CG][CG]GGCCTGGGACC[CG]CAGA GGGAAC[CG]CAC[CG][CG]AAGCCT[CG]GAGCCTG[CG]GGGG[CG]GAGGGGC[CG]GAGGGCTTGGGGGAGGGTTT GGGGG
SEQ ID NO: 674 TTC[CG]TTTTAAGTAAGAAGAAAATA[CG]TAATTA[CG]AAGGAGGCTTTACCTTTGGGAAAACAAAAAGCCACTT TTGACCAATTATTCCCACAGATACACACC[CG]GGTCCCCAACCACC[CG]CCAGGAGGGCCCATCCTGGTGCCTGG AAGG[CG]GGGGTTCCTG[CG]ATCTGGGGTTGGGATTT[CG]GCTCAGGC[CG]TG[CG][CG]GTGGCCTTGGGT[CG][C

G]CC[[CG]]CCCTGCCTGGGCCCCCAGCCCAAGGGAC[CG]AG[CG]GGTG[CG]GG[CG]GGG[CG]GG[CG]GGG[CG]GG[CG]GGG[CG]GGGGTGT[CG]GGGGCT[[CG]]GACT[CG]GAGC[CG]TCCCTGCCAGTGGCTTT[CG]TGGG[CG]GCCC[CG]CCTTGGAGCCCAGGCCAA[CG]AGC[CG][CG][CG]GGA[CG]GAAGAGCTG[CG]GGTGGGGAGGGACAAG[CG]GG[CG]GAGAAGGGG[[CG]]GCCCTGCTGGAGGCCCAG[CG]AGTCTGAGTGATTGACAAGTGAATGAGCTGGGAATGAAGACTCCTGGGGC[CG]GGAGGGAGAGAGGGGGTTGGAGGGTGGTGAATGCCTGGGCCTCTGGGGCTCCAGGCTGCCAGTGGCC[CG]ACCAGGCTCT[CG]GTGTCCTCCTCCAACCTCAGTTTC
SEQ ID NO: 675 GG[[CG]]CATGTTAGAGGCACAAAGATGAGAATGTTAAAAGACATAAAATACAGGTCTGCTCTGGGAATGCAAAAACTGGTAAAAGGAGAGATAAAAGAGCAGGTGCAGTCTAGTGAAGTACC[[CG]]CTACCTCCTATCAGCAAATATCTGTCCACCTAGGGTGCAG[CG]AGCTGGAGAGGAAGGGGTGGCCTAGAG[CG]CAGGGGAAGGATTCCTCCCCAGC[CG]CCTGCACCCCTACCC[CG]GTAG[[CG]]GTCCCTGGGAT[CG]TC[CG]TGTCTCCAGGAGAAC[CG]GAC[CG]CTCTCCCCTCCCTCCC[CG]AG[[CG]]AGAAAGGAGGACCACAGAGATG[CG]G[CG]CCCTC[CG]C[CG]TCCTAGAGCAAC[CG]GAG[CG]GCC[CG]AGCCC[CG]GCCTCC[CG]GATGCTGGGGCCTGG[CG]GGTGTGGAGCA[CG]GGGAGT[CG]GG[CG]TGGGG[[CG]]GGCAGGGAGTGGAGT[CG]GGGTCTTACTC[CG]GTGGCTGCAGGG[CG]CAGGGTAGC[CG]TGTCAGGCCTGCCCAGGTGCAGAG[[CG]]CTCTTC[CG][CG]ACCCCAACAGCCTCTGGTC[CG]GTCTGG[CG][CG]CCCT[CG]CTTTCCCAGAGGG[CG]ACCTGGGCTATGG[CG]GC[CG]TGG[CG]CTGG
SEQ ID NO: 676 G[CG]AGGCAGAGAG[CG][CG]ATT[CG]GCTCCAAACTC[CG]G[CG]CTGCAGC[CG]AT[CG]GACTCTGGGC[CG][CG]GTGGGCAC[CG][CG][CG]CAGCTAGGGAGC[CG]AGAAC[CG][CG]G[CG]AGCCC[CG]AGGA[CG]CCCAGAG[CG][CG]AGGGT[CG]CTG[CG]CCT[CG]CAGAGC[CG]GAGC[CG]AGT[CG]AGC[CG]GG[CG]CC[CG]GGCTGCCTGGC[CG][CG]G[CG]GCATGGGGG[CG]CCCC[CG][CG]GCTCTC[CG][CG]CTGCC[CG]CCAC[CG]CCT[CG]GCCAGTGGC[CG]GAGGCAGGAG[CG][[CG]]TCTGAGCCCATGG[CG]AGGGGACC[CG]C[CG]CCAC[[CG]]CCTCCACCCC[CG]C[CG]CCC[CG]CCAC[CG]C[CG]CCAGCTCC[CG]GGCACCATG[CG]AAC[CG]CCC[CG]AGCCTC[CG]C[CG]CTG[CG]TCTGCCTGCTGCT[CG]C[CG][CG]ATCCTGGACCTGG[CG][CG][CG]GTGAGTG[CG][CG]GG[CG]CCTGG[CG]GGAGC[CG]AG[CG]GTGAA[CG]TG[CG][CG]GGGA[CG]GGGTGC[CG]GGGGAGGG[CG]CTGGC[CG]GGGT[[CG]]CTC[CG]AGAGGCT[CG]GGCTA[CG]AGCAC[CG]GTCCTGCC[CG]GGGTCTGTGGAGCTGGTTGGCT[CG]ATGAGGGAGGGAGGA[CG]CCTCTTGGAGAG[CG]CTCATGG
SEQ ID NO: 677 G[CG][CG]CT[CG]CTCCTGGTTTCCTTCCAATTTAGGCAAAGGCCCTGGC[CG]CC[CG]TCTTCCTGCTTCTGCTGTGCCCTGCCACAGCACTCCTAAGA[CG]G[CG]AATT[CG]TTTCTG[CG]CCAATTTTGTTTTGAATATCTACAAACCACTTTTCCTTGCATGAAGAAAACAAGGCAGGGCCCCCTGGCC[[CG]]TCCCACACCTG[CG]AGAGGCAGAGATACAGAGGCCT[CG]GGCCTCAGCCTTCATTTCCC[CG]CCCTAGCTT[CG][CG]CCAAGCTGCAGTGTCCC[CG]ACACACTGTCAGGACA[CG][CG]CTTTT[[CG]]CCCCTACTTTGTTCTTG[CG]CAGTCTTCCCAGCTG[CG]GAGAGGAGGGAG[CG]AAAGCAAAA[CG]AAAGCACC[CG]GGG[CG]CATCAGTTGCAATAGCTTCCCTGAG[CG][CG]GC[CG]TGGGAGGCCAAGATCTGAGGT[CG][CG]AGG[CG]A[CG]GTGGGGGCC[CG]AGCTG[CG]CAGAAACTGGGTGGGGG[CG]GTCCCTGGAGGG[CG]CC[CG]GGAGCTGCTAGAAGTTGTC[CG]GAGCCCCTCAACCCCCTTGGAAAAG[CG]AA[CG][CG]GATGTTAATATACCAACTC[CG]CAGGGAACTTTTGGCC[CG]GGTCTTGA
SEQ ID NO: 678 [CG]GG[CG]AAGAAT[CG]TG[CG]GGTCTGGGACCTGGGGGCCCAGAGGGAG[CG]AGCTCCTG[CG][CG]GG[[CG]]CT[[CG]]GTC[CG]CAGGTTT[CG]CAGGCTCAGGGG[CG]TGCCT[CG]TTCTCACCCCCACTC[CG]GACCC[CG]GTCCTCTTCCCTAGACAG[CG]GCCCCCTCCACCCCTGGCTCC[CG]CAGGC[CG]CTAGTAGTC[CG][CG]CCAGGCCC[CG]C[CG]G[[CG]]CCTCTAGGGCCCCCCAGAT[CG][CG]CAGACCCTGACATCCC[CG]CCTGGCCCTGGGTTCTGGGAGCTGAGAGC[CG]GCCAGGGTCCTGCT[CG]TACCTC[[CG]]GG[CG]CCCAGCCT[CG]GGTCTGCTCCC[CG][CG]GA[CG]CCCCAACCTCCC[CG]GC[CG]AATGGATGGTGGTG[CG][CG][CG][[CG]]TCCTACTC[CG]G[[CG]]GTGC[[CG]]GCCTTTTCTGTTGCCAAAACTAGACCCAAACCTCTGCATGGGATT[CG]TCTTTGGGTCCCCACCC[CG]TG[CG]CCCAGCAAACAGTGGGTGAGCCATGAAGATGTG[CG]AGTCAGC[[CG]]GACCCTCCC[CG]TCAGG[[CG]][CG]GACC[CG]CTG[CG]GCCAGAGAACCCAGTCTG[CG]CCAGCC[CG]GCT[CG]CT[CG][CG]AAGCCA[CG]GGCTTCACTGA[CG]C
SEQ ID NO: 679 GAGTGAGGCCTGTGAGTGACAC[[CG]]GC[CG]GGGG[[CG]]CAGGTCACTACCCCTCCACATCCCCCA[CG]GAC[CG]CC[CG]GGTCTCCC[CG]AGTCTCTGGGTC[CG]AGATCCA[CG]C[CG]AGGCAG[CG]GGACCTGGAGACCCTTGACC[[CG]]GGAGAGGCCCAGGAGC[CG]TTACC[CG]GTTTCATTTTCAGCCAAAATCCC[CG]CAGGTTGGTCCTGG[[CG]]AGGG[CG]GGGCT[[CG]]GTGGG[[CG]]GGGCTGGC[CG][CG]GGGG[CG]GGGCCAGGGTCTCACACCCATCTAGAGGATGTCTGTCTG[[CG]]A[[CG]]TGGGGT[CG]GA[CG]GG[[CG]]CCTACTC[CG][CG]GGTATCACCAGCTTGCTTA[CG]ATGGCAAGGATTACAT[CG]TCCTGAA[[CG]]AGGACCTGTGCTCCTTGACAGC[CG]CAGACA[[CG]]G[CG]GCTCAGATCACCCAGCTCAAGTGGGAGG[CG]GCC[CG]GGGGG[[CG]]GAGGTTCATCCTCACAGGGATAGGCACCTATTAGATGTGGTGTGGTTTTCCTCTCTACTCTTAGACCCTCAGCCAGTATCACTATTGGCATTCCTGAGCCACTGGCTCAGAATTTCAGTACATTATCTGCC[[CG]][[CG]]GGACACACCTCAGAGGAAAGGGGATGA
SEQ ID NO: 680 AATACCAGGTGTTG[[CG]]TAATCTCTACTTGGAGATTAGCCACCC[CG]TG[CG]CCCAGGTGAAAGATATCATTCTTC[CG]TG[CG]ATC[CG]AAGTGC[CG]TGGAAGTTAGTGCCCTAGCCCAGTCCAGGAGGAAGGGG[CG]T[CG]TGC[CG]G[CG]GTTTTAAGCT[CG]GAAGGGGCAGGGGAATGAGCCCAGGGACCCCAG[CG]GGG[CG]CAGGTAGGAGGCTGTG[[CG]]CT[CG]C[CG]GGTG[CG]CTC[CG]GCCC[CG]ATTCCCAG[CG]CAGCCAGTAAGTGG[CG]CTGGGCCT[CG]GGTTTGG[CG]GCC[CG]GAGGAG[CG]GGCTG[[CG]]GATTACCTGCAGCAG[CG]GGGAGC[[CG]]C[CG]AGCTCCTCCC[CG]CC[CG]CCCCCACACCCCACCCCCAC[[CG]]CTGCACTAACCC[CG]GCTCAGCTGGCTC[CG][CG]CACTTGCT[CG]GAGGAGC[CG]GGGC[CG]AG[CG]GAC[CG]C[CG]GCTGCAGGCAG[CG]AG[CG][CG]GCTGGGCTG[CG]GGGCTGCTTCCC[CG][CG]TCCTC[CG]GGCC[CG]GGC[CG]CCCTCCTCC[CG]CACAGTG[CG]GAGCAGGGAGGCCC[CG][CG]CCT[CG]ACCACC[CG][CG]CC[CG]AG[CG]TC[CG][CG]CCTCCTCCTC[CG]CTCTGCAGG[CG]GGGAC[CG]CCC
SEQ ID NO: 681

TTACAAGGAC[[CG]]GGCACTGTTGGACCA[CG]TGGCTCCATCATGATGACTCCAGTTAGATGTCACCC[CG]CCCCT
GAGCTCAGGTCTTGCTGAATAAGGTCAC[CG]CCCAGGGGGCAGT[CG]ATGAACA[[CG]][CG][CG][CG]AGGGCTCT
G[CG]AGTGGCCT[CG]TGACTTTGTCCCTAACTC[CG]GGTGTCCCCTCCTTCCCATCAG[CG]TC[CG]G[CG]CCTGGTC
CTGGTCC[CG]GTCCC[CG]AGGCCCC[CG]GGATTCTTCC[CG]AG[CG]TTTTC[CG]AGTTGG[CG][CG]GGGGGTGGAG
G[CG]GGGCCATGGAG[CG][[CG]]TCC[[CG]]GGGAC[CG]TTGCATC[CG]GAGG[CG]GC[CG]T[CG]TG[CG]GCTCCTT
CC[CG]CCT[CG]AGAGTGAGGTGGC[CG]GGCCTTGA[CG]AGAAGGCCCA[CG]CCTGC[CG][CG]GGGGTGGCT[CG][
CG]ATGGCAGT[CG]GGGTT[CG]AGTCC[CG]CCTGGGGGGCTGCTCCTGCTGGAGAAAA[CG]CCTCCCTGAGGG[CG]
G[CG]GCAAA[CG][CG]CAG[CG]AGGCCC[CG]TGC[CG][CG]CCAGAAGCCACCCTGAGAAAGGGGCAC[CG]GGACA
C[CG]AGGGGTTCCCACTTTCTCCTCAGCCTGTGA[CG]CC[CG][CG]TCCT[CG]GGTGGGTTC

SEQ ID NO: 682

[CG]TCTGGACATCACCCTGAACC[CG]AG[CG]G[CG]AGGGAG[CG]TTCCTGCATCTGGTGTCCAAGGG[CG]GACTG
GAC[CG]TGAGGTCACTC[CG]CAGTACCAGCTCCTGGTTGAGGTGGAGGACAAGGGTGAGCCTAAG[CG]G[[CG]]GG
GCTACCTTCAGGTAAA[CG]TGACTGTGCAAGACATTAATGACAACCCCC[CG]GTTTTTGGCAGTTCTCACTACCAG
G[CG]GGGGTGCCTGAGGA[CG][CG]GTTGTGGGTTCCAG[CG]TCCTCCAGGTGG[CG]G[CG]G[CG]GA[CG][CG]GA[
CG]AGGGCACCAA[CG][CG]GACATC[[CG]]CTAT[CG]CCTGCAGGA[CG]AGGGGACCCCCTTCCAAATGGACCCTG
AGA[CG]GGACTTATCA[CG]GTG[CG]GGAGCCCCTGGACTT[CG]AAGCT[CG]G[CG]CCAATACT[CG]CTTA[CG]GT
GCAGG[CG]ATGGACAGAGG[CG]TGCCTTCCCTCACTGGG[CG][CG]C[CG]AGG[CG]CTGATTCAGCTGCTGGA[CG]
TGAATGACAATGACC[CG]GTAGTGAAGTTC[CG]CTACTTCC[CG]GCCACCT[CG][CG]CTA[CG]CCT[CG]GTAGATG
AGAATGCTCAAGTGGGCAC[CG]TGGTGGCTCTGCTCAC[[CG]]TGA[CG]GA[CG]CA

SEQ ID NO: 683

CAAGAATCTCCCTCCTCCCA[CG]CCCAAAAGGAATAAGCTG[CG]GGGCACAC[CG]CC[CG]CCTCCAGATCCCCCA
TTCA[CG]TTGAGC[CG]GGG[CG][CG]CT[CG]GGG[[CG]]GT[CG]CCTGCAGTATCAGTATCAGCATCAGCATCAGCA
TCAGCATCTGCATGAGCATCAGCTCAGCTCAGCTCAGCTCAGCATCAGCTCAGCTGTCCTGAGGCAGC[CG]G[[CG]
]GCTGTGAAGGAGCTCCAGGCTGCCCCCATCCCCA[CG]CCCTTCT[CG]GCTCAGGG[CG]TGCATGAACCTG[CG]GA
TGGC[CG]G[CG]GG[CG]AGTGG[[CG]]CCTT[[CG]][CG]AT[CG][CG]GC[CG]CCCCTCTAGG[CG]GAGGCAC[CG]GGG
AC[CG]AACC[CG]TGACTT[CG]AGCTCCACTG[CG]GA[CG]AATCC[CG]GGAC[CG][CG][CG]CCT[CG][CG]GAAGAG
[CG]GC[CG]C[CG]TGCAG[CG][CG]GAGGGATA[CG]CCT[CG]GC[CG]CACCTCCCCT[CG]C[CG][CG]CCCC[CG]CCC
C[CG]C[CG]CCCTCCC[CG]CC[CG]GCTCTGCTGC[CG]C[CG][CG]G[CG]GC[CG]CTGCTGCTGCTTCTGC[CG]C[C
G]CTGC[CG]C[CG]C[CG]CTGCCTGGATATAGTG[CG]GCAAGAG[CG]GAGCTTGCAGTCACTTTG[[CG]]AGG

SEQ ID NO: 684

ACATGCCCTTTCCAGGAAAT[CG]CCCCTTTCACCACCCC[CG]CCCCCATTTCCAGATACCTTAA[CG]AGAC[CG]AG
AGAAAAGTGGTTCTGCTTTGGTTTC[CG]AGTGGA[CG]AGGTTCTCTGGGCAG[CG]GGACTGAGTCTTGG[[CG]]CCC
AGGTGAGC[CG]CCCTTCTC[CG]A[CG]AGAAACTACTTGTTGG[CG]TTTTC[CG]GATTCAGGTGGTTGAGC[CG]CTT
CCCTGGG[CG]CTGGGGTGGGGGAGAAAGCCCC[CG]C[CG]GC[CG]C[[CG]]GC[CG][CG]CTCCC[CG]CCTTCATTCT
GTGATCTG[CG]GATTTGCCAGT[[CG]]CCAACCTC[CG][CG]CCCAGAGTCACCAT[CG][CG]CAGGGTTGGGCAAAC
CATGGAGCT[CG]GGG[CG]GGTCCAGC[CG]GCACTGCC[CG]ACCCCTC[CG]GGAG[CG]GGCAGAT[CG]GCTGGC[[C
G]]TGAATGGAGTGGAGACTGGC[CG]CAGGTCAGGAGAGCTCACCACTTGAAGGTGAAGT[[CG]]CCCTGCT[[CG]]G
ATTCCATCTGCAGATTTTGTTTCTCCCCCAAATCAGCCACTGCTGGAGCTGTCCCTTCAGCACCACT[[CG]]CCATCA
ACCTCC[CG]C[CG]CCATC[CG]AAGCACAGGGCTCAGGAAAGAGTG

SEQ ID NO: 685

TGTCTGT[[CG]]CACATATATTATAT[CG]TGTATGTAATGTATAAGTATTTATTT[[CG]]TTTGCTTGGGGTTTTGTTTG
CTTTTGCTGAGTC[CG]ACCCCTCTACCTGC[CG]CCTGGCCCTTGCCTCA[CG]CTCCAGTGCCACTGAGATCAAGGA
GAGAA[CG]AATTTGC[CG]CTGACTGGGCAGAG[CG]AG[CG][CG]TGGAT[CG][[CG]]GCCAC[CG]CC[CG]TTCATCA
CC[CG][CG][CG]CATCTGGGCTGGCAC[CG]GG[CG]AAGAAT[CG]TG[CG]GGTCTGGGACCTGGGGGCCCAGAGGG
AG[CG]AGCTCCTG[CG][CG]GG[[CG]]CT[[CG]]GTC[CG]CAGGTTT[CG]CAGGCTCAGGGG[CG]TGCCT[CG]TTCTCA
CCCCCACTC[CG]GACCC[CG]GTCCTCTTCCCTAGACAG[CG]GCCCCCTCCACCCCTGGCTCC[CG]CAGGC[CG]CTA
GTAGTC[CG][CG]CCAGGCCC[CG]C[CG]G[[CG]]CCTCTAGGGCCCCCCAGAT[CG][CG]CAGACCCTGACATCCC[CG
]CCTGGCCCTGGGTTCTGGGAGCTGAGAGC[CG]GCCAGGGTCCTGCT[CG]TACCTC[[CG]]GG[CG]CCCAGCCT[CG]
GGTCTGCTCCC[CG][CG]GA[CG]CCCCAACCTCCC[CG]GC[CG]AATGGATGGTGGT

SEQ ID NO: 686

GGGAGA[CG][CG]GGAGGTTTGCAAACAGACCTTGGCCTGGGCTG[CG]CAGGGACAAAGTGTTCAAGGGCAGCAG
GGGAGGCTGAGGGAGTACA[CG]GCTGGGAACAAGGGACACTGC[CG]CCCCCAGCCA[CG]CAGGAG[CG]GTGTCT
GCACCACTGAAAGTCCCC[CG]GGGCCCACAGCTCTATCCAGG[CG]GAAGGGAAGCAGCCAGGC[CG]C[CG][CG]G
ATCTGAACTTGAATCC[CG]GGTGGAC[CG]GA[CG]CCC[CG]GC[CG]G[CG]CTCCTGA[CG][CG][CG]GAGGAGCTGG
[CG]AGAACCTGCAGATCTCAGGGCT[[CG]]CC[CG][CG]GTC[CG]G[CG]CT[CG]GTTCAGGA[CG]TC[CG]GGAACCC[
CG]CAG[CG]CTTACCCTCTGCAGCAGG[CG]T[CG]CTGG[CG]CCTCCAAGGGCAGGGG[CG]GGTC[CG]G[CG]GGTA
CAAGT[CG][CG]ATTGA[CG][CG]A[CG]GCCCAGGCAGGCACTGTGGGCTTCAC[CG]CC[[CG]]CAACTTTTGACCCT
AGAGGCCCTG[[CG]]CTGCAGCCTGTGGCC[CG]GAGGGACAGAAGTGGGAG[CG]TGTTTGGGCCACTCTGCAG[CG]
AAAA[CG]ACCTTCCCTCATGGAACTTTCAGTAACTAACTCCTGAGAGCTG[CG]AGAG

SEQ ID NO: 687

TATTTAATGAAAGTCT[CG]AGAGATTTTTACCTCTGTATAAAAATTCTAA[[CG]]TTGGACCAATTGTGTGAAGCCA
GAGCATTTTGCCTCCAGACAAGGAAATTAAATGAGAATAGAATTTTGCTTTTTGGAAACAAAAGCAAAG[CG]ACC
CAACTATATTCTGAAGTGCCTCTGCTGCAAGACCCAAGCACCCAGT[CG]GG[CG][[CG]]CCTTGCATTTGTCTCCAT
GT[CG]TAGGAATGTCAAGAAAGTTAC[CG]CCAAGTGGTTTACCAAAA[CG][CG]G[CG]GAAGGAATCAGGACAGTT
TGCC[CG]A[CG]GG[[CG]]GGT[CG]G[[CG]]GCTTTCAGG[CG]GGAGAGATCTTGCCAGGGGCAGAGAGAGATCC[CG]
AAAAT[CG]CCCCCAGCCTTG[CG]TCCAGCCCTTTCT[CG]C[CG]A[CG]TTTTTTCTTGATCCTC[CG]AAGGCCCAGG
G[CG]A[CG]TTTGCCAT[CG][CG]GCTTCC[CG]AAAGGA[CG]G[CG]C[CG]GGTTTGCTGGAAGACAGCTCAGTTTTA

GGCATGGCC[[CG]]GTGGGGGTGGGGGTGCTCATTTTCTTGGGTT[CG]GATTCCCTCTCTTTGAC[CG]CACTTATCTT AGCTTTAGGAGATTCTGGCATCTCATAGGAAAAGG

SEQ ID NO: 688

TC[CG]GAG[CG]GCTGGAGGAG[CG]CAGTGGGAACTGGGAAGAGCTAGCC[CG]GCTGGAGGG[CG]GACCTCTG[[C G]]TC[CG]GGAGC[CG]GGTCTCAGGCAC[CG]CTGGGGG[CG]AAGCCA[CG]|[CG]TCTTTT[CG]GGCAGCCAATTTCA CA[CG]|[CG]CCTGTGTG[CG]GTTC[CG]GGCATCCCAGTAAGCTCTAGCACC[CG]GG[CG]|[CG]GGTAA[CG]GGAAG[C G]CAGAACCAAATCCCCAG[[CG]]CCCAGGTCACCTCCCCAGACCCAGCCTTGCAGGGACCAGGGCTTTAGGGCTC A[CG]GACCCAA[CG]GCCAGGTCAGAC[CG]|[CG]]AAC[CG]GGAGGAG[CG]|[CG]GGCCCCACCCTAAAGAGGG[CG] CAGC[CG]GGAGCTGGGGAG[[CG]]GGTGC[CG]|[CG]CTCCAGAGATTGTGT[CG]TGGG[CG]C[CG]TCCTAGTGG[CG] GGGAG[CG]CACCTC[CG]AGGGGGCATGAGAT[CG]GAGAAATCCCTTA[[CG]]CTGG[CG]G[CG]C[CG]GGGGAGGT C[CG]TGGGC[CG]GAGGGAGAGCAACAGGATG[CG]GGAGACTTCC[CG]GAGGC[CG]G[CG]GGGG[CG]GGGGCTGC TGTAGTAG[CG]AG[CG]GCTGGTGATCAATATCTC[CG]GGCTG[CG]CTTTGAGACACAATTG[CG]CAC

SEQ ID NO: 689

[CG]GACCTCTG[[CG]]TC[CG]GGAGC[CG]GGTCTCAGGCAC[CG]CTGGGGG[CG]AAGCCA[CG]|[CG]TCTTTT[CG]G GCAGCCAATTTCACA[CG]|[CG]CCTGTGTG[CG]GTTC[CG]GGCATCCCAGTAAGCTCTAGCACC[CG]GG[CG]|[CG]G GTAA[CG]GGAAG[CG]CAGAACCAAATCCCCAG[[CG]]CCCAGGTCACCTCCCCAGACCCAGCCTTGCAGGGACCAG GGCTTTAGGGCTCA[CG]GACCCAA[CG]GCCAGGTCAGAC[CG]|[CG]]AAC[CG]GGAGGAG[CG]|[CG]GGCCCCACC CTAAAGAGGG[CG]CAGC[CG]GGAGCTGGGGAG[[CG]]GGTGC[CG]|[CG]CTCCAGAGATTGTGT[CG]TGGG[CG]C[C G]TCCTAGTGG[CG]GGGAG[CG]CACCTC[CG]AGGGGGCATGAGAT[CG]GAGAAATCCCTTA[[CG]]CTGG[CG]G[CG]C[CG]GGGGAGGTC[CG]TGGGC[CG]GAGGGAGAGCAACAGGATG[CG]GGAGACTTCC[CG]GAGGC[CG]G[CG]GG GG[CG]GGGGCTGCTGTAGTAG[CG]AG[CG]GCTGGTGATCAATATCTC[CG]GGCTG[CG]CTTTGAGACACAATTG[C G]CACCCTGT[CG]CTGTTTC[CG]GACA[CG]CTGCT[CG]GAGACCCTGGC[CG]G[CG]AGTC[CG]CTTCTT

SEQ ID NO: 690

TGGAGCTGCTGGTGGACTGGGTG[[CG]]TTTGGAAGCC[CG]GCTGCTGC[CG]TCCCC[CG]CTGC[CG]CAGTGGAGC AGGAGGAGGAAGAGGAGGAAAAGGAGCAGGGGGAGGCCT[CG]T[CG]C[CG]|[CG]|[CG]GTCTGTGCCC[CG]C[CG]T GGCCTTC[CG]CCTGCTGGACTTCCCCA[CG]CTGTTGGTTTACCCTCCTGA[CG]GCCC[CG]G[CG]CTCC[CG]C[CG]C[CG]AAC[CG]TGGCC[CG]GTGTCATC[CG]CTT[CG]GT[CG]|[CG]]GCAAGTCCTGCCTCTTC[CG]CCTGCAGCCTGCTA CCCTGCACTGC[CG]GCTCCTG[CG]GACCC[[CG]]CTTGCCACCTTGCTGCTGCAGCTGCCCCCTGGG[CG]CC[CG]A[C G]CCCACCCCACAGCTCCTGGGGGCCTG[CG]ACATTT[CG]CTGGCCAC[CG]CAG[CG]CACAGGGT[CG]TGGGGC[C G]GC[CG]CCTC[CG]GATGCTCCCAC[CG]TCAC[CG]GGGA[CG]TTTCCCCCTGCATAAT[CG]AGTGGG[CG]AG[[CG]] GACTGGGGACATTGCACTGGCCTAC[CG]CCTGACTGACCTGGGAAGC[CG]CCTGCTGAGCCAACTTGAG[[CG]]GC CCCTCACCTTCACC[CG]CACAGGAGGAGGAG[CG]GAGGTCAGTCCCCAAACCC

SEQ ID NO: 691

CCT[[CG]]GTGCCCCTGACCTGCAGT[CG]TCACCTGCACTCCAGG[CG]GGCAACAACAG[CG]AGGACACCCTGCC[C G]GCCAGGCTCCCAGCATCAGAGA[CG]CTGGGTGGACAA[CG]TGGTGG[CG]GCCAATCCAGGTGGTC[CG]CCAGA C[CG]|[CG]GCAGAGACAA[CG]CAGAGGCTG[CG]GGTTAGGACTGCCCAG[CG]CTAG[CG]GCCCCCAGCTCTGTG[C G]CC[CG]CTGAGGAGGAGACAGCCAGCAG[CG]TGGTCAGGCAGGCTCT[CG]|[CG]CTGAGGAGGCAGTGCACTCAG GATACTGAGGC[CG]CCCAGAGCA[[CG]]CCC[CG]CCAACCCACCTAGG[CG]CCTGAGCTGCAGCCTCTG[CG]C[CG] TCTCTGC[CG]|[CG]GTC[CG]GCAGGC[CG]CCTGGATTGGC[CG]C[CG]C[CG]CTGCTGCCACCA[CG]GTGTCCACCCA A[CG]ACTCTAATGTGGGAAGTCTGG[CG]GTGGAGGGTGT[CG]|[CG]GGCTCTC[CG]GCAGACC[CG]TAGCTGGTGG TGGAGCTGAGGGCCCTGGGGCATGG[CG]GGCAGGGACTTGAGGCC[[CG]]CAGGAGGAGGGGGC[CG]TGC[CG]AT GCTGGCTGTGC[CG]GGGCTGCCTGAGAACC[CG]|[CG]GAGGCTGGGGGG[CG]A

SEQ ID NO: 692

TTTGGGTGCCTGTTTTTGGTTCTGGGTGAGATGCACTCACCAGGGTGATAAAGACCCTGCCTGGCTTGTTCATGG[C G]TCTCCAGGACCTAGTATGGTGCCTGAC[[CG]]TGGCACTCATAGGGTGTTTGTTGAGTGAATGAATGATGCCTTTT CAGCTGAACT[[CG]]AGCTAGAAGACTCCAGGGCTCACTCCACTGTGCCCATTCCACAGATC[CG]GCCC[CG]AGGT GTGCC[CG]TTCACCAGGCAGAGGTGTCATC[CG]AATTCAGGCTCCTGGGGCC[CG]GGAGGGTC[[CG]]ACTCTA[[C G]]GACCCAGGT[[CG]]CTGTGGCCCAT[CG]CTTT[CG]ATTTGACTTGGTTTCTGT[[CG]]CCACT[CG]|[CG]GAAGG[CG]|[CG]CCCCC[CG]CCCT[CG]CT[CG]G[CG]GCC[CG]CCC[CG]CCC[CG]CCCCTGCTCTTCCTC[CG]GGGC[CG]CTGGCA CTG[CG]GC[CG]CTC[CG]CAGGCAGAGAAGC[CG]GGAG[CG]GG[CG]AGG[CG]G[CG]G[CG]GCAGCAG[CG]ATGGT GAGGGCCCAGG[CG]GGGC[CG]GCCAGCCCTG[CG]A[CG]GGCAGAGGG[[CG]]AGTGG[CG]AGGGTGGGAGAGAG GAGTCCAAAGTC[CG]|[CG]GGCTGGGGCCTCCCCTGGGGCCCA[CG]AGGGC

SEQ ID NO: 693

TCTCC[CG]CAGGG[CG]AACAAAGGCCCAG[CG]GGTCCC[CG]|[CG]CCCAGGTCCCCCCA[CG]TCCCCCTT[CG]GAG GTTCCCTTCTG[CG]TCCCAAGTCCCCAGGCCCCC[CG]|[CG]|[CG]CC[CG]ATGCCCCCTCCACCCTC[CG]|[CG]CCCCC CACCTC[CG]ATCACCCCTG[CG]CTCC[CG]GATCTCCA[CG]AAGCCC[CG]GACCC[CG]|[CG]CCCC[CG]G[CG]TCCCC [CG]|[CG]GCACTCACAGGATGGAGGTCTG[CG]G[CG]CCA[CG]G[CG]GGCA[CG]GCCTCCAGCAGCAGATGCATGCA G[CG]CA[CG]GTGGTG[CG]GAAGCACAGGCAG[[CG]]GCT[CG]GACACCCTG[CG]CC[[CG]]GCTTCTGGGCCACCA[CG]GCCAG[CG]TCCCCCAGG[CG]CAGAACAGCA[CG]AG[CG]CCAACAGGCAG[CG]G[CG]CC[CG]GGGCCCCTGGA G[CG]CTTGGCCATGGC[CG]A[CG]G[CG]|[CG]GA[CG]GA[CG]CT[CG]GA[CG]CA[CG]GAGCCACCA[CG]GC[CG]GCT CC[CG]ACTG[CG]CC[CG]CC[CG]GC[CG]|[CG]GCCCA[CG]TCCCAGCTGTG[CG]|[CG]GGGGG[CG]GGGGG[|[CG]]CCA GCTGTGCACATG[CG]|[CG]AGGCTCCTCC[CG]GCCCCTCTGAATCCC[CG]AGGG[CG]GGG[CG]GGG[CG]AGAACC[CG]G

SEQ ID NO: 694

ACCAGCTTCCTCCTG[CG]TGTCTATTTCCAGCCAGGAC[CG]C[CG]GCCAC[CG]C[CG]CAC[CG]GTGCCCTCAC[CG] ACCCTCAACT[CG]GGGGAGAATGGCAC[CG]G[CG]ACTGGGCTC[CG]|[CG]GCT[CG]TGTTCAT[CG]AGGAGCCCC[C G]GG[CG]GTGG[CG]G[CG]TGGCCCCCAG[CG]|[CG]GTCCCCACT[CG]CCCCC[CG]GGAC[CG]CAG[CG]CTGCAGGG AGCAGAG[CG]ACTGGGCAT[CG]GA[CG]TGGAAGTCCTGGGGCCCTTG[|[CG]]TCC[CG]GGGG[CG]TGGCAGGCT[C

G]GCCCTGGTCCAGGTG[CG]AGTG[CG]GGAGCTG[[CG]]CAAGGG[CG]AAG[CG]GAG[CG]GGG[CG]G[CG]|[CG]GG[CG]GTGG[CG]GGAAGCTCTTTTCACTCTG[CG]CCTGGGATGGG[CG][CG]|[CG]TGGCACCACCA[CG]G[CG]C[CG]C[CG]G[CG]GCTTCCTGCTG[CG]|[CG]TT[CG]CC[CG]|[CG]GTTGTA[CG]GCCCAGG[CG]GGGACCTGCTGCCCCCTG[CG]TGGCTG[CG]GG[CG]CT[CG]GGG[CG]CTCCTGCTGCTAGCCTTGT[CG]GCCCTGTTCAG[CG]GCCTG[CG]CCTGAG CCTGCTGT[CG]CTGGACC[CG]GTGGAGTTA[CG]GGTGCTG[CG]GAACAG[CG]GCT[CG]GC[CG]C[CG]AGCAGGAG

SEQ ID NO: 695

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SEQ ID NO: 696

GGCAGTTGG[CG]|[CG]GTCTAGAGAGAGGGCA[CG]AACCT[CG]GG[CG]C[CG]TC[CG]GGGTT[CG]GGTCTGGATCC [CG]|[CG]GA[CG]C[CG]GGA[CG]AGGGG[CG]GGG[CG]GGGTGGCAGCCTGCAGGTCCTCCAG[[CG]]CT[CG]CC[CG]C CCAGGAGAAGTCTCAG[CG]C[CG]CTCTC[CG]C[CG]CAGGTTGGGGGCCAGGGGAGGGTC[CG]AACAC[CG]GCTCT GTTCCTGCTACTTCAG[CG]GGCACCTGG[CG]CTC[CG]G[CG]|[CG]GCAGCCTG[CG]AGGCCAGGGC[CG]AG[CG]|[CG]|[CG]GAGC|[CG]AATGCTGGGCT|[[CG]]GGGATC[CG]|[[CG]]GC|[[CG]]C[CG]CCTCTAATC[CG]CCCTTAAGTAGTCTC| CG]CCTG[CG]TCA[CG]CCAGGT[CG]G[CG]GAGGGGAGCAGAG[CG]|[CG]C[CG]TG[CG]GCTGT[CG]CTG[CG]|[CG]T| CG]GAGCC[CG]AGGGGC[CG]GGGA[CG]|[CG]|[CG]|[CG]GGGGGAGAGGGGCAAGAGTCCTGGAGGCC[CG]G[CG]GG GAG[CG]GGG[CG]ATTT[CG]AAAGGAAGGACTGCAG[[CG]]CCCCT|[[CG]]GGGCTTCT|[[CG]]GGGAGCCCAGGTAAC CTCACCTGAC[CG]CCAGACCCAAGCAGG[CG]GAGGGGGAGC[CG]GGAG[CG]GA[CG]|[CG]TGGGTGAGTGGGGAG GGGAGTG

SEQ ID NO: 697

TTCTTTTTCCTCTTC[CG]CTAGTTGTGAAAGACAGGGGAAGGGTGTTCTTTCTCTCTGCCCTCCCTTTCCATCTCCA GCTCCCCATTTCCTTTCTCACCTCCTCCTCCACTCCCTGCCTCTTCTCCCCACCCATCCTGG[CG]GG[CG]GGCTG[CG]|[CG]GAGGCT[CG]GGAGCTGGC[CG]GGGAGGGG[[CG]]GATGGAGGGGCCTGGGTTGCCAGCTCCCTTGGT[CG]GG GTCCTGCT[CG]CTGGGGCTTGTGTGTTCTCTG[[CG]]G[CG]GGC[CG]|[CG]TCCC[CG]CTGAGCCT[CG]|[CG]GTGACA GC[CG]CCTTTGGCAG[[CG]]AG[CG]CT[CG]GGGCACTTCTATCCC[|[CG]]CCTCTCAAAGGGTGGGGACAGC[CG]TTT CCAGATTTGAATTTTTTCTGTTCTTTATTTTTAA[CG]CTGCATCTT[CG]|[CG]TGTGCTCAGAGGTGGTTGTTGG[CG] GAGAA[CG]C|[CG]]C[CG]CAGTGTTTGACCTCTAG[CG]GTGAAGGGGGAAGGGGAAGAGGAAAGGAGAGAAGTGG T[CG]GTGTCTGTTTCCTTCTGTCCCC[CG]GGGC[CG]TGGAGCTGT[CG]GAGGGAAGGAGGA[CG]GTG[CG]GGGC[C G]CAGGGGG[CG]|[CG]GGG[CG]|[CG]G[CG]GGACCCAGGCTAC

SEQ ID NO: 698

GCTTCCC[CG]CCCC[CG]GCTCAGAGGTCTCTGGCTGG[CG]GG[CG]CCC[CG]T[CG]GC[CG]C[CG]GCTTCCTCCTTG AAACC[CG]C[CG]G[CG]CACATGAGGC[CG]CTGCCCC[CG]C[CG]CAGG[CG]CTGG[CG]GCCCCCT[CG]|[CG]GTGCC| CG]TGGTGATGCCATGCCC[CG]CCACCA[CG]|[CG]GGAGGAGAGGAGGG[CG]G[CG]C[CG]C[CG]GGCTCTGGGTGA AGAG[CG]G[CG]CAG[CG]G[CG]G[CG]G[CG]G[CG]GG[CG]GGGGG[CG]CTTGGGCAG[CG]GCATGAAGGATGTGGA GTC[CG]GC[CG]GGGCAGGGTGCTGCTGAACT[CG]GCAGC[[CG]]CCAGGGG[CG]A[CG]GCCTGCTACTGCTGGGCA CC[CG]|[CG]|[CG]GCCA[CG]CT[CG]GTGG[CG]G[CG]G[CG]GTGGCCTGAGGGAGAGC|CG]C[CG]GGGCAAGCAGGG GGCC[CG]GATGAGCCTGCTGGGGAAGC[CG]CTCTCTTACA[CG]AGTAGCCAGAGCTGC[CG]G[CG]CAA[CG]TCAA GTAC[CG]G[CG]GGTGCAGAACTACCTGTACAA[CG]TGCTGGAGAGACCC[CG]|[CG]GCTGGG[CG]TTCATCTACCA| CG]CTTT[CG]TGTGAGTACC[CG]|[CG]CCCCCTGCTATGCC[CG]CTGCAGGGGACCACTGTCCCTGGCCCCC

SEQ ID NO: 699

GAGG[CG]G[CG]TGGA[CG]CTGG[CG]C[CG]TTGCTGTAGGGGAAATGGTCCT[CG]T[CG]TCCT[CG]TCCT[CG]TCCT CCT[CG]GGGTCACTGTCCCTCAAGTCC[CG]CAGG[CG]G[CG]TC[CG]CTGCCCTTGTCTC[CG]GG[CG]CTGG[CG]GC CCCAGCAGCTCCT[CG]GCTCC[CG]GCTCCTC[CG]|[CG]C[CG]CCCTTCCC[CG]|[CG]CCCC[CG]C[CG]C[CG]CCCTTCT GTTTCTC[CG]CTTCCTG[CG]C[CG]CCTGCTCTTTGGCCTTTTTGCTG[CG]TTTCCATTTCATC[CG]C[CG]GTTCTGGA ACCAAATCTTCACCTG[CG]GGCACAAG|[CG]]GG[CG]TGAGAAAC|CG]GCCAC|CG]CCACCCCAGGGCTTCCTGTC CC[CG]GAGTCCCC|CG]GC|CG]|CG]TG[CG]CCTGGGCCCCATTGGGT|CG]GCCCTGGAATGGCCTCAGGGTGAGA[C G]ACTTAGAAGCAGAATGGGGAGGGGGCT[CG]TAGCTTCCTCCTCCC[CG]CAACCCCCCACTCAGCAGCAAACCCC AGAGCTGGGCTGGAGCTC[CG]TGGGAGCTAGGACTATGTCCCCAA[[CG]]ACCCAGGC[CG]GGGACTTTTCTACC[C G]|[CG]CCCTC|CG]TCTG[CG]GAGGAAGGGTCAGGGCAGCTGGCTA[CG]T

SEQ ID NO: 700

GGG[CG]GG[CG]GGTCACT[CG]GTGC[CG]GTTCC[CG]GTGCAAACCCCC[CG]G[CG]|[CG]CCTCTGGCTTTGTGCAGC C[CG]AGATGGTTGAGTTTGGCTC[CG]GAGC[CG]GGAGTGGGG[[CG]]CAGATTGATTTTTAAATATGGAGAAGGAG A[CG]CATCTGC[CG]CTGG[CG]|[CG]TT[CG]GTC[CG]AGCCCCCCAC[CG]GTCCCCAC|CG]GCAC|CG]CCTC|CG]CCA GCCCCAGG[CG]CAGCCCCCAGGC|CG]CC|CG]|CG]GAGGGGAGGGAG[CG]ACAGGGGC|CG]|CG]GCTGCTCCCTG G[CG]GGGT|CG]GGGCTG|CG]AGCTGCCCTC|CG]|[CG]]GGGACCCTC|CG]CC|CG]CCC|CG]CTGAC|CG]C|CG]CTG TCTTCACAGATGGGAGCAGCTCC|CG]GACTG[CG]CC|CG]CCC|CG]C|CG]|CG]GTCACCCTGAGGCCAGGGGCC[CG]GGAG[CG]|[CG]]ACCTCCTGGC|CG]C|CG]TCTGGGACTTTGACCTTCCAGAGGCCATGGAGGCTGG|CG]GGGAGC AGGG|CG]CCACCTGAT|CG]CCTCCCCCTGGA|CG]CCTCCTCCAG|CG]G|CG]CTCA|CG]CTTC|CG]CAACTTTGCAG [CG]CTCATGGTGAGTA|CG]GGGGTCC|CG]GGGGTCCTGCAGCTGGGGGCTAGGC|[CG]]CTG|CG]G

SEQ ID NO: 701

G[CG]TGTTAGGGAGGGAT[CG]CCCCA[CG]GGGCAGGAGAGC[CG]GGCAGT[CG]GCTTG[CG]GGGGAG[CG]GAC[C G]T[CG]GT[CG]GGGAACTCAC[CG]TTAGCTGTCTC[CG]C[CG]G[CG]GCTGTGC[CG]GGCTGCTATGCAGGGC[CG]G GGT[CG]AGCCTGGGACCTTGGTGGTCC[[CG]]GGCTG[CG][CG]AGGCCCAGCAC[CG]AGTTCCTGGG[CG]CCCCCA GAGC[CG]GGC[CG]A[CG]GC[CG]G[CG][CG]AAGG[CG]GCCAGGG[CG]AGCAGGAGCCCCCACATGG[CG]GGGATT GAGTGCCAGGGG[[CG]][CG][CG]GGCTA[CG]G[CG]GGTGG[[CG]]GGT[CG]GTCTCTTCCTGC[CG]AGTG[CG]C[CG] AGCCCCC[CG]CCCCTTCCTGCCCCC[[CG]]CCCCTC[[CG]]CAGCCTCCTGCC[CG]CCCACAGCC[CG]CTGCC[CG]CC T[CG]GACCT[CG]GAGAGGAGGAGAGGGC[CG]GGAGGAG[CG]AG[[CG]]GGGCTGACCTCCAAGGGGC[CG]CCCCA AGTCTCAGGAC[[CG]]C[CG]ACTCTGCCCTTCCTCTC[CG]C[CG]TCTGGGGCCAACC[[CG]]CCT[[CG]]TTGG[[CG]][C G]CTG[CG]CCTTTATAGTCTGCAAAGCCACACTGAAGAGACCAGAGATCACCTGGTGGCCATCAAGT[CG]ACC
SEQ ID NO: 702
CAAGCTAATTGGCTGAGGCCCT[CG]GCTGGGGACCAATCAC[[CG]]GCTCTGAGAAAGTT[CG]GCAGTGGCCACCA CATCTGGTTCT[CG]TTAACTTTTCTAAGGCAG[[CG]]GC[[CG]]CTGGAGCAG[[CG]]GGGCTGG[CG]GGGTAAAAGC TCCTGGCCAGGGCTGCCTGGAGCTGCCCCTTCCACTC[[CG]]CCCCCAGGGAGCTCC[CG]GGTCATCCTCTCATC[CG]GGCTGCCC[[CG]][CG]GCCCCCAAGGAGCCCCACCCC[CG]GGACCAAATGGCC[CG]CAAGGTTTGGGGCAG[CG]G[CG]TTGCAGGAGATGAGCTCAG[[CG]]CAAAGGGAACCC[CG]CAG[CG]G[CG]AGTG[[CG]]GCTGCTGGCCTG[CG][C G]CTGTGGCCCCAACAGGCTGGCAGGG[CG][CG]GG[CG]GGTGG[CG]GGGTTG[CG]GTATGAGCTTTGCTCCCTGCC CTGGGGTCC[CG]GG[CG]CTCCTGGCTCTGGAGGCCTGGCCAT[CG]GTC[CG]AAAAGCAAAGGGACATTGT[CG]TG GTCCCCT[CG]GC[CG]CTT[CG]CTCCACCCAGAGA[CG]CCCTGAGGAGAAG[CG]AGCCTTTGTA[CG]AAGGCAGAG GGCTGACTCCTAAGTTCTGTCCCCCTCC[CG]AAGGC[[CG]]GC[CG]CTAGG
SEQ ID NO: 703
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SEQ ID NO: 704
GGGACCAATCAC[[CG]]GCTCTGAGAAAGTT[CG]GCAGTGGCCACCACATCTGGTTCT[CG]TTAACTTTTCTAAGGC AG[[CG]]GC[[CG]]CTGGAGCAG[[CG]]GGGCTGG[CG]GGGTAAAAGCTCCTGGCCAGGGCTGCCTGGAGCTGCCCCT TCCACTC[[CG]]CCCCCAGGGAGCTCC[CG]GGTCATCCTCTCATC[CG]GGCTGCCC[[CG]][CG]GCCCCCAAGGAGCC CCACCCC[CG]GGACCAAATGGCC[CG]CAAGGTTTGGGGCAG[CG]G[CG]TTGCAGGAGATGAGCTCAG[[CG]]CAA AGGGAACCC[CG]CAG[CG]G[CG]AGTG[[CG]]GCTGCTGGCCTG[CG][CG]CTGTGGCCCCAACAGGCTGGCAGGG[C G][CG]GG[CG]GGTGG[CG]GGGTTG[CG]GTATGAGCTTTGCTCCCTGCCCTGGGGTCC[CG]GG[CG]CTCCTGGCTCT GGAGGCCTGGCCAT[CG]GTC[CG]AAAAGCAAAGGGACATTGT[CG]TGGTCCCCT[CG]GC[CG]CTT[CG]CTCCACC CAGAGA[CG]CCCTGAGGAGAAG[CG]AGCCTTTGTA[CG]AAGGCAGAGGGCTGACTCCTAAGTTCTGTCCCCCTCC[CG]AAGGC[[CG]]GC[CG]CTAGGGAAGACTTGGCCACCCTCTGGAAGTACC
SEQ ID NO: 705
GCA[[CG]]ACCAAAGTTTTTGGCTTGGTCTCTTGCTTTCCACAA[CG]AGATAAAGTCTGAAGCCTGTAACTCTCCCT GTCC[[CG]][CG]GGAG[CG]TGCAAAGGGAGGGAAGATAAG[CG]G[CG]TGGGTGAGGGGTGG[CG]G[CG]CAGAACC CAGGAAGGGAGCAGAGG[CG]AGAGCCAGCCTC[CG]GCAGGAGGG[[CG]]TAGACCC[CG]GTGCCAGCCAGAA[CG] GCTCCAGCCTTCC[CG][CG]GCCAGAGAGCCAG[CG]G[CG]GGAGGGGA[CG]GG[CG]GGACCTC[CG][CG]GACAGC CC[CG]GGTG[CG]GACCAG[CG]GGCAG[[CG]]GC[[CG]]G[[CG]]AGACCCTCCCTGGATC[CG]CCCAGAGCTTAC[CG] GACCCTG[CG][CG]CCCC[CG]TCC[CG]GCTCC[CG]GC[CG]GCT[CG]GGGGAGAAGG[CG]CC[CG]AGGGGAGG[CG]C [CG]GACAGAT[CG][CG]TTT[CG]GAGG[CG]G[CG]CAGGTGTGTCAGGGGTGGGGGTC[CG]CTGGCATCTCT[CG]TG C[CG]G[CG]CTGGGGGGGTCTCC[CG]TGGAGGAAGGGCTGAAGGTGCTC[CG]GGAGGGGTCCACT[CG]TTATGGAA AGGAAG[CG]GGG[CG][CG]GTCAGGGTCCCT[CG]TC[CG]CAGTGGGGGTGGTC[CG]GGCCCCTCAGCC
SEQ ID NO: 706
CTCTCTCTCTTTCTCTCTCTCTCTCTCTTGCTCTACTCT[[CG]]CC[[CG]]TCTG[[CG]]TTCTACATTGGTTCTG[CG]GC[CG]TGTCCCTTT[CG]TGTGTGTCTGCCCTGTGTTTCTC[CG]T[CG]TCTC[CG]TGTGGATCT[[CG]]GTCTTTGTCT[CG] CCCTCTAGCTCTCT[CG]TG[CG]CCTGTGTTTAAT[CG]TG[CG]CTTCTCTCAATCTCTCTGTCCCTCCCTTTGCCCCCT ACA[CG][CG]TGTTCT[CG]TCAACAGATCTCCAGAGGTGGTGCAGAAA[CG]ACCC[CG][CG]C[CG]G[CG]CCCCATC CTG[[CG]]GCCAGTGCCTC[CG][[CG]]CCC[CG]GCTC[CG]GTCCCCAC[CG]TCCC[CG]CCCCAGATTTC[CG]GAGGAG CAGG[CG]GG[CG]GGGTCC[CG][CG]GGGC[CG]GCTGC[CG]TCAG[CG]CCCCTTCC[CG]G[CG]GC[CG][[CG]]ACCCC TCCC[CG]CTGACCTCACT[CG]AGC[CG]C[CG]CCTGG[CG]CAGATATAAG[CG]G[CG]GCCCATCTGAAGAGGGCT[C G]GCAGG[CG]CC[CG]GGGTCCTCAG[[CG]]CTGCAGACTCCTGACCTGC[CG]ACTG[[CG]]GATCC[CG]AGTCCC[CG] GATCC[CG]GACCCATCCTGTGGAGCCCACTCCTGGCAGGTAAC[CG]CCCCAACCCCT
SEQ ID NO: 707
[CG]TCCC[CG]GGAACTCCCT[CG]GCTTTT[CG][CG]CATCCAGGTCCCCAGCCCCAGCTACTGGTG[CG]CCC[CG]AG CCCCTAGGTGCCAGAG[CG]GTGGT[CG]GC[CG]GGCTCCTGCCCAGTCT[CG]GCTCCTCCCTCCTCCCCACCAGAAG GAAAAACTTGGGCCCTT[CG]AGAACCCTGTGGAATGTTCTTTGTAATCAACTGTACATC[CG]CTTCCA[CG]GCA[C G]GCCT[CG]TGCAAAAT[CG][CG]GGTTT[CG]GGGCCTTGGAGCAAATTG[CG]CTTGTCAG[CG]G[CG]A[CG]TCAGG AGGACAAGGGGAGGGGTT[CG][[CG]]GCTGAAACTGCAGCTT[CG]CAGCACAGAGCCATTTTAGGCTGCTCCCCAC CT[CG][CG]GGGCCCATGGGAAAGC[CG]GCCC[CG]GGAGGG[CG][CG]CCCAAA[CG]CAGGCTGGAGGAGCCA[CG] GA[CG][CG]TCCTGGC[CG]G[CG]TGT[CG]CCAT[CG]TTCAGCCT[CG]CTGCCCAGGTGGGAGGGGTCACCTGC[CG][

CG]GGGTCTCCAAGCCAGTGC[CG]CTTGCTCC[CG]GCCCCCACCCACTGACAGCA[CG]G[CG]TC[[CG]]AGTGACCC TGTCTAGCCT[CG]TTCTG[CG]CTCCTGCAAACCA[CG]TTGCTG[CG]CTAAC
SEQ ID NO: 708 CAGGTGCAGCA[CG]CAGCCCCTC[CG]GGAGCCAGGGAAAAC[CG]C[CG]G[CG]AAGATCTGGAG[CG]GTAAGG[[CG]]GAGAGAAGGGTCTTTCCACCTG[CG][CG]GCTGCAGC[CG]G[CG]GATCCCTCTTCCCAGGCTC[CG]TGGT[CG][CG]CAG[CG]GG[CG]GAGG[[CG]]CC[CG]GGAAGGGGACCCCAGTGCTCT[CG]AGATCAC[CG]TCCCTTCC[CG]AGAA GGTCCAGCTC[CG]GGCTCC[CG]AACCCACCCTCTCTCAGAAGGTCC[CG]G[CG]CAAAGA[CG]GTGCCACCAGGCA[CG]GCCAC[CG]GATCCC[CG]CTCC[[CG]]CTGGCT[[CG]]][[CG]]CCT[CG]GGGGAAGCTCAGACTCCTAAACT[CG]CA CTCTC[CG]TGCTTTG[CG]C[CG]GGACCCCTGGCCACCCC[CG]G[CG]CCTACTATCC[CG]CCCTCCCTCCC[CG][CG][CG]CCC[CG]C[CG]CT[CG]C[CG]GGACAGCCC[CG][CG]GGCCATGGAGCTGG[CG]GT[CG]GGAACCTCAG[CG]AGG GCAA[CG][CG]AGCTGGC[CG]GAGCCCCC[CG]CCC[CG]GAGCC[CG]GGC[CG]CTGTT[CG]GCAT[CG]G[CG]TGGAG AACTT[CG]TCA[CG]CTGGTGGTGTT[CG]GCCTGATCTT[CG][CG]CTGGGTGTGCTGGGCAACAGCCTAGTG
SEQ ID NO: 709 C[CG]AGCAACAGGTGCAGCA[CG]CAGCCCCTC[CG]GGAGCCAGGGAAAAC[CG]C[CG]G[CG]AAGATCTGGAG[CG]GTAAGG[[CG]]GAGAGAAGGGTCTTTCCACCTG[CG][CG]GCTGCAGC[CG]G[CG]GATCCCTCTTCCCAGGCTC[CG] TGGT[CG][CG]CAG[CG]GG[CG]GAGG[[CG]]CC[CG]GGAAGGGGACCCCAGTGCTCT[CG]AGATCAC[CG]TCCCTTC C[CG]AGAAGGTCCAGCTC[CG]GGCTCC[CG]AACCCACCCTCTCTCAGAAGGTCC[CG]G[CG]CAAAGA[CG]GTGCC ACCAGGCA[CG]GCCAC[CG]GATCCC[CG]CTCC[[CG]]CTGGCT[[CG]]][[CG]]CCT[CG]GGGGAAGCTCAGACTCCTA AACT[CG]CACTCTC[CG]TGCTTTG[CG]C[CG]GGACCCCTGGCCACCCC[CG]G[CG]CCTACTATCC[CG]CCCTCCCT CCC[CG][CG][CG]CCC[CG]C[CG]CT[CG]C[CG]GGACAGCCC[CG][CG]GGCCATGGAGCTGG[CG]GT[CG]GGAACCT CAG[CG]AGGGCAA[CG][CG]AGCTGGC[CG]GAGCCCCC[CG]CCC[CG]GAGCC[CG]GGC[CG]CTGTT[CG]GCAT[CG] G[CG]TGGAGAACTT[CG]TCA[CG]CTGGTGGTGTT[CG]GCCTGATCTT[CG][CG]CTGGGTGTGCTGGGCAACA
SEQ ID NO: 710 GGTGCAGCA[CG]CAGCCCCTC[CG]GGAGCCAGGGAAAAC[CG]C[CG]G[CG]AAGATCTGGAG[CG]GTAAGG[[CG]] GAGAGAAGGGTCTTTCCACCTG[CG][CG]GCTGCAGC[CG]G[CG]GATCCCTCTTCCCAGGCTC[CG]TGGT[CG][CG]C AG[CG]GG[CG]GAGG[[CG]]CC[CG]GGAAGGGGACCCCAGTGCTCT[CG]AGATCAC[CG]TCCCTTCC[CG]AGAAGGT CCAGCTC[CG]GGCTCC[CG]AACCCACCCTCTCTCAGAAGGTCC[CG]G[CG]CAAAGA[CG]GTGCCACCAGGCA[CG] GCCAC[CG]GATCCC[CG]CTCC[[CG]]CTGGCT[[CG]]][[CG]]CCT[CG]GGGGAAGCTCAGACTCCTAAACT[CG]CACTC TC[CG]TGCTTTG[CG]C[CG]GGACCCCTGGCCACCCC[CG]G[CG]CCTACTATCC[CG]CCCTCCCTCCC[CG][CG][CG] CCC[CG]C[CG]CT[CG]C[CG]GGACAGCCC[CG][CG]GGCCATGGAGCTGG[CG]GT[CG]GGAACCTCAG[CG]AGGGCA A[CG][CG]AGCTGGC[CG]GAGCCCCC[CG]CCC[CG]GAGCC[CG]GGC[CG]CTGTT[CG]GCAT[CG]G[CG]TGGAGAAC TT[CG]TCA[CG]CTGGTGGTGTT[CG]GCCTGATCTT[CG][CG]CTGGGTGTGCTGGGCAACAGCCTAGTGAT
SEQ ID NO: 711 ACAC[CG]CCAGGAGCACAATCCCTGAGGCCAATAAAGACCCCAGCTTTGCAAGTCAGGGG[CG][CG]AGCACTCTT GCCCCTCAGGTTCCCAGAAGAAAC[CG]CCA[CG]AGGGTGGGGTG[CG]GGGTCAGTGTGCTCCACAGGACTTC[CG] AGGA[CG]TGCCCCCCAAGCTGCTC[CG]TTCCTCCACCCCCTGGGATGCCACAGAACACC[CG]CCAG[CG]AGTTTCT TCCCCAG[CG]CCCATGAGAGGAGGCTG[CG]GG[CG]GCAGC[CG]CAAG[CG]AGGAATCCAG[CG]CAGGGAAAGTA GCCCCAGTGGGGCC[CG]G[[CG]][CG]TCAGCCCCACT[CG][CG]TGGCAAAACTTG[CG]GGGGCCCC[CG][CG]TGC[C G][CG]CCTCAGCCCAGCTGTG[CG]CC[CG]CAGGTCCCAGACT[CG]C[CG]CC[CG]CCTGACCTGG[CG][CG]G[CG]CC CTCACCT[CG]GAA[CG]CTGGGTGGACTT[CG]CAGTAAACCTTAACTTCCCATCCAGG[CG]GCAG[CG]G[CG][CG]G TGCCT[CG]GCTT[CG]CTCCTGGCAC[CG]CAGGT[CG]CC[CG]TTC[CG][CG]TTCCCAAAAGCATCAGGCTCACTTAG AAGCTCAGGCAGCCT[CG][CG]ACCCTCACCTACCCCTCCCAGCAC[CG]C
SEQ ID NO: 712 AGTGATTTAAATCCAGCTTATTT[CG]G[[CG]]GCAGCTGGACTATTCCTTTGCTTATTTGGGGATGGGTGAGGGGCA TACCCTTTAGGAAAA[CG]TTTCCAAATGATGTAATAATTTCTCTCTCATCTCTGGTCTTGCTCCAGACTTGGCCTCT TCCT[CG]CCACTCTGTCC[CG]GCCTCC[CG]CCCC[CG]CAGGCTCC[CG]TG[CG]GACTTAGCAGTT[CG][CG]C[CG]T AGCCCTCCTGGTTTTTTAC[CG][CG]CCTTGGT[CG][CG][CG]GCCCC[CG]GTG[CG]GGCCT[CG]T[CG]CTC[CG]ACA GCCCTACAGCTGTCCCTA[[CG]]GCC[CG]CAC[CG]ACAGCT[CG]TCCC[CG]CCACCTCCCTC[CG]GGCTGTAGGGA[CG]T[CG]AGATC[CG]AATCCTCACAG[CG]CCTGACC[CG]GGGC[CG]TGTTGGGTA[CG]GGTA[CG]G[CG]AGAGCCT TC[CG]AGC[CG]CCTCCAAAACTCTCCC[CG][CG]GACCTCAGCAGTCCCTCCA[CG][CG]T[CG]GGGCCCTGCTGGC[CG]GCCATGCCCTCTGAGGAGA[CG][CG]GAAAAGAG[CG]AGGCATATAGGAAGGTGGGG[CG]TTTTATC[CG]CCT[[CG]]GTTTTGACCCATCTGCCATGTAGTCTCCCCAGGCAC[CG]AGGGAA
SEQ ID NO: 713 AGAAACAGATTAGACAGAGATAGATGGATCCAT[[CG]]ATTGATTAGATAGGTTAAGATAGTCCTTGCATTCAGGC AAGCCACAGCAGGTGC[[CG]]CCTAGGGCAG[CG]GCCTCTGCCCAGACACTCAGTGCTGCAGAACAGGAGGGAGG C[CG]GGGCCTGTGG[CG]GG[CG]AGGGAAATG[CG]GGGCC[CG]AGGACTGGGGTGAGGGAGAGAGG[CG]G[CG]GC CCAGAGGAGCAGCAGG[CG][CG]CCTCTGG[CG]GTTTCCTGTC[CG]GGCTGG[CG]GGGC[CG]CCAGT[CG]G[CG]TG GGGTG[CG]GCAAGGGGAG[[CG]]GGG[[CG]]CTGGGTCAGC[CG]AGGGC[CG]GGCCT[CG]GGGG[CG]CAGC[CG]GA CTGGA[CG]G[CG]GCTCCTGTGGGCACTTGGC[CG]GGTTTGCTGGTTTTT[CG]GGAAATAAGGCCACTGGGGACAG TCACTA[CG]TTTTCAGGAAC[[CG]]CTCAGCCCCTCTGAGTGCCC[[CG]]CAGATGGACCTGG[CG]G[CG]TTCCTGGC TA[CG]GCTGACTGGGCTCC[CG]GAG[CG]AGGAG[CG]CCCCTG[CG]GGCCCAGCCTGGGCCCTGGG[CG]GTGGGAG GGCCTC[CG]CCCCCTTCC[CG]CTTC[CG]CCC[CG]CTGG[CG]C[CG]GACCCC[CG]CC
SEQ ID NO: 714 GGC[CG]AGAGGAAGGAGCCAGCCC[CG]C[CG]GGC[CG]C[CG]CCTG[CG]ACTTCCCCTCTGATCCACAGGTGC[CG] GTAAACAAAAGTGC[CG]CAGCTACCCCCC[CG]CCCCCACCC[CG][CG]GAGTT[CG]GCCCAAGGTTA[CG]C[CG]GG GTT[CG]GG[CG]G[CG]CC[CG]C[CG]GGGGCCCCCAAACCCAGCTTCTGGACTCTCCC[CG]GCTTCTCAAGCCCAC[C G]GGC[CG]GGAGCCTTCCTCTGGCTC[CG]AGCTGCTCCCCT[CG]CTCCAGGCTGGATTCCCCCCTGAAATGTTGGTC [CG]GGAAAACCAGCCTGGGTCCT[[CG]][[CG]][CG]CCCTTCTGCA[CG]GGGACCCCAGCCCACCCC[CG]TA[CG]GA

CA[CG]CCTTCCACCATCT[[CG]]CCTAGAAGGCTGCTGGGACCCCAGACCCAGAGCCC[CG]GTCACACTCC[CG]TCC
CATGCTGTCCCCCTCC[CG]CAAAGCCCA[CG]GTGGGAACAGAGGGCAC[CG][CG][CG]AGC[CG]ATGCCACCCTCA
CTGC[CG]GCCCCACCCAGACCTGC[CG]GTGCTGCAGTGCCC[CG]TATGTGCAGCCTGCAGCATCCCAG[CG]GCTG
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SEQ ID NO: 715

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G]CTTCCTGCAGC[CG]GGG[CG]AGG[CG]GAGGAGC[CG]G[CG]GGCAGGAGG[CG][CG][CG]GC[CG]GTG[CG]G
TCCAAGG[CG][CG]G[CG]CATGGC[CG]CCAA[CG]TG[CG]GGAG[CG]CAAG[CG]CATCCTAGACTACAA[CG]AGGCC
TTCAA[CG][CG]CTG[CG]C[CG]GG[CG]CTG[CG]GCA[CG]ACCTGGG[[CG]]GCAAGAGGCTCTCCAAGAT[CG]CCA[C
G]CTG[CG]CAGGGCCATCCAC[CG]CAT[CG]C[CG][CG]CTCTCCCTGGTCCTG[CG][CG]CCAGCCC[CG][CG]CCC[CG
][CG]GGCCCTG[CG]GACACCTGGAGTGCCA[CG]GCC[CG]GC[CG][CG][CG][CG]GGGACAC[CG]GGGACACAGG[C
G]CCAGCCCCC[CG]C[CG]CCTGCAGGGCCCAGCCT[CG][CG][CG]CCCAGA[CG]C[CG]CC[CG]CCCCT[CG]GTGC[C
G]TC[CG][CG]CCC[CG]CTG[CG]CCT[CG]TGCCCCC[CG]CA[CG][CG]CCCCTGGCA[CG]GCCCAGTG[CG]GTGGC[CG
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SEQ ID NO: 716

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GGCTGATGCCTAGGCCTC[CG]TGGGGAGGAGGTCTGGG[CG]GTAGG[CG]GTGGGGTGGGTGGAACCTAG[CG]TCC
AGCTAGG[[CG]]GAAGGG[[CG]]GAGCTTCAGGTCTCCATGGAGG[CG]GCTTCTCCTAGCAACT[CG]A[CG]GG[CG]T
TGAG[CG]GAGC[CG]CTGACCTGATGGA[CG]C[CG]ACAGCCTCCTGCTGTCTCTGGAGCTGG[CG]TC[CG]GCAGTG
GGCAGGGCCTCAGCC[CG]GAC[CG]T[[CG]]GGCCT[CG]CTGCTCA[CG]TCTCTTATGCTGGTTAAG[CG][CG]ACTAC
[CG]CTATGAT[CG]GGTTCTCTTCTGGGGC[CG]CATCCTTGGCCT[CG]T[CG]C[CG]ATTACTACAT[CG][CG]CAGGG
CCTGAGTGAGGACCAGCT[CG]CAC[CG][CG]CAAGA[CG]CTCTATAGGTGAGGAGGCCCC[CG]GGA[CG]GGCTCCC
CAGAGGGTGGCTACCTGGAGGCAGGG[CG]GGGTGGG[CG]GGT[CG]CAGCAATTGAAAGGGG[CG]GGGCCCATGG
GGCCAAGGGAGGTGTGGG[CG]GGATCTGAGATGAGTGGAATGGGGGAGA

SEQ ID NO: 717

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C[CG]GATTGGATGG[CG]AGACCT[CG]ATTTTCCTAAAATTG[CG]TCATTTAGAACCCAATTGGGTCCAGATGTTAT
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ATTAAATATTGAGCAGAAAGT[CG][CG]TGGGGAGAATGTCA[CG]TGGGTCTGGAGGCTCAAGGAGGCTGGGATA
AATAC[CG]CAAGGCACTGAGCAGG[CG]AAAGAG[CG][CG]CT[[CG]]GACCTCCTTCC[CG]G[CG]GCAGCTAC[CG]A
GAGTG[CG]GAG[CG]ACCAG[CG]TG[CG]CT[CG]GAGGAACCAGAGAAACTCAGCACCC[CG][CG]GGACTGTC[CG]
T[CG]CAGTAAGTGCC[CG][CG][CG]GTGCTGGC[CG][CG]GCTGCC[CG]GGTCACCCC

SEQ ID NO: 718

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CCA[CG]TTCT[CG][CG]G[CG]CCACCTGGTGGCCATGGAC[CG]CCAT[CG]C[CG]CTGGA[CG]TCAGGGC[CG]CCAG
GCCCAG[CG]AGATGTCACCTCCTCTGAGGAGCCTTCCAGGAT[CG]CACC[CG]GCA[CG][CG]CTCCA[CG]CCT[CG]T
TGTCTGTTCTT[CG]GAGCAC[[CG]]ACCATGATCACAAATCAGCT[CG]CT[CG]CTGTGTTTCCTGC[CG]GGT[CG]CT
AC[CG]CCATGATC[CG]CA[CG]TAGTGGTCAAGGCTGAGGTTGTATGAATGTGGA[[CG]]TTATAACCCTGGCTCCCT
CTCCCTCCCTATGCTGGGCTCCCCT[CG]ATCCCCAGG[CG]GTGGGGTGCCCCTGGTTTTTCCTTTTTAAAATTATAA
GTCTGGC[CG]GA[CG][CG]GTGGCTCAGGAC[CG]TAATCCCAGCACTTTGGGAAGT[CG]AGGGAGGGTGTATCACT
TGAGGCCAGGAGTTCAAGACCAGCCTGGCCAACA

SEQ ID NO: 719

GCACCAGCCTTCTAGTGTGCCCCTGCCCAA[CG]GGAGGGAGGAGGGAG[CG]GGGAGCCC[CG]G[CG]AGGGAGGA
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[CG]GCTTCCCCA[CG]GGAGGA[[CG]][CG]AGGCCC[CG]GCCCAGCCATGGCCCCCTGG[CG]CAAAGCTGACAAGGA
G[CG]GCA[CG]G[CG]TGGGTAGGTG[CG]GGCCCCAGGG[CG][CG]GCAGGGAG[CG]GGACAGGTGG[CG]GGAGAGC
[CG][CG]AGCAGGAGGATGCTG[CG]GGGC[[CG]]G[CG]G[CG][CG]GGGTGGGCAGGG[CG][CG]CTGCCTGCAGGTC
AGAGGG[CG]CAGCCTG[CG]G[CG]GGGCCT[CG]GGG[CG]GGAAAGC[[CG]]AGGCT[CG]GGGAGAGGA[CG]G[CG]G
GACCCCACCC[CG]CAGGCTAAGCACAGCCCT[CG]CCCTCT[CG]CCTGCTGAGGGAACCTTAGACATTTC[CG]AGAT
AGGGTCAAGACCTG[CG]CTTGACAACTCAGTTCTT[[CG]][CG]CCAAACT[CG]G[CG]TCCCCAGGAGTGCCCCAGCT
[CG]C[CG][CG]TGGGAGACTTGGCCTTGTAGAGGGAGCTCCACTCTCCCCTGGCTCAGC

SEQ ID NO: 720

CCTCCAGCCTTTCTCTCTGGGCCTAG[CG]GGACTCTCCCAGGCAGGCCCCTCCCTGCC[CG][CG]GG[CG]CACTTTC
CC[CG]CCTGCATCTGAGG[CG]TGG[CG]CAGCTGGGAGCAAAGCACAGGTGGGCTGGG[[CG]][CG]GTTTGGGGTT[
CG]GG[[CG]]TGGCAGAGTGG[CG]G[CG]GGGTCTGGGGAAGAGTTGTCTTGGGGGCAG[CG]CCAGCCACCAGAGCC
[CG]AGTCAG[CG][CG]GCCAGGACTCTGCAGGGGCAGGTAG[CG]ACCCTTAGAGA[CG]CAA[CG]TGG[CG]CAG[CG
]GACT[CG]GCTG[CG]TGGGGCAAGGGC[[CG]]GGGC[CG]GACACAGGAGCAG[CG]GGGATGC[CG]GGTG[CG]CTC[
CG]AGGGTGTGGCCCC[CG]GGCTGTG[CG]GGGCTCAGAGCTGCTTGCTGGG[CG][[CG]]GTGCC[CG]ACAAAGGTA
AGGCAGGAGTGGG[CG]TCTTTCT[CG][CG]GGA[CG]CTGGGT[CG]GAGGGAGCTTGAACTTGAGGTTGTTGGGGAG
AGCCAGAAAGGA[CG]CCAGTGCCACAAGGAG[CG]CCTGCCTTGGGG[CG]TGGAGC[CG]CTCCTCCCCTCACTGGG
CAGACC[CG]GCCAGCAACCAGGTAGGAGAGTGGGGGCAAATGTGGCCATTC

SEQ ID NO: 721

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G[CG]GCTG[CG]T[CG]CTGAAGGTTGGGGTCCTTGGTG[CG]AAAGGGAGGCAGCTGCAGCCTCAGCCCCACCCCAG

AAG[CG]GCCTT[CG]CAT[CG]CTG[CG]GTGGG[CG]TTCT[CG]GGCTT[CG]ACTT[CG]CCAG[CG]C[CG][CG]GGGCAG
AGGCACCTGGAGCT[CG]CAGGGCCCAGACCTGGGTTGGAAAAGCTT[[CG]]CTGACTGCAGGCAAG[CG]TC[CG]GG
AGGGG[CG]GCCAGG[CG]AAGCCC[CG]G[[CG]]CTTTACCACACACTTC[CG]GGTCCCATGCCAGTTGCATC[CG][CG
]GTATTGGGCAGGAAATGGCAGGGCTGAGGC[CG]ACCCTAGGAGTATAAGGGAGCCCTCCATTTCCTGCCCACATT
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AGGAATATTTTCCAGCAGTGAGCAGGGGCTGTATGGGA[CG][[CG]]GGAGGAGCTCAGAGGAGG[CG][CG]GAGAG
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SEQ ID NO: 722

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GGAGCCAGG[CG]GCCC[CG][CG]TAG[CG]GTGGGAG[[CG]]CAGGTACC[CG]AGAGTACCCTCTGGGGGC[CG]GCC[
CG]G[CG][CG]CT[CG]CTCCTCCT[CG]CCTTTC[CG]GGAAC[CG]TG[CG]CAGGAGCTCACA[CG]GCA[CG]CCTG[CG]
GCCAGGGGCAAT[CG]GGTTCT[CG]GTTCC[[CG]]GAGTCCCAGTTCC[CG]GTTTCCAGTTTCCTTAT[CG]A[CG][CG]
ATTGTTC[CG]T[CG]GGGTCTTCCAAGGGGATC[CG]AATGGTGGCCAAGTCC[CG]CTGGGGAAATC[CG]CAGGGGT
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SEQ ID NO: 723

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CCAGAG[CG]CCTGGAAAGCTC[CG]GAACCTCTCACCTGC[CG]CCTCCT[CG]GGTCCAAGTGCCAC[CG][CG]GC[CG
][CG]CCCC[CG]GCAGCCCAGGG[CG][CG]CTTCCACCA[CG]GTAC[CG]GTGGATT[CG]C[CG]TG[[CG]]CAGC[CG]GA
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[[CG]]GGAAACATAGTCTTTAGG[[CG]]TAAAGGCAGCAGCC[[CG]]GCCTTGAAGC[CG]GATCT[[CG]][CG]ATGTTT
CAGGGTGAGC[CG]GA[CG]CAGG[CG]TGCCTG[CG]CAGTG[CG][CG]GAGGAGTGCTGTT[[CG]]TGTGTT[CG]AGTC
CCTGGGTTGCTTCCTGGGGTCTGTGGTGCTGGGTGTGCTATCTG[[CG]]TGTGATTCTCTAG[CG]AGAGATTGTGGG[
CG]AGTGAC[CG]AGTGGGCAAGGGGC[CG]TCACTGTGTGTG[CG]TGATTTTGACAGTGTGTGGTGGTA

SEQ ID NO: 724

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AAGG[CG]GGACAAGG[CG]AGGTCTCACAGGCCTGCTCCTGCCCCAGTCTCTGGCCCC[CG][CG]ATGGAGGAAGCT
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G[CG]TTGGCAAGAAC[CG]CACAAAAGGGGCCCC[CG]GAGGGGAGCAAGGGCATTTT[CG]TGTTCTCTTTTTTTCTC
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SEQ ID NO: 725

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ATGTGCAGCCCTG[CG]GC[CG]GGG[CG][CG]AGATCTCCC[CG]CAGG[CG]GC[CG]CTCCC[CG]CCAGGGGCTTC[CG
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G]CTTGTCCCCAG[CG]CAGGAGGAGC[CG]GGACC[CG]A[CG][CG]CACCCTC[CG]GCCTGCTGGAGGCTGAGC[CG]
C[CG]CAGGGAAAGCA[CG]TGGGTGAAGGGCCCAG[CG][CG]G[CG]GTTCCTTGAAAAAG[CG]GGAGCCTGGTCTC
AGCTGGGGCCTGGGGCCTGCCC[CG]CCCATGCAGGGGT[[CG]][CG]GGAGCAGGGGCT[CG]GCCTCC

SEQ ID NO: 726

TGACTCC[CG]CCCCCAGGAGGTGGAGCAGGTGA[CG]TTCAGTAC[CG]CCCTGGAGGGGCTCA[CG]GACCAC[CG]G
GCAGTG[CG]CCTGCAGCTC[CG]AGTCTCAGTGTCCTCCTAAGGCAAGCACAGATGAGGGG[CG][CG][CG]GCTGG[
CG][CG]CACAGACA[CG]ACT[CG]GAGCA[CG]AACTAGG[CG]C[CG]TAGCTG[CG]TCCCCAGAAC[CG]GGAGACTT
AAGGCATCTTTATTG[CG]GGATCCTCACA[CG]GCCTCCTGGGCC[[CG]]G[CG]ATACTCATAGA[CG]CTGC[CG]TGC
T[CG]GGAAAGGCCAGTGCTTG[CG]GGGG[[CG]]ACCC[CG]G[CG]GTGGGG[CG]GGGTCCTC[CG]GGTCCCCATAGC
CAC[CG]C[CG]C[CG]GG[CG]TGTGGAGACAGAACACATCCTGTTGG[CG][CG]GGGGGGGG[CG]GGGAGG[CG]GGC
TCAGTGCAGG[CG]TGGCCCCTCCCTGTCACCTG[[CG]]CAGTCCCCTCCCCAC[CG]GGCAG[CG]TCCATCACC[CG]C
CCCCCATGGACCA[CG]GAGGCC[CG]GTA[CG][CG]CCCCCTTTCCTTC[CG]GGGCCAAATTAAACT[CG]GCCTCTGGT
CAGGTCTGCAACTGTTCCCCCTCTGTGGGATGGGGC[[CG]]GGAGGGGAGGGGAGG

SEQ ID NO: 727

CT[CG]GTCTGGGTTCCCC[CG]AGGAAAAATACCCACC[CG][CG]AGGGCT[CG]G[[CG]]GCTTTT[CG]ACT[CG]G[CG]
GGGATGAACTGTGGCAACTT[[CG]]GCAGCCCCCAC[CG][CG]GTG[CG]GAAGTAAAGAGGGCAACATTGG[CG]ACT
G[CG]GCT[CG]GAGGGGCTGGAG[CG][CG]TGAAGC[CG]TGGGGG[[CG]]C[CG]TG[CG]CCTCC[CG]CTCTCT[CG]TT
T[CG]GC[CG]CAGGTCCTGGGACTC[CG]ACTT[CG]GTGCTC[CG]GGTGATAG[CG]GCTG[CG]G[CG]CCTGCAGTCCA
GATCCT[CG]CAGTTCTG[CG]GG[CG]AAGGAGG[[CG]]AA[[CG]]GAAT[[CG]]GCCCCCAGTGGGGAG[[CG]]CAACA
AGCCACAGTAGCCAAACCC[CG][CG]CTCCTGCC[CG]GGCTCCCAGA[CG]AA[CG]CAGC[CG]CAG[CG]GGGGGC[C
G]GGCCC[CG]AGCCCCA[CG]C[CG]C[CG]C[CG]C[CG]C[CG][CG]CCAG[CG]GTGGGGGG[CG]GGCTGGGGG[CG]GGG[CG]
GC[CG]GGGCTGCCTTCC[CG]GG[CG]CATATG[CG]AG[[CG]]CAGCACC[CG]G[CG]CTGC[CG]AGCCACCTCCCC[CG
]C[[CG]]CC[CG]CTAGCAAGTTTGG[[CG]]GCTCCAAGCCAGG[CG][CG]CCTCAGGATCCAGGCTCATTTGCTTCCAC
CTAGCT

SEQ ID NO: 728
[CG]GTGCTC[CG]GGTGATAG[CG]GCTG[CG]G[CG]CCTGCAGTCCAGATCCT[CG]CAGTTCTG[CG]GG[CG]AAGGA
GG[[CG]]AA[[CG]]GAAT[[CG]]GCCCCCAGTGGGGAG[[CG]]CAACAAGCCACAGTAGCCAAACCC[CG][CG]CTCCTG
CC[CG]GGCTCCCAGA[CG]AA[CG]CAGC[CG]CAG[CG]GGGGGC[CG]GGCCC[CG]AGCCCCA[CG]C[CG]C[CG]C[CG]
C[CG][CG]CCAG[CG]GTGGGGGG[CG]GGCTGGGGG[CG]GGG[CG]GC[CG]GGGCTGCCTTCC[CG]GG[CG]CATATG[
CG]AG[[CG]]CAGCACC[CG]G[CG]CTGC[CG]AGCCACCTCCCC[CG]C[[CG]]CC[CG]CTAGCAAGTTTGG[[CG]]GCTC
CAAGCCAGG[CG][CG]CCTCAGGATCCAGGCTCATTTGCTTCCACCTAGCTT[CG]GTGCCCCCTGCTAGG[CG]GGGA
CCCT[CG]AGAG[CG]ATGC[CG]ATGGATTTGATTTTAGTTGTGTGGTTCTGTGTGTGCACTGCCAGGACAGGTAAGC
ATGACTGTGG[[CG]]GTTAGAGGGATC[CG]GGAAATGGGGGTGCCCACAGACCA[CG]G[CG]G[CG]TGGGGAGACC
TGGAGC[CG]AGCTTTG[CG]CTGGTCTGGGGAA[[CG]]G[CG]GTAG[CG]TGGAC[CG]GTTCCTGGGATCTC

SEQ ID NO: 729
GGCTGGTGAGTGAACC[CG]GC[CG]GGGG[[CG]]CAGGTCA[[CG]]ACCACCCCCCATC[CG]CCA[[CG]]GAC[[CG]]CC
[CG]GGTCCCTCAGAGTCTC[CG]GATC[CG]AAATCTACCC[CG]AGGCAG[CG]GGACC[[CG]]CCCAGACCCTCCACC[
[CG]]GGAGAGTCCCAGG[CG]CCTTTACCCAGGTTCATTTTCAGTTTAGGCCAAAATCCC[CG][CG]GGTTGGG[[CG]]
GGGAGGGGG[CG]GGGCTAGCTGGG[CG]GGGCTGACTG[CG]GGGAC[CG]GCTAGGGTCTCACACCCTCCAGGGAA
TGAATGGCTG[[CG]]ACATGGGGCC[[CG]]A[CG]GA[[CG]]CCTCCTC[[CG]][[CG]]GGTATCACCAGCA[CG][CG]TA[C
G]A[CG]GCAAGGATTACATCTCCCTGAA[CG]AGGACCTG[CG]CTCCTGGAC[CG][[CG]]G[[CG]]GACAC[[CG]]TGGC
TCAGATCACCCAG[[CG]]CTTCTATGAGGCAGAGGAATATGCAGAGGAGTTCAGGACCTACCTGGAGGG[CG]AGTG
CCTGGAGTTGCTC[[CG]]CAGATACTTGGAGAATGGGAAGGAGA[CG]CTACAG[CG][CG]CAGGTACCAGGGGCCAT
GGG[CG]CCTTCCCTATCTCCTGTAGATCTCTTGGGATGGCCT[[CG]]CACAAGGTTGGGAGGAA

SEQ ID NO: 730
TCT[CG]TTT[CG]GC[CG]CAGGTCCTGGGACTC[CG]ACTT[CG]GTGCTC[CG]GGTGATAG[CG]GCTG[CG]G[CG]CCT
GCAGTCCAGATCCT[CG]CAGTTCTG[CG]GG[CG]AAGGAGG[[CG]]AA[[CG]]GAAT[[CG]]GCCCCCAGTGGGGAG[[C
G]]CAACAAGCCACAGTAGCCAAACCC[CG][CG]CTCCTGCC[CG]GGCTCCCAGA[CG]AA[CG]CAGC[CG]CAG[CG]G
GGGGC[CG]GGCCC[CG]AGCCCCA[CG]C[CG]C[CG]C[CG]C[CG]C[CG][CG]CCAG[CG]GTGGGGGG[CG]GGCTGGGGG[CG
]GGG[CG]GC[CG]GGGCTGCCTTCC[CG]GG[CG]CATATG[CG]AG[[CG]]CAGCACC[CG]G[CG]CTGC[CG]AGCCACCT
CCCC[CG]C[[CG]]CC[CG]CTAGCAAGTTTGG[[CG]]GCTCCAAGCCAGG[CG][CG]CCTCAGGATCCAGGCTCATTTGC
TTCCACCTAGCTT[CG]GTGCCCCCTGCTAGG[CG]GGGACCCT[CG]AGAG[CG]ATGC[CG]ATGGATTTGATTTTAGT
TGTGTGGTTCTGTGTGTGCACTGCCAGGACAGGTAAGCATGACTGTGG[[CG]]GTTAGAGGGATC[CG]GGAAATGG
GGGTGCCCACAGACCA[CG]G[CG]G[CG]TGGGGAGACCTGGAGC[CG]AGCTTTG[CG]CTGGTCTGGG

SEQ ID NO: 731
GTCTTTTGCTAAAAAC[CG]GCAGTG[CG]CTT[CG]CCTCCCTGCCCAGC[CG]CAGCCTGC[CG]TCCCCTAGACAAAA
AG[CG]G[CG]AC[CG][CG]GCC[CG]GCCACC[CG]AGCCC[CG]C[CG][CG]CTG[CG]CCTTTGTTGGG[CG]GTCCACAG
ATGGTGCCCAGCA[CG]GGGC[CG][CG]C[CG]AGGG[CG]GGGG[CG]GGAGGC[CG][CG]AAGAGGGT[CG]GG[CG]GG
AGGGGAGGAGA[CG]G[[CG]]GAGCAGCCAATC[CG][[CG]][CG][[CG]]GCCCATCAGCTGAC[CG]CCTTTGCTTACAC
CAGGTGCA[CG]C[CG]GCTG[CG]GGGAGCACAAAG[CG]GGG[[CG]]CAC[CG][CG]GG[CG]C[CG]GCAA[CG]AGC[CG
]GTGAA[CG]AGG[CG]AGGCC[CG]TG[CG]CC[CG][CG]GCTGCAAG[CG]CC[CG]CCTGG[CG]GGGAGAGGGGC[CG]A
[CG]G[CG]TCAGCC[CG]GG[CG]G[CG]GCATCCCTAGG[[CG]]CCTGGGG[CG]CCTTCCTC[CG]GACCTGGC[CG]CT[C
G]CTGCCC[CG]CCCTCTGCACCCCACTTCTC[CG]ACCCTCCTTCCCAGTCCTGCCTCCCCCTGCCCTGGCCTCTGAG
AGC[CG]ACTGAGCCCAGCCC[CG]TGCAGCAG[CG]GTTGCCTGTGT[CG]C[CG]CCTAGTCTC[CG]GTCTTGGTGCTC

SEQ ID NO: 732
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GTCCTGGACTGGTTTTGGGCTGACCC[CG]GG[CG]CCCAGGACAG[CG]CTGTCCTC[CG]TGGTTCTGTCCCTGGTGA
CAG[CG]ACTCC[CG]CTAGCTAGGCC[CG]GGAGCACCAGGGGGAGGGAGGCAGGAGGGCCAC[CG]TGGGTG[CG]G
GCCTGG[CG]C[CG]GGCTCAGCC[CG][CG]GGGGC[CG][CG]TGGG[CG]GGGA[CG]GGG[CG]TCTTGT[CG][CG]GGCA
CCTGTG[CG][CG]TGGG[CG]GG[CG][CG]CACT[[CG]]CCAG[CG]CTTTGTT[CG]TGAC[CG]GCCTTTTAAGGGCTGTC
TCACCCATCTTGTCTGGCTCTGCCTCCCTGTTTCCTTTC[CG]TCCTCTCTCCCACCACAGCCAGCTCCCCACTTTTTT[
CG][CG]GGGGCCCCCTCCAGCCTGTC[CG]GGGCCTCCC[CG]TTCCCAGGCCAGGGCTTCCCCCTCCTCCCAGACCT[
CG]TTGCTCTGCC[CG]GTGAGGCCC[CG]GGCTCCCAGCAGGGGG[CG]CCTGCT[CG][CG]ATCAGGTGG[CG]GCCTG
GGGG[CG]GCCTGG[CG]GTCC[CG]G[CG]GACCCTGA[CG][CG]G[CG]GGGC

SEQ ID NO: 733
AAATGT[CG]ATGGGCA[CG]TTGAC[CG]GC[CG]G[CG]GATG[CG]GCCCC[CG]GACTGATAGTAGTAGAGGATGG[C
G]T[CG]AAGCTGGGC[CG]GTTG[CG]GT[CG]AAGAAGTACT[CG]TTG[CG]GAG[CG]GGT[CG]AAGTACCTCATG[CG]
C[CG]CTTGGGGT[CG]CCCAGCAG[CG]TCT[CG]GGGAACTGGCAAAGGGTCTTCAGCTG[CG]TCT[CG]AAG[CG]CA
GCC[CG]GAGATGTTGATGACCA[CG][CG]CTCCC[CG]CAGCAGTCCTGCT[CG]CC[CG][CG]GC[CG]GCAGTGAGGG[
CG]GCAG[CG]GCT[CG]TAG[CG]GT[CG]CAGC[CG]C[CG]C[[CG]]CCACAGC[CG]CCTTGAGG[CG]GGGCCCCTCCAC
CAT[CG]GCCACCTC[CG]GCTCCAGCAGGTGGTCCC[CG]GGCACCA[CG]GTCATGT[CG]GG[CG]GCAGCT[CG][CG]
GCCTG[CG]G[CG]GGCTC[CG][CG]TAGC[CG]TGGTTCACCAG[CG]TGTGGGCAC[CG]C[CG]CTGCT[CG]CTGGG[CG
]CTGAGGAGGGTGGG[CG][CG]GTGG[CG]GGCTGAGGG[CG]G[CG]G[CG]G[CG]AG[[CG]]CAGAAGGCTGAGG[CG]
CT[CG]TCCATG[CG]G[CG]GGGAAGAGG[CG]GCAG[CG]GTGAGGCCAGGT[CG]CTCCTCCT[CG][CG]CTCCC[CG]C
CCTTT

SEQ ID NO: 734
CACAGGCACACTCATG[CG]CTTGCCACCCCATCCCCCCCACCCAGACACAGACACACAACACAACACACA[[CG]]CA
CACACTGCACACACCTGGCAC[CG]TGTGCACCACCTCATGCCACAAGCAGCCACACACCCCACA[[CG]][CG]CC[CG
]AACAACACCCTTCACCCACACTGCACA[CG]CTGCAGCCCTGTACA[CG]CCACATAACACA[CG]CACCCCACACAC
CCACT[CG]GGACCC[CG]A[CG][CG]GGTGAACAAG[CG]ATGGGAACAGGCCCT[CG]GGGTGGGC[CG]TAG[CG]GG
TAGGG[CG]GG[CG]G[CG]GGGGT[[CG]]CACC[CG]GGT[CG]G[CG]CA[CG][CG]CAGCAGGCTAGTGC[CG]CCCCCTC
CCCCT[CG]C[CG]GCTGCCA[CG]TCTTTGCCCTCTC[CG][CG]GC[CG]GGCCCTG[CG]GGGCACCCTGGGTGCC[CG]A

[CG]GCCTC[CG]GGAG[CG][CG]GTGGGCTCCAGCCC[CG]CACCC[CG][CG]AAGGAA[CG]GTCAG[CG]CAGTCCCC[CG]GGCCCTC[CG]CCCCT[CG]C[CG]GGCCTTG[CG][CG]CCCCC[CG]C[CG]CC[CG]GAG[CG]CCTGAGTAC[CG]CATCCCAGGG[CG][CG]G[CG]CAGCCAA[CG][CG]CAACC[CG]CCCAGGTCAGGGGTGCC[CG][CG]CCTG

SEQ ID NO: 735

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SEQ ID NO: 736

GAGCCCATGGA[CG]AGGCCTTGTC[[CG]]TTCCTAGAGCTCTGCTCTCACTTGGTCCTTCTCTCCACTTCTCTCT[CG]CTTCTTTTTTACTCT[CG]TTTCTCTCTGCTTCCA[CG]TCTCTCACAAATCTGG[CG]TTTCTCTCTTCCATCTCTTCCTCTCTAGGTCTCCTTGTT[CG]CATTCTTGCCTCTCCCTCCT[CG]TCTCCTCATGCCCTCTCCCCTCTGTCCTCTG[CG]CTCTTCT[CG]CCTCTCCTCTCCCTCCC[CG]TCTGGTTCTGTTAGTGTAAAGCCACCAGACTGACCAGGC[CG]A[CG]G[CG]GGG[[CG]][CG]GAAGTGGGTG[CG]AAGGCAGCCAG[CG]GC[[CG]]GC[CG]ACCAGGGCTCTCCCCAC[CG]ACTGCCTGCTTTGGCACC[CG]GCTACCCCCCTTGGCCTGGCTTTCCTGGGGCCTTT[CG][CG]TT[CG]CT[CG]CTTTCTACTGT[CG]GTATTTGCAGCAG[CG]CTCCCTCAGGTCC[[CG]]AGCAGAGCTAAGCCAGCCAGCACCCAGGGGAAGGGGACCCACAGCCC[CG]TGGAAAGAGGTCTAT[CG]AGATGCTTTGCAGCAAAGTGCTCTGCA[CG]TGGCCCTGGCCAAAATGTGCACCACCCCCTTTCAGAAAG

SEQ ID NO: 737

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SEQ ID NO: 738

CC[CG]AGCACCCA[CG]TGCAGCTTC[CG]ATCACAGCCCTGG[CG]TGGCTTCTCTGTCCC[CG]GCTAAGGCC[CG][CG]GT[CG]CTGCAGGGTGCCT[CG]C[CG]AGGGTG[CG]GGCT[CG]GGGCTCACAGTGCTCCCAGCCTCTCCCACCCCAACCC[CG]CCATTAAGGGGAGCCCCAG[CG]A[CG]CCCTGAACCCTGAAAGTCACACTGGGGC[CG]GGGCTGCACTTGG[CG]TC[CG]CTTCCCCTCC[CG]TCACAGTGACCAGGGCTAGGGC[CG][CG]GT[CG]GGGC[CG]T[CG]GGGAGAG[CG]GAGGG[CG][CG]TGGGAATGGGGCT[[CG]]CTG[CG]CCA[CG]GAAATCC[CG][CG]C[CG]CCCTT[CG]AGTCCTCCCAGCTGCTC[CG]CAGAGC[CG]GGGC[CG]CTGCCAT[CG][CG]TCTGCCC[CG]AGGGTG[CG]CAGG[CG]GGTACCTGTCC[CG]ACT[CG]GGGAACAG[CG]GGAGCC[CG]GAGA[CG]CC[CG]T[CG]GGCTTCCCAGCCCCACCTGGGA[CG]TCTCTAGGGG[CG]GGAGGCCAGGAGAGAAGAGGGTGGGAGAGATGAGCTGCAGGGGGATA[CG]GGACCCAGGGACC[CG]GGATCTTATAACA[CG]CTTTCCACC[CG]TAGGATTGGGGCCCACAAATGACCA

SEQ ID NO: 739

CC[CG]AGCACCCA[CG]TGCAGCTTC[CG]ATCACAGCCCTGG[CG]TGGCTTCTCTGTCCC[CG]GCTAAGGCC[CG][CG]GT[CG]CTGCAGGGTGCCT[CG]C[CG]AGGGTG[CG]GGCT[CG]GGGCTCACAGTGCTCCCAGCCTCTCCCACCCCAACCC[CG]CCATTAAGGGGAGCCCCAG[CG]A[CG]CCCTGAACCCTGAAAGTCACACTGGGGC[CG]GGGCTGCACTTGG[CG]TC[CG]CTTCCCCTCC[CG]TCACAGTGACCAGGGCTAGGGC[CG][CG]GT[CG]GGGC[CG]T[CG]GGGAGAG[CG]GAGGG[CG][CG]TGGGAATGGGGCT[[CG]]CTG[CG]CCA[CG]GAAATCC[CG][CG]C[CG]CCCTT[CG]AGTCCTCCCAGCTGCTC[CG]CAGAGC[CG]GGGC[CG]CTGCCAT[CG][CG]TCTGCCC[CG]AGGGTG[CG]CAGG[CG]GGTACCTGTCC[CG]ACT[CG]GGGAACAG[CG]GGAGCC[CG]GAGA[CG]CC[CG]T[CG]GGCTTCCCAGCCCCACCTGGGA[CG]TCTCTAGGGG[CG]GGAGGCCAGGAGAGAAGAGGGTGGGAGAGATGAGCTGCAGGGGGATA[CG]GGACCCAGGGACC[CG]GGATCTTATAACA[CG]CTTTCCACC[CG]TAGGATTGGGGCCCACAAATGACCA

SEQ ID NO: 740

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SEQ ID NO: 741

GGTTAGAAAAG[CG]TGGTTCTTG[CG]CAGGAAAGTTGGAGCAAAGAAGAGTTCAGAAGTGGG[CG]GGTGTGTGTTTAAAAAAAAAAAAGGGGGTGGAAACCCCACCAGCCAAGTCTGCAGAAAAAAAATAAATGAAGTCTGCCTATCTC[CG]GGCCAGAGCCCCTCCCCT[CG]GCC[CG][CG][CG]GGAGGAGTGTGACCCAGGTGC[CG]CTTCCTCT[

CG]C[CG]C[CG]AGGGTCAGGAGCC[CG]GGAG[CG][CG]ACCCTCCCC[CG]GCC[CG]GCCTGGCC[CG]GCCTGGC CAGTCCC[CG][CG]GTCTCTGCC[CG]GGCTGA[[CG]]CCCAGGAATGTGGT[CG]A[CG]AGAAGCCCCAACAGCA[CG]G[CG]TGGCCTCTCAGCCT[CG]GTGAGTACC[CG]C[CG]TGGGGAAGGGTCCTGGGGACCCACTGGAGGC[CG]][CG]]GCC[CG]CAGCAGCCAGGGGC[CG]AGCCA[CG]GCCA[CG]GA[CG]CCCTGGTGTCC[CG]GTC[CG]TGC[CG]GGCCTCCAGG[CG]GAGGAGG[CG]TC[CG]CTGGGCTCAGATCCC[CG]ACTCCAGCCC[CG]GTTCCC[CG]G[CG]C CTGGGCTG[CG][CG]GAGTCCCTGTCC[CG][CG]TCC[CG]GACCCCTA[CG][[CG]]CAGCCTCCA[CG][CG]CTC[CG] AGC
SEQ ID NO: 742 CTCTA[CG]GAGA[CG]C[CG]AGAAGC[CG]G[CG]GAGAG[CG]G[CG]GGAGCCAACCCC[CG][CG]GGC[CG]C[CG] CC[CG]GAAGGC[CG]CCTG[[CG]]CCTG[CG]ACCAGAAGCCCTGCAGCTGCTCCAAAGTGGATGTCAACTA[CG][CG]TTTCTCCATGCAACAGGTAAAGACTCAG[[CG]]GGGAGCCC[CG]GGG[CG]CCCCTGCCCCTCTCTCTGCCC[C G]CCCAC[CG][CG]GC[CG]GTG[CG]GGTC[CG]G[CG]CTGAGAGC[CG]GACAGGGG[CG]T[CG]AGGTGGCAG[CG] GAGG[[CG]]GGACCTGCCAGAATCTTCAGATAAAAG[CG]AGAAATG[[CG]]GGACCTGCC[CG]CTGGGTCCAAG CCCC[CG]AACCTGGCCT[CG]GAGCTCCAAGAGGGCTCTGAGGC[CG]TGG[CG]CTCTTCCCCCAG[CG][CG]GCC CTTGGGATGG[CG]GGTGGC[CG]A[CG]ATCCAGG[CG]CT[CG]TG[CG]CTCACTGAAT[CG]ATGA[CG]GCTGGCT TCCCTAGGC[CG]CTGGGGCCT[CG]GGTGGGACTCAGTTTCCAAATAC[CG]TGCC[CG]AGAATTCAGAATTGCA TTTTTTTTAGGTCTTTAGATCA[[CG]]AGAGTGATTTGTAGCTGCAATTGCACAAGAGAA[CG]ATTCCATTCACA TGAA
SEQ ID NO: 743 CCAAGTCTGCAGAAAAAAAATAAATGAAGTCTGCCTATCTC[CG]GGCCAGAGCCCCTCCCCT[CG]GCC[CG][CG][CG]GGAGGAGTGTGACCCAGGTGC[CG]CTTCCTCT[CG]C[CG]C[CG]AGGGTCAGGAGCC[CG]GGAG[CG][CG] ACCCTCCCC[CG]GCC[CG]GCCTGGCC[CG]GCCTGGCCAGTCCC[CG][CG]GTCTCTGCC[CG]GGCTGA[[CG]]CCC AGGAATGTGGT[CG]A[CG]AGAAGCCCCAACAGCA[CG]G[CG]TGGCCTCTCAGCCT[CG]GTGAGTACC[CG]C[C G]TGGGGAAGGGTCCTGGGGACCCACTGGAGGC[CG][[CG]]GCC[CG]CAGCAGCCAGGGGC[CG]AGCCA[CG]G CCA[CG]GA[CG]CCCTGGTGTCC[CG]GTC[CG]TGC[CG]GGCCTCCAGG[CG]GAGGAGG[CG]TC[CG]CTGGGCTC AGATCCC[CG]ACTCCAGCCC[CG]GTTCCC[CG]G[CG]CCTGGGCTG[CG][CG]GAGTCCCTGTCC[CG][CG]TCC[C G]GACCCCTA[CG][[CG]]CAGCCTCCA[CG][CG]CTC[CG]AGCTGGAGAAGC[CG]CCAGCC[CG]CCCTCCCAGGG[CG]TGT[CG]CC[CG]CTTTCTGTTTCTTTGTG[CG]GGGCATGTGAAATGTGTGGGGCCAGAATTGTCTCCCTAAAG AACA
SEQ ID NO: 744 GGTTAGAAAAG[CG]TGGTTCTTG[CG]CAGGAAAGTTGGAGCAAAGAAGAGTTCAGAAGTGGG[CG]GGTGTGT GTTTAAAAAAAAAAAAGGGGGTGGAAACCCCACCAGCCAAGTCTGCAGAAAAAAAATAAATGAAGTCTGCCT ATCTC[CG]GGCCAGAGCCCCTCCCCT[CG]GCC[CG][CG][CG]GGAGGAGTGTGACCCAGGTGC[CG]CTTCCTCT[CG]C[CG]C[CG]AGGGTCAGGAGCC[CG]GGAG[CG][CG]ACCCTCCCC[CG]GCC[CG]GCCTGGCC[CG]GCCTGGC CAGTCCC[CG][CG]GTCTCTGCC[CG]GGCTGA[[CG]]CCCAGGAATGTGGT[CG]A[CG]AGAAGCCCCAACAGCA[CG]G[CG]TGGCCTCTCAGCCT[CG]GTGAGTACC[CG]C[CG]TGGGGAAGGGTCCTGGGGACCCACTGGAGGC[CG]][CG]]GCC[CG]CAGCAGCCAGGGGC[CG]AGCCA[CG]GCCA[CG]GA[CG]CCCTGGTGTCC[CG]GTC[CG]TGC[CG]GGCCTCCAGG[CG]GAGGAGG[CG]TC[CG]CTGGGCTCAGATCCC[CG]ACTCCAGCCC[CG]GTTCCC[CG]G[CG]C CTGGGCTG[CG][CG]GAGTCCCTGTCC[CG][CG]TCC[CG]GACCCCTA[CG][[CG]]CAGCCTCCA[CG][CG]CTC[CG] AGC
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SEQ ID NO: 747
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SEQ ID NO: 748
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SEQ ID NO: 749
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SEQ ID NO: 750
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SEQ ID NO: 751
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CATTT[CG]GTTC

SEQ ID NO: 752
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CA[CG]CTCAC

SEQ ID NO: 753
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SEQ ID NO: 754
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SEQ ID NO: 755
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SEQ ID NO: 756
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SEQ ID NO: 757
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SEQ ID NO: 758
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SEQ ID NO: 759
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SEQ ID NO: 760
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SEQ ID NO: 761
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SEQ ID NO: 762
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]AGTTTCTTGAATGAAGTCCCCCCAGCATGGC[CG]TTGCCATG[CG]GGTCCTGGGTTGTGGAGAGATG[CG]G[C
G]GTACTTGC[CG]ACAG[CG]G[CG]G[[CG]]CTTGGGGTCCTGGGCTCC[CG]GCCA[CG]CTACAT[CG]C[CG]GTCT
GGGAG[CG]C[CG]GAGA[CG][CG]TCTGATCC[CG]CC[CG]C[CG]GGCAGAGTTG[CG]GGCTT[CG]CT[CG]GCT[CG
]GGGTTCCCCA[CG]ATCTCTCACCCTGTGTTT[CG]G[CG]GAGTTG[CG]GGGGTTCCCTCTGCTCC[[CG]]GGTCCC
TGAGATCCCTGATCC[CG]CTCTCAGGGCAGGGAATTC[CG]GGGTT[CG]CCCCTCTGGGCTTCCC[CG][CG]ATCC
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SEQ ID NO: 763
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]GGGTTCCCCA[CG]ATCTCTCACCCTGTGTTT[CG]G[CG]GAGTTG[CG]GGGGTTCCCTCTGCTCC[[CG]]GGTCCC
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SEQ ID NO: 764
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SEQ ID NO: 765
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TCCCAC[CG]GGCTG[CG]GGTG[CG]ATTTGGAGCTT[CG]TGGC[CG]ATGAAGAAAGC[CG][CG]GTTTAGAGCTT
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SEQ ID NO: 766
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SEQ ID NO: 767

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TCCCAC[CG]GGCTG[CG]GGTG[CG]ATTTGGAGCTT[CG]TGGC[CG]ATGAAGAAAGC[CG]|CG]GTTTAGAGCTT
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SEQ ID NO: 768

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CG]AATG[CG]TCCTCCTGG[CG]GTGATGGCTCTGGAC[|CG]|[CG]|CG]GC[CG]CAGTGTGC[CG]CC[CG]CTG[CG]
CTATG[CG]GGGCT[CG]TCTCCC[CG]|CG]CCTATGT[CG]CA[|CG]|CTGGCCAG[|CG]|CCTCCTGGCTAAG[CG]GC
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TAC[CG]AGAACCAGATGTT[|CG]|C[CG]CC[|CG]||[CG]|TGGTCATCCTGCTGCTGC[|CG]|TTTGC[|CG]|TCATCC
TGGCCTCCTA[CG]GTGC[CG]TGGCC[CG]AGCTGTCTGTTGCATG[CG]GTTCAG[CG]GAGGC[|CG]|GAGGAGGG[
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SEQ ID NO: 769

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GCTGCTGG[|CG]|GTG[|CG]|||CG]|ACC[CG]|||CG]|CCTGCACA[|CG]|CCCATGTACTACTTCCTCTGCCACCTGGC
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TGCTGGACCACTTCATCTGTGAGCTGC[CG]G[CG]TTGCTCAAGCTGGCCTG[CG]GAGG[CG]A[|CG]|GAGACAC
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SEQ ID NO: 770

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TAC[CG]AGAACCAGATGTT[|CG]|C[CG]CC[|CG]||[CG]|TGGTCATCCTGCTGCTGC[|CG]|TTTGC[|CG]|TCATCC
TGGCCTCCTA[CG]GTGC[CG]TGGCC[CG]AGCTGTCTGTTGCATG[CG]GTTCAG[CG]GAGGC[|CG]|GAGGAGGG[
CG]GTGGGCA[CG]TGTGGGTCCCACCTGACAGC[CG]TCTGCCTGTTCTA[|CG]|GCT[|CG]|GCCATCTACACCTA
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SEQ ID NO: 771
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SEQ ID NO: 772
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SEQ ID NO: 773
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SEQ ID NO: 774
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SEQ ID NO: 775
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TGGCCTCCTA[CG]GTGC[CG]TGGCC[CG]AGCTGTCTGTTGCATG[CG]GTTCAG[CG]GAGGC[[CG]]GAGGAGGG[
CG]GTGGGCA[CG]TGTGGGTCCCACCTGACAGC[CG]TCTGCCTGTTCTA[[CG]]GCT[[CG]]G[[CG]]][[CG]]][[CG]]][[
CG]]

SEQ ID NO: 776
GTCTTCCCCTTCTTCTCTTTGCTAAA[CG]ACCCCTCCAAGATAATTTTTAAAAAACCTTCTCCTTTGCTCACCTTT
GCTTCCCAGCCTTCCCATCCCCCCCAC[CG]AAAGCAAATCATTCAA[CG]ACCCC[CG]ACCCTC[CG]A[CG]GCAG
GAGCCCCC[CG]ACCTCCCAGG[CG]GAC[CG]CCCTCCCTCCC[CG][CG][CG][CG]GGTTC[CG]GGCC[CG]G[CG]A
GAGGG[CG][CG]AGCACAGC[CG]AGGCCATGGAGGTGA[CG]G[CG]GACCAGC[[CG]][CG]CTGGGTGAGCCACC
ACCACCC[CG]C[CG]TGCTCAA[CG]GGCAGCACC[[CG]]GACA[CG]CACCACC[CG]GGCCTCAGCCACTCCTACA
TGGA[CG][CG]G[CG]CAGTACC[CG]CTGC[CG]GAGGAGGTGGATGTGCTTTTTAACAT[CG]A[CG]GTCAAGGCA
ACCA[CG]TCC[CG]CCCTACTA[CG]GAAACT[CG]GTCAGGGCCA[CG]GTGCAGAGGTACCCTC[CG]ACCCACCA[
CG]GTGAGTG[CG]CC[CG]GGGTGC[CG]GGGCTCC[CG]C[CG]GC[CG]CTTCAGC[CG]TCC[CG]GCT[CG]GGGAG
GT[CG]GGAGGGACCTGAGGG[CG]GGGAGAGGTCAAG[CG]AAAGCCCCCATCTGC[CG]TTCCTGGTTCATTTA

SEQ ID NO: 777
GTCTTCCCCTTCTTCTCTTTGCTAAA[CG]ACCCCTCCAAGATAATTTTTAAAAAACCTTCTCCTTTGCTCACCTTT
GCTTCCCAGCCTTCCCATCCCCCCCAC[CG]AAAGCAAATCATTCAA[CG]ACCCC[CG]ACCCTC[CG]A[CG]GCAG
GAGCCCCC[CG]ACCTCCCAGG[CG]GAC[CG]CCCTCCCTCCC[CG][CG][CG][CG]GGTTC[CG]GGCC[CG]G[CG]A
GAGGG[CG][CG]AGCACAGC[CG]AGGCCATGGAGGTGA[CG]G[CG]GACCAGC[[CG]][CG]CTGGGTGAGCCACC
ACCACCC[CG]C[CG]TGCTCAA[CG]GGCAGCACC[[CG]]GACA[CG]CACCACC[CG]GGCCTCAGCCACTCCTACA
TGGA[CG][CG]G[CG]CAGTACC[CG]CTGC[CG]GAGGAGGTGGATGTGCTTTTTAACAT[CG]A[CG]GTCAAGGCA
ACCA[CG]TCC[CG]CCCTACTA[CG]GAAACT[CG]GTCAGGGCCA[CG]GTGCAGAGGTACCCTC[CG]ACCCACCA[
CG]GTGAGTG[CG]CC[CG]GGGTGC[CG]GGGCTCC[CG]C[CG]GC[CG]CTTCAGC[CG]TCC[CG]GCT[CG]GGGAG
GT[CG]GGAGGGACCTGAGGG[CG]GGGAGAGGTCAAG[CG]AAAGCCCCCATCTGC[CG]TTCCTGGTTCATTTA

SEQ ID NO: 778
TCCCTTTGCCCCCTACA[CG][CG]TGTTCT[CG]TCAACAGATCTCCAGAGGTGGTGCAGAAA[CG]ACCC[CG][CG]
C[CG]G[CG]CCCCATCCTG[[CG]]GCCAGTGCCTC[CG][[CG]]CCC[CG]GCTC[CG]GTCCCCAC[CG]TCCC[CG]CCC
CAGATTTC[CG]GAGGAGCAGG[CG]GG[CG]GGGTCC[CG][CG]GGGC[CG]GCTGC[CG]TCAG[CG]CCCCTTCC[C
G]G[CG]GC[CG][[CG]]ACCCCTCCC[CG]CTGACCTCACT[CG]AGC[CG]C[CG]CCTGG[CG]CAGATATAAG[CG]G[
CG]GCCCATCTGAAGAGGGCT[CG]GCAGG[CG]CC[CG]GGGTCCTCAG[[CG]]CTGCAGACTCCTGACCTGC[CG]
ACTG[[CG]]GATCC[CG]AGTCCC[CG]GATCC[CG]GACCCATCCTGTGGAGCCCACTCCTGGCAGGTAAC[CG]CC
CCAACCCCTCTCCTTC[CG]CAGA[CG]GTGTC[CG]GGAGCACTGGAAAGGGAGCCCTCT[CG]GCC[CG]CCCTCA
CCTT[CG]GTTCTCTGAGAGCTTCCTGGAGAACAGGGC[CG]GTGCACAGG[[CG]]GG[CG]CTGTGCT[CG]CACCC
C[CG]GGTCCTCCC[CG]AG[CG]CAGGC[CG]GGGACC[CG]A[CG]GGAGGCA[CG]G[CG][CG]GGCACAT[CG]GAG
GCTCT[CG]CTGCTG

SEQ ID NO: 779
TCCCTTTGCCCCCTACA[CG][CG]TGTTCT[CG]TCAACAGATCTCCAGAGGTGGTGCAGAAA[CG]ACCC[CG][CG]C[CG]G[CG]CCCCATCCTG[[CG]]GCCAGTGCCTC[CG][[CG]]CCC[CG]GCTC[CG]GTCCCCAC[CG]TCCC[CG]CCCCAGATTTC[CG]GAGGAGCAGG[CG]GG[CG]GGGTCC[CG][CG]GGGC[CG]GCTGC[CG]TCAG[CG]CCCCTTCC[CG]G[CG]GC[CG][[CG]]ACCCCTCCC[CG]CTGACCTCACT[CG]AGC[CG]C[CG]CCTGG[CG]CAGATATAAG[CG]G[CG]GCCCATCTGAAGAGGGCT[CG]GCAGG[CG]CC[CG]GGGTCCTCAG[[CG]]CTGCAGACTCCTGACCTGC[CG]ACTG[[CG]]GATCC[CG]AGTCCC[CG]GATCC[CG]GACCCATCCTGTGGAGCCCACTCCTGGCAGGTAAC[CG]CCCCAACCCCTCTCCTTC[CG]CAGA[CG]GTGTC[CG]GGAGCACTGGAAAGGGAGCCCTCT[CG]GCC[CG]CCCTCACCTT[CG]GTTCTCTGAGAGCTTCCTGGAGAACAGGGC[CG]GTGCACAGG[[CG]]GG[CG]CTGTGCT[CG]CACCCC[CG]GGTCCTCCC[CG]AG[CG]CAGGC[CG]GGGACC[CG]A[CG]GGAGGCA[CG]G[CG][CG]GGCACAT[CG]GAGGCTCT[CG]CTGCTG

SEQ ID NO: 780
TGCTGAGGATGACAGGGAGC[CG]GGAGC[CG]GAGGATGGAGGATGGTGCAGGCTGGGGAGATGC[CG]GTACCTTTCCCTGGGTCATGGTGC[[CG]]TCTCT[[CG]]GGGAAGGGGTCCCTGAGGCC[CG]GGTGGC[CG]CTTGGGTAAC[CG]CAGCCTGCCTG[CG]TCTCTTCCTTCCTC[CG][CG]TGGGTTCTAGCAACATCCACTGCAGC[CG]GGCCAGG[CG]AGC[CG]G[CG][CG]TACCAT[CG]G[CG][CG]GGGGGAGGAGAGGGC[CG]GGCCTGGGAAGATGCTG[CG]GAGGA[CG]CTG[CG]GATT[CG][[CG]]AGCC[CG]GGGTAAGG[[CG]]G[CG]G[CG]CAC[CG]CCCCCTCC[CG]C[CG]CTTCCCCCCCACCC[CG]CCCCCCAC[CG]C[CG]CCCTTAGCCCTCCCC[CG]GGATGAGAGAGAGT[CG][CG]CTG[CG]GAGCAACCCCAGTGGATGGGTC[CG][CG]GGGGCTGAG[CG]GG[CG]GAGGA[CG][CG]GGAACTC[[CG]]TGACAC[CG]ACCAGCTGA[CG]CTGCC[CG][CG]TGAAACCAGAGC[CG]GGCATCAGGGCCTCATCTCCACTGTCTCTGCACCTCTCTGCAGCTCCAGCTG[CG]CCTCTGCCTTTTCCTCCTCCCTCTTTGGATG[CG]GCCCTGATTTCTGTCTC

SEQ ID NO: 781
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SEQ ID NO: 782
AG[CG]AGT[CG]TCTGCATG[CG]G[CG]G[CG]AAG[CG]CC[CG]GGCCCC[CG]TC[CG][CG]C[CG]GTGCC[CG]CAG[CG][CG]CAGCAACTTGGC[CG]C[CG]GGTCC[CG]GC[CG]CCC[CG]GTAGAGGCTGGGTACAG[CG]AGGGGGC[CG]GG[CG]CC[CG]GGCAGGA[CG]GG[CG][CG]G[CG]GGTGGGGCCTGGC[CG]TCTCCCCCTGCCCT[CG]GGGC[CG]AACA[CG]CACAG[CG]AGAGTCTAG[CG]T[CG]G[CG]TGGCTG[CG]GCCAGC[CG]GGTCCCCCTGGAGGCCTC[CG]GA[CG]AT[CG]GAAGTGACTGAG[CG]TC[CG]GGTC[CG]TGAGGC[CG]GGGGT[[CG]]GCC[[CG]]CCCTAAGACTCCCACCTGGTCC[CG]GTTCTC[CG]TC[CG]CTAGGCTGGC[CG][CG]GGGCCCCTGGGGCC[CG]ACCTTCC[CG]GGGTGCCCCAACCTG[CG]GCAAGGC[CG]AGGTCC[CG]CTGAGGCATGAGTCC[CG]GGT[CG]GGGAC[CG]CTCTGGGC[CG]ACCCC[CG]GAGGA[CG]GACTAGGC[CG]ATCCCCAGAGGGAAGGGGGCCAGGC[CG]AGGCCATGGCAG[CG][CG]TTCCCTGATCC[CG]TGTTCT[CG]GCTCCT[CG][CG]TCCCACTAT[CG]GCTGTCCCTTT[CG]TG[CG]GGACTGA[CG]GCTCACAGAA

SEQ ID NO: 783
AG[CG]AGT[CG]TCTGCATG[CG]G[CG]G[CG]AAG[CG]CC[CG]GGCCCC[CG]TC[CG][CG]C[CG]GTGCC[CG]CAG[CG][CG]CAGCAACTTGGC[CG]C[CG]GGTCC[CG]GC[CG]CCC[CG]GTAGAGGCTGGGTACAG[CG]AGGGGGC[CG]GG[CG]CC[CG]GGCAGGA[CG]GG[CG][CG]G[CG]GGTGGGGCCTGGC[CG]TCTCCCCCTGCCCT[CG]GGGC[CG]AACA[CG]CACAG[CG]AGAGTCTAG[CG]T[CG]G[CG]TGGCTG[CG]GCCAGC[CG]GGTCCCCCTGGAGGCCTC[CG]GA[CG]AT[CG]GAAGTGACTGAG[CG]TC[CG]GGTC[CG]TGAGGC[CG]GGGGT[[CG]]GCC[[CG]]CCCTAAGACTCCCACCTGGTCC[CG]GTTCTC[CG]TC[CG]CTAGGCTGGC[CG][CG]GGGCCCCTGGGGCC[CG]ACCTTCC[CG]GGGTGCCCCAACCTG[CG]GCAAGGC[CG]AGGTCC[CG]CTGAGGCATGAGTCC[CG]GGT[CG]GGGAC[CG]CTCTGGGC[CG]ACCCC[CG]GAGGA[CG]GACTAGGC[CG]ATCCCCAGAGGGAAGGGGGCCAGGC[CG]AGGCCATGGCAG[CG][CG]TTCCCTGATCC[CG]TGTTCT[CG]GCTCCT[CG][CG]TCCCACTAT[CG]GCTGTCCCTTT[CG]TG[CG]GGACTGA[CG]GCTCACAGAA

SEQ ID NO: 784
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CCCAATTGCCAAGGGGGTCCCTGGGGG[CG]G[CG]GGAAGGGGGGTAG[CG]GCCTCAGGGTCTTGGGGGTGCT
GAGGGGCAGAAAGGGGCAAAGGAG[CG]TGGAGGAG[CG]GAAGT[CG]AGAGTGGGACAGAAGTGGAG[CG]CT
GGG[CG]GCAA[CG]AGGAAACTAAAGCCACAGAAGCC[CG]G[[CG]]CAGGG[CG]GGAAG[CG]TGGGAAGGCCC
CTTCCTT[CG][CG]G[[CG]]AGGTGCCCCCCT[CG]CC[[CG]]AAA[CG]C[CG]GCCCAGGCC[CG]CCTC[CG]GCTCCC
AGGC[CG]TCACCTCCTCCTCCCC[CG]C[CG][CG]GGTCATCCACTGG[CG]TC[CG]CT[CG]GTGGGCCT[CG][CG]G
CCTGG[CG]GCCTGGAG[CG]TACCAC[CG][CG]G[CG]GAG[CG]G[CG]GGTTGGGG[CG]T[CG]CA[CG]GTGAGAA
AGGC[CG]GGGCCTGAGAACAAAC[[CG]]C[[CG]][CG]GT[CG]C[CG]GGGCAA[CG]GGA[CG]GGGCA[CG]TGCCC
CCCC[CG]CCAGAGC[CG]GAAG[CG]GCAGGCT[CG]TG[CG]TCCCTCCTGAGCT[CG]AAGCCAACCAGGCCT[CG]
AG[CG]GCT[CG]CTGC

SEQ ID NO: 785
GTCTGGCATTTTGCTGATGGTATCTGGGTGAGGGAGAAAGG[CG]TGTTGTTGG[CG]T[CG]GGGAAGGGGCCTC
CCCAATTGCCAAGGGGGTCCCTGGGGG[CG]G[CG]GGAAGGGGGGTAG[CG]GCCTCAGGGTCTTGGGGGTGCT
GAGGGGCAGAAAGGGGCAAAGGAG[CG]TGGAGGAG[CG]GAAGT[CG]AGAGTGGGACAGAAGTGGAG[CG]CT
GGG[CG]GCAA[CG]AGGAAACTAAAGCCACAGAAGCC[CG]G[[CG]]CAGGG[CG]GGAAG[CG]TGGGAAGGCCC
CTTCCTT[CG][CG]G[[CG]]AGGTGCCCCCCT[CG]CC[[CG]]AAA[CG]C[CG]GCCCAGGCC[CG]CCTC[CG]GCTCCC
AGGC[CG]TCACCTCCTCCTCCCC[CG]C[CG][CG]GGTCATCCACTGG[CG]TC[CG]CT[CG]GTGGGCCT[CG][CG]G
CCTGG[CG]GCCTGGAG[CG]TACCAC[CG][CG]G[CG]GAG[CG]G[CG]GGTTGGGG[CG]T[CG]CA[CG]GTGAGAA
AGGC[CG]GGGCCTGAGAACAAAC[[CG]]C[[CG]][CG]GT[CG]C[CG]GGGCAA[CG]GGA[CG]GGGCA[CG]TGCCC
CCCC[CG]CCAGAGC[CG]GAAG[CG]GCAGGCT[CG]TG[CG]TCCCTCCTGAGCT[CG]AAGCCAACCAGGCCT[CG]
AG[CG]GCT[CG]CTGC

SEQ ID NO: 786
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AGGAGGGT[CG]GGAGGGTCTCAGCCCCCTCCTTGCTCCCAGGCTTCCACTCCTTGAGGTATTTCCACACCACCA
TGTCC[CG]GCC[CG]GC[CG][CG][CG]GATCCC[CG]CTTCCTCTC[CG]TGGG[CG]A[CG]TGGA[CG]ACA[CG]CAGT
G[CG]TG[CG]GCT[CG]ACAG[CG]A[CG]CCA[CG]AGTCCCAGGATGGAGC[CG][CG]GG[CG]C[CG]TGGATGGAG
CAGGAGGGGC[CG]GAATATTGGGAAGAGGAGACAGGGAC[[CG]]CCAAGGCCAAAGCACAGTTTTAC[[CG]]AG
TGAACCTG[[CG]]GACCCTGAG[CG]GCTACTACAACCAGAGTGAGGCCTGTGAGTGACAC[[CG]]GC[CG]GGGG[[
CG]]CAGGTCACTACCCCTCCACATCCCCCA[CG]GAC[CG]CC[CG]GGTCTCCC[CG]AGTCTCTGGGTC[CG]AGAT
CCA[CG]C[CG]AGGCAG[CG]GGACCTGGAGACCCTTGACC[[CG]]GGAGAGGCCCAGGAGC[CG]TTACC[CG]GTT
TCATTTTCAGCCAAAATCCC[CG]CAGGTTGGTCCTGG[[CG]]AGGG[CG]GGGCT[[CG]]GTGGG[[CG]]GGGCTGG
C[CG][CG]G

SEQ ID NO: 787
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AGGAGGGT[CG]GGAGGGTCTCAGCCCCCTCCTTGCTCCCAGGCTTCCACTCCTTGAGGTATTTCCACACCACCA
TGTCC[CG]GCC[CG]GC[CG][CG][CG]GATCCC[CG]CTTCCTCTC[CG]TGGG[CG]A[CG]TGGA[CG]ACA[CG]CAGT
G[CG]TG[CG]GCT[CG]ACAG[CG]A[CG]CCA[CG]AGTCCCAGGATGGAGC[CG][CG]GG[CG]C[CG]TGGATGGAG
CAGGAGGGGC[CG]GAATATTGGGAAGAGGAGACAGGGAC[[CG]]CCAAGGCCAAAGCACAGTTTTAC[[CG]]AG
TGAACCTG[[CG]]GACCCTGAG[CG]GCTACTACAACCAGAGTGAGGCCTGTGAGTGACAC[[CG]]GC[CG]GGGG[[
CG]]CAGGTCACTACCCCTCCACATCCCCCA[CG]GAC[CG]CC[CG]GGTCTCCC[CG]AGTCTCTGGGTC[CG]AGAT
CCA[CG]C[CG]AGGCAG[CG]GGACCTGGAGACCCTTGACC[[CG]]GGAGAGGCCCAGGAGC[CG]TTACC[CG]GTT
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C[CG][CG]G

SEQ ID NO: 788
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CAGCCAGTGGC[CG]GAGGAGCTGG[CG]T[CG]G[CG][CG]GAGAGC[[CG]]C[CG]TGCTGGGG[CG]C[CG]GGC[CG
]GACCAGAGCTGCTGCCCCAGCAGGG[CG]G[CG]GCAGAGG[CG]GTGAGATGCAGGTGGAAGC[CG]GAGGGAC
ATCAC[CG]GCAGG[CG]AG[CG]G[CG]GGGC[CG]GGGCATCCCAGCTCCTGCCAAGCTTGG[CG]G[CG][CG]AGG
AGGAGT[[CG]]C[CG]GG[CG]CAGCCCCCAATCACCCAGGAA[CG][CG]GGGA[[CG]]CCTGGGCCACTGCTC[CG]G
C[CG]ATGGTTCCAGAGGAAGC[CG]TCCCCTTGCTAAGGGTTCC[CG]GGAGGAGGTGAAGG[CG]C[CG][CG]GGC
TGGGGGGT[CG]G[CG]GCTGAAGACCTC[CG]GCTGCCCAGCACCTCCTT[CG][CG]CTGAC[CG]GGGACT[CG]GC
CCACAACCAAGCCATGGTGCACTGGT[CG]GGACACAACAGCAG[CG]TGAGTACCCACC[CG]G[CG]G[CG]GGT
C[CG]CCTGTTTCCTGACAC[CG]AAGGGGAATGGGGGGGTGGGTGGGAG[CG]AGGGACAGATAGTTGCT[CG]G
GGGT[CG]AGG[CG]G

SEQ ID NO: 789
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CAGCCAGTGGC[CG]GAGGAGCTGG[CG]T[CG]G[CG][CG]GAGAGC[[CG]]C[CG]TGCTGGGG[CG]C[CG]GGC[CG
]GACCAGAGCTGCTGCCCCAGCAGGG[CG]G[CG]GCAGAGG[CG]GTGAGATGCAGGTGGAAGC[CG]GAGGGAC
ATCAC[CG]GCAGG[CG]AG[CG]G[CG]GGGC[CG]GGGCATCCCAGCTCCTGCCAAGCTTGG[CG]G[CG][CG]AGG
AGGAGT[[CG]]C[CG]GG[CG]CAGCCCCCAATCACCCAGGAA[CG][CG]GGGA[[CG]]CCTGGGCCACTGCTC[CG]G
C[CG]ATGGTTCCAGAGGAAGC[CG]TCCCCTTGCTAAGGGTTCC[CG]GGAGGAGGTGAAGG[CG]C[CG][CG]GGC
TGGGGGGT[CG]G[CG]GCTGAAGACCTC[CG]GCTGCCCAGCACCTCCTT[CG][CG]CTGAC[CG]GGGACT[CG]GC
CCACAACCAAGCCATGGTGCACTGGT[CG]GGACACAACAGCAG[CG]TGAGTACCCACC[CG]G[CG]G[CG]GGT
C[CG]CCTGTTTCCTGACAC[CG]AAGGGGAATGGGGGGGTGGGTGGGAG[CG]AGGGACAGATAGTTGCT[CG]G
GGGT[CG]AGG[CG]G

SEQ ID NO: 790
GGTGGGGTGGGGTGGGCAATGGGCAATGAGA[CG]GAGGG[CG]GGGC[CG]GGACCTAATATGG[CG]GGTCAGG
AGGGTCTGGAAGA[[CG]]AAGAAGAGGGACAGGCAATGCCAGGTCTAGGACTAGGAGGGAGG[CG][CG]GG[CG
]GTATTAG[CG]GCTGGAGGAGGCTT[CG]GGAGGCC[CG]GC[CG]A[CG]GC[CG]C[CG]CCTGGTGCTACCCACCC
AGGGG[CG][CG][CG]ACCCTCCCTT[[CG]]GTCTGGCTCCAAAGACCTAGCAGCACTGACTTCACCCAGCTGTGG
TTCCAA[[CG]]G[CG]GGTCCAG[CG]GCCT[CG]GCC[CG]G[[CG]]C[CG]TCCTCCTGCTGGCCCAACAGGCC[CG]C
CAGCC[CG]CCCCTGTA[CG]TCTGTGATTGGA[CG]G[CG]G[CG]GCCACTGATGTTCAAG[CG]ACAGGTCCTGGC
C[[CG]]GGAGCCAATCTGCAGGTGTTGAGGCCCAGGCTC[CG]AGAG[CG]GGC[CG]AGGAGG[CG]TGGATACCC
TGATTCCTAGGGGGCAGGCCTGGTTCCCC[CG]AGGAGGACC[CG]GCCTATGAATGACTGGAGTTCTGGGGTTC
TGGC[CG]AAAGAGGAAGTGGGACAGGGC[CG]GGTGTGATGGGGCCTAGAGTCACAGAGCCTTG[CG]GC

SEQ ID NO: 791
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AGGGTCTGGAAGA[[CG]]AAGAAGAGGGACAGGCAATGCCAGGTCTAGGACTAGGAGGGAGG[CG][CG]GG[CG
]GTATTAG[CG]GCTGGAGGAGGCTT[CG]GGAGGCC[CG]GC[CG]A[CG]GC[CG]C[CG]CCTGGTGCTACCCACCC
AGGGG[CG][CG][CG]ACCCTCCCTT[[CG]]GTCTGGCTCCAAAGACCTAGCAGCACTGACTTCACCCAGCTGTGG
TTCCAA[[CG]]G[CG]GGTCCAG[CG]GCCT[CG]GCC[CG]G[[CG]]C[CG]TCCTCCTGCTGGCCCAACAGGCC[CG]C
CAGCC[CG]CCCCTGTA[CG]TCTGTGATTGGA[CG]G[CG]G[CG]GCCACTGATGTTCAAG[CG]ACAGGTCCTGGC
C[[CG]]GGAGCCAATCTGCAGGTGTTGAGGCCCAGGCTC[CG]AGAG[CG]GGC[CG]AGGAGG[CG]TGGATACCC
TGATTCCTAGGGGGCAGGCCTGGTTCCCC[CG]AGGAGGACC[CG]GCCTATGAATGACTGGAGTTCTGGGGTTC
TGGC[CG]AAAGAGGAAGTGGGACAGGGC[CG]GGTGTGATGGGGCCTAGAGTCACAGAGCCTTG[CG]GC

SEQ ID NO: 792
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GGTGCCAGCTCC[CG]CAGCTCAATGAGCTCAGGCTCCCC[CG]ACATGGCC[CG]GTTGGGCC[CG]TGCTT[CG]CT
GGCTTTGGG[CG]CTAGCAAG[CG][CG]GGC[CG]GG[CG]GGGCCACAGGG[CG]GGCCC[CG]ACTTCAG[CG]CCTC
CCCCAGGATCCAGACTGGG[CG]G[CG]GGAAGGAGCTGAGGAGAGC[CG][CG]CAATGGAAACCTGGGTGCAGG
GACTGTGGGGCC[[CG]]AAGG[[CG]]GGGCTGGG[[CG]][[CG]]CTCT[[CG]]CAGAGCCCCCCC[CG]CCTTGCCCTT
CCTTCCCTCCTT[CG]TCCCCTCCTCACACCCCACCC[CG]GA[CG]GCCACAA[CG]A[CG]G[CG]AC[CG]CAAAGCA
CCA[[CG]][[CG]]GAGATACC[CG]TGTTTCTGGAGGCCAGCTTTACTGTGCTAGAGGAAGAGGGTCCCCACATC[C
G]GCCCTGGCCCTCCTGGTC[[CG]]GTTTGCTGAAGCAACACACTTGGCCTACCCACTGGGTGGGGCAGGAAGTC
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SEQ ID NO: 793
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GGCTTTGGG[CG]CTAGCAAG[CG][CG]GGC[CG]GG[CG]GGGCCACAGGG[CG]GGCCC[CG]ACTTCAG[CG]CCTC
CCCCAGGATCCAGACTGGG[CG]G[CG]GGAAGGAGCTGAGGAGAGC[CG][CG]CAATGGAAACCTGGGTGCAGG
GACTGTGGGGCC[[CG]]AAGG[[CG]]GGGCTGGG[[CG]][[CG]]CTCT[[CG]]CAGAGCCCCCCC[CG]CCTTGCCCTT
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SEQ ID NO: 794
[CG]CTGCAGATCAA[CG]C[CG]GTGGCAAGAAGGGGC[CG]CAAGGGTTTC[CG]CAGACACCCACACATGCAGG[[CG]]TTCCCACAGAGGGTACCAGGGATTTCCCAGACCCCCACCAGCCCTCAGGAATAG[CG]TAGAGAGAGGAA[CG]T[CG]CCTGGCTGAGAAAGGTGGATGGGCATACCCATGTACCTTTGTGTATTAAGTACCCACAACCTC[CG]AACTTAGC[CG]TCCCTGTCC[[CG]]GCC[CG]CCCAACTGCTGC[CG]C[CG]CATCTGCAGAAACCACT[CG]TGTTGAGGCCT[CG]GAGCAGC[CG]GGAGCACCA[[CG]]CTGGAGCAAAAAAGC[CG]GAGGG[CG]CAGGGCTCCAGCC[CG]GCTGACCATCCCACCCAG[CG]CAGGGACCAA[CG]GAAAACC[CG][CG][CG]G[CG]CCAGGACCAGGGGGCTGCC[CG]A[[CG]]C[CG]CT[CG][CG]GACTAGTTCCTCAGACTGTGGGACTCCCTAGTGC[CG]GCTTTGCCCAGGGCTTTCCAAGGCTGTCTCATGCCCTAGATCTGCCCCAGCAGCTCAGGCCTTGGACTG[CG]AACCCAGTATCC[CG]AGACAC[CG]ATTCCATCAGTCCCCATCC[CG]ACCCCTCTCCAGC[CG]GGTTCATC[CG]CCT

SEQ ID NO: 795
[CG]CTGCAGATCAA[CG]C[CG]GTGGCAAGAAGGGGC[CG]CAAGGGTTTC[CG]CAGACACCCACACATGCAGG[[CG]]TTCCCACAGAGGGTACCAGGGATTTCCCAGACCCCCACCAGCCCTCAGGAATAG[CG]TAGAGAGAGGAA[CG]T[CG]CCTGGCTGAGAAAGGTGGATGGGCATACCCATGTACCTTTGTGTATTAAGTACCCACAACCTC[CG]AACTTAGC[CG]TCCCTGTCC[[CG]]GCC[CG]CCCAACTGCTGC[CG]C[CG]CATCTGCAGAAACCACT[CG]TGTTGAGGCCT[CG]GAGCAGC[CG]GGAGCACCA[[CG]]CTGGAGCAAAAAAGC[CG]GAGGG[CG]CAGGGCTCCAGCC[CG]GCTGACCATCCCACCCAG[CG]CAGGGACCAA[CG]GAAAACC[CG][CG][CG]G[CG]CCAGGACCAGGGGGCTGCC[CG]A[[CG]]C[CG]CT[CG][CG]GACTAGTTCCTCAGACTGTGGGACTCCCTAGTGC[CG]GCTTTGCCCAGGGCTTTCCAAGGCTGTCTCATGCCCTAGATCTGCCCCAGCAGCTCAGGCCTTGGACTG[CG]AACCCAGTATCC[CG]AGACAC[CG]ATTCCATCAGTCCCCATCC[CG]ACCCCTCTCCAGC[CG]GGTTCATC[CG]CCT

SEQ ID NO: 796
ATAAATATTAATGTCAGCAAGAGTGTGCTGTTGGCAGGA[CG]TAT[CG][CG]AGCCTGGAGATTTTGGTGGC[CG]CAGTTGGTAAGTGGCTACAATCCAGAAAGTAGGAT[CG]AGTTGCTCCCCTTGTCTTATCAGTGTAT[CG]TTTCT[CG]GG[[CG]][CG]GGTCTAACACCTTACAAGTGGTAATTTC[CG]CTCA[CG]GCAGCTTTGTCTCTCTTCTACCATCCCCAGACCCAGCCTTGCACTCCAAGGCTG[CG]CAC[CG]CCAGCCACTATCATGTCCACTCC[CG]GGGTCAATT[CG]TC[CG]CCTCCTTGAGCCC[[CG]]AC[CG]GCTGAACAGCCCAGTGACCATCC[CG]G[CG]GTGATGTTCATCTT[CG]GGGTGGTGGGCAACCTGGTGGCCAT[CG]TGGTGCTGTGCAAGT[CG][CG]CAAGGAGCAGAAGGAGA[CG]ACCTTCTACA[CG]CTGGTATGTGGGCTGGCTGTCAC[CG]ACCTGTTGGGCACTTTGTTGGTGAGCC[CG]GTGACCAT[CG]CCA[CG]TACATGAAGGGCCAATGGCC[CG]GGGGCCAGC[CG]CTGTG[CG]AGTACAGCACCTTCATTCTGCTCTTCTTCAGCCTGTC[CG]GCCTCAGCATCATCTG[CG]CCATGAG

SEQ ID NO: 797
ATAAATATTAATGTCAGCAAGAGTGTGCTGTTGGCAGGA[CG]TAT[CG][CG]AGCCTGGAGATTTTGGTGGC[CG]CAGTTGGTAAGTGGCTACAATCCAGAAAGTAGGAT[CG]AGTTGCTCCCCTTGTCTTATCAGTGTAT[CG]TTTCT[CG]GG[[CG]][CG]GGTCTAACACCTTACAAGTGGTAATTTC[CG]CTCA[CG]GCAGCTTTGTCTCTCTTCTACCATCCCCAGACCCAGCCTTGCACTCCAAGGCTG[CG]CAC[CG]CCAGCCACTATCATGTCCACTCC[CG]GGGTCAATT[CG]TC[CG]CCTCCTTGAGCCC[[CG]]AC[CG]GCTGAACAGCCCAGTGACCATCC[CG]G[CG]GTGATGTTCATCTT[CG]GGGTGGTGGGCAACCTGGTGGCCAT[CG]TGGTGCTGTGCAAGT[CG][CG]CAAGGAGCAGAAGGAGA[CG]ACCTTCTACA[CG]CTGGTATGTGGGCTGGCTGTCAC[CG]ACCTGTTGGGCACTTTGTTGGTGAGCC[CG]GTGACCAT[CG]CCA[CG]TACATGAAGGGCCAATGGCC[CG]GGGGCCAGC[CG]CTGTG[CG]AGTACAGCACCTTCATTCTGCTCTTCTTCAGCCTGTC[CG]GCCTCAGCATCATCTG[CG]CCATGAG

SEQ ID NO: 798
GGGAAGTAAA[CG]GCCCCAA[CG]CAAGCCTGACTG[CG]AGA[CG]TGCCCAAGGGAGGTAGGT[CG]AATGAAGAGGGTTGTGTGAGTTTTG[CG][CG]GGCAGG[CG]GGATAA[CG]GAGGAGGGAGGCC[CG][CG]GC[CG]AGGCT[CG]GG[CG]GG[CG]GGGGGCAGGGAGGGG[CG]GGGTT[CG]C[CG]G[CG][CG]CACTCCCAGGCAGGCCC[CG]CCCCCT[CG]GC[CG]GCTGTG[CG][CG]CTGATTGGCCCCTGC[CG]GCCT[CG][CG]CTCCCT[CG]CTC[CG]GGTTGG[CG]GGAGACCTTAGAG[CG]GGTAC[CG]CTGCTGGCTAG[CG]AC[CG]A[[CG]]AGCAAC[CG]TCTGAGGCCAGGAG[CG]CTG[CG]A[CG]GAGCCTTGAC[CG]C[CG]TTGCC[[CG]]GCCCTCTCC[CG][CG]CAGCCC[CG]GGCTTC[CG]CAGGTACCTGTGCT[CG]CCCC[CG]GGAAGGGGCCT[CG]CAGG[CG]AATCTCCAGTTT[CG]AGTGTGCC[CG]GTCCCTGGGTT[CG]CT[CG]C[CG]G[[CG]]ACCCCAC[CG]CC[CG]CCTTAGATGAGAAGGCAG[CG]CTCCAGCCT[CG]TCCTCA[CG]C[CG]CCTCC[CG]TGGG[CG]CCCTCAGCTGCCTT[CG][CG]G[CG]A[CG]ACACA[CG][CG]CTCCC[CG]CAG[CG]GGCTCTGGGCTGAG

SEQ ID NO: 799
GGGAAGTAAA[CG]GCCCCAA[CG]CAAGCCTGACTG[CG]AGA[CG]TGCCCAAGGGAGGTAGGT[CG]AATGAAG
AGGGTTGTGTGAGTTTTG[CG][CG]GGCAGG[CG]GGATAA[CG]GAGGAGGGAGGCC[CG][CG]GC[CG]AGGCT[C
G]GG[CG]GG[CG]GGGGGCAGGGAGGGG[CG]GGGTT[CG]C[CG]G[CG][CG]CACTCCCAGGCAGGCCC[CG]CCCC
CT[CG]GC[CG]GCTGTG[CG][CG]CTGATTGGCCCCTGC[CG]GCCT[CG][CG]CTCCCT[CG]CTC[CG]GGTTGG[CG]
GGAGACCTTAGAG[CG]GGTAC[CG]CTGCTGGCTAG[CG]AC[CG]A[[CG]]AGCAAC[CG]TCTGAGGCCAGGAG[C
G]CTG[CG]A[CG]GAGCCTTGAC[CG]C[CG]TTGCC[[CG]]GCCCTCTCC[CG][CG]CAGCCC[CG]GGCTTC[CG]CAG
GTACCTGTGCT[CG]CCCC[CG]GGAAGGGGCCT[CG]CAGG[CG]AATCTCCAGTTT[CG]AGTGTGCC[CG]GTCCCT
GGGTT[CG]CT[CG]C[CG]G[[CG]]ACCCCAC[CG]CC[CG]CCTTAGATGAGAAGGCAG[CG]CTCCAGCCT[CG]TCC
TCA[CG]C[CG]CCTCC[CG]TGGG[CG]CCCTCAGCTGCCTT[CG][CG]G[CG]A[CG]ACACA[CG][CG]CTCCC[CG]CA
G[CG]GGCTCTGGGCTGAG

SEQ ID NO: 800
C[CG][CG]GGG[CG]GG[CG]GG[CG]G[CG]C[CG]CAAG[CG]CCCCCTGCAG[CG][CG]GGAAGC[CG]CCCTACAGC
TACAT[CG][CG]CTCAT[CG]CCATGGCCAT[CG][CG]CA[CG][CG]CC[CG]AG[CG]C[CG]CCTCA[CG]CTGGG[CG]
GCATCTACAAGTTCATCAC[CG]AG[CG]CTTCCCCTTCTAC[CG][[CG]]ACAACCCCAAAAAGTGGCAGAACAGC
ATC[CG]CCACAACCTCACACTCAA[CG]ACTGCTTCCTCAAGATCC[CG][CG][CG]AGGC[CG]GC[CG]CC[CG]GG
TAAGGGCAACTACTGGG[CG]CTTGACCCCAA[CG][CG]GAGGACATGTT[[CG]]AGAG[CG]GCAGCTTCCTG[CG]
C[CG]C[CG]CAAG[CG]CTTCAAG[CG]CT[CG]GACCTCTCCACCTACC[CG]GCTTACATGCA[CG]A[CG][CG]G[CG
]GCTGC[CG]CAGC[CG]C[CG]C[CG]C[CG]C[CG]C[CG]C[CG]C[CG]C[CG]C[CG]C[CG]CCATCTTCCCAGG[CG][CG]GTG
CC[CG]C[CG][CG][CG]CCCCCCCTACC[CG]GG[CG]C[CG]TCTATGCAGGCTA[CG][CG]C[CG]C[CG]T[CG]CTGGC
[CG][CG]C[CG]CCTCCAGTCTACTACCC[CG][CG]G[CG]T[CG]CC[CG]GCCCTTGC[CG][CG]TCTT[CG]GCCTGGT
TCCTGAG[CG]GC[CG]CTCAGCCCAGAGCTGGG

SEQ ID NO: 801
C[CG][CG]GGG[CG]GG[CG]GG[CG]G[CG]C[CG]CAAG[CG]CCCCCTGCAG[CG][CG]GGAAGC[CG]CCCTACAGC
TACAT[CG][CG]CTCAT[CG]CCATGGCCAT[CG][CG]CA[CG][CG]CC[CG]AG[CG]C[CG]CCTCA[CG]CTGGG[CG]
GCATCTACAAGTTCATCAC[CG]AG[CG]CTTCCCCTTCTAC[CG][[CG]]ACAACCCCAAAAAGTGGCAGAACAGC
ATC[CG]CCACAACCTCACACTCAA[CG]ACTGCTTCCTCAAGATCC[CG][CG][CG]AGGC[CG]GC[CG]CC[CG]GG
TAAGGGCAACTACTGGG[CG]CTTGACCCCAA[CG][CG]GAGGACATGTT[[CG]]AGAG[CG]GCAGCTTCCTG[CG]
C[CG]C[CG]CAAG[CG]CTTCAAG[CG]CT[CG]GACCTCTCCACCTACC[CG]GCTTACATGCA[CG]A[CG][CG]G[CG
]GCTGC[CG]CAGC[CG]C[CG]C[CG]C[CG]C[CG]C[CG]C[CG]C[CG]C[CG]C[CG]C[CG]CCATCTTCCCAGG[CG][CG]GTG
CC[CG]C[CG][CG][CG]CCCCCCCTACC[CG]GG[CG]C[CG]TCTATGCAGGCTA[CG][CG]C[CG]C[CG]T[CG]CTGGC
[CG][CG]C[CG]CCTCCAGTCTACTACCC[CG][CG]G[CG]T[CG]CC[CG]GCCCTTGC[CG][CG]TCTT[CG]GCCTGGT
TCCTGAG[CG]GC[CG]CTCAGCCCAGAGCTGGG

SEQ ID NO: 802
[CG]CC[CG]CCCCTC[CG][CG]CTGGGCAGGGCCCCAGCAGTTGTCCTCCTCC[CG]CTCC[CG]GGCT[CG]GCC[CG]
GGCTCCATGGGGCTCCAGG[CG]GG[CG]GCAG[CG]GCCAG[CG]GTCCCCTGAAGGGC[CG]AGTCCTCCCTTCCC
TCCTCCTGCTCCTCCCC[CG][CG][CG]GT[CG]C[CG]AGGG[CG]AGAC[CG]ACTTTTGC[CG]CAAGGTGCAGG[CG]
GCC[CG]GG[CG]G[CG]G[CG]GCT[CG]GGAAA[CG]CATGGCCCTGGGGA[CG][CG]G[CG]AGGACAGGAGAGCC[
CG]GCTG[CG]AGGT[CG]GGACCCTGAGGCCCAGGGG[CG]GGTC[[CG]][CG]G[CG]TG[CG]GGGCCCTGG[CG]GC
TCCTCTGTGCTG[CG]CTGGGCTC[CG]GG[CG][CG][CG]GGATG[CG]GGCAG[CG]G[CG]GGA[CG]GTCCACA[CG]
GG[CG]GGG[CG]GC[CG]GGTTCACCCTCCTGTTCCACC[CG][CG]GGGTCTCCTTCACT[CG]CAGC[CG]CCAT[CG]
CCAGCCCTCAGCT[CG]GTCC[[CG]]GCTACACTTGAGAGTT[CG]GAGGATTAATGGGAAAATGTGTGTAAAGTG
CATTGGAAATGAGGGATTGT[CG]GCAGTTTCTCCTCCTGTTCCTCTGCC[[CG]]GCTCTTT[CG]TCTCCCTCCAG[
CG]CAAAGC

SEQ ID NO: 803
[CG]CC[CG]CCCCTC[CG][CG]CTGGGCAGGGCCCCAGCAGTTGTCCTCCTCC[CG]CTCC[CG]GGCT[CG]GCC[CG]
GGCTCCATGGGGCTCCAGG[CG]GG[CG]GCAG[CG]GCCAG[CG]GTCCCCTGAAGGGC[CG]AGTCCTCCCTTCCC
TCCTCCTGCTCCTCCCC[CG][CG][CG]GT[CG]C[CG]AGGG[CG]AGAC[CG]ACTTTTGC[CG]CAAGGTGCAGG[CG]
GCC[CG]GG[CG]G[CG]G[CG]GCT[CG]GGAAA[CG]CATGGCCCTGGGGA[CG][CG]G[CG]AGGACAGGAGAGCC[
CG]GCTG[CG]AGGT[CG]GGACCCTGAGGCCCAGGGG[CG]GGTC[[CG]][CG]G[CG]TG[CG]GGGCCCTGG[CG]GC
TCCTCTGTGCTG[CG]CTGGGCTC[CG]GG[CG][CG][CG]GGATG[CG]GGCAG[CG]G[CG]GGA[CG]GTCCACA[CG]
GG[CG]GGG[CG]GC[CG]GGTTCACCCTCCTGTTCCACC[CG][CG]GGGTCTCCTTCACT[CG]CAGC[CG]CCAT[CG]
CCAGCCCTCAGCT[CG]GTCC[[CG]]GCTACACTTGAGAGTT[CG]GAGGATTAATGGGAAAATGTGTGTAAAGTG
CATTGGAAATGAGGGATTGT[CG]GCAGTTTCTCCTCCTGTTCCTCTGCC[[CG]]GCTCTTT[CG]TCTCCCTCCAG[
CG]CAAAGC

SEQ ID NO: 804 [CG][CG]G[CG]G[CG]TTTCCTGGGGCAACAGCAATGG[CG]GCCT[CG]CTGTC[CG]AG[CG]GCTCTTCT[CG]CTGG AGCTGCTGGTGGACTGGGTG[[CG]]TTTGGAAGCC[CG]GCTGCTGC[CG]TCCCC[CG]CTGC[CG]CAGTGGAGCA GGAGGAGGAAGAGGAGGAAAAGGAGCAGGGGGAGGCCT[CG]T[CG]C[CG][CG][CG]GTCTGTGCCC[CG]C[CG] TGGCCTTC[CG]CCTGCTGGACTTCCCCA[CG]CTGTTGGTTTACCCTCCTGA[CG]GCCC[CG]G[CG]CTCC[CG]C[C G]C[CG]AAC[CG]TGGCC[CG]GTGTCATC[CG]CTT[CG]GT[CG][[CG]]GCAAGTCCTGCCTCTTC[CG]CCTGCAGC CTGCTACCCTGCACTGC[CG]GCTCCTG[CG]GACCC[[CG]]CTTGCCACCTTGCTGCTGCAGCTGCCCCCTGGG[CG]CC[CG]A[CG]CCCACCCCACAGCTCCTGGGGGCCTG[CG]ACATTT[CG]CTGGCCAC[CG]CAG[CG]CACAGGGT[CG]TGGGGC[CG]GC[CG]CCTC[CG]GATGCTCCCAC[CG]TCAC[CG]GGGA[CG]TTTCCCCCTGCATAAT[CG]AGT GGG[CG]AG[[CG]]GACTGGGGACATTGCACTGGCCTAC[CG]CCTGACTGACCTGGGAAGC[CG]CCTGCTGAGCC A
SEQ ID NO: 805 [CG][CG]G[CG]G[CG]TTTCCTGGGGCAACAGCAATGG[CG]GCCT[CG]CTGTC[CG]AG[CG]GCTCTTCT[CG]CTGG AGCTGCTGGTGGACTGGGTG[[CG]]TTTGGAAGCC[CG]GCTGCTGC[CG]TCCCC[CG]CTGC[CG]CAGTGGAGCA GGAGGAGGAAGAGGAGGAAAAGGAGCAGGGGGAGGCCT[CG]T[CG]C[CG][CG][CG]GTCTGTGCCC[CG]C[CG] TGGCCTTC[CG]CCTGCTGGACTTCCCCA[CG]CTGTTGGTTTACCCTCCTGA[CG]GCCC[CG]G[CG]CTCC[CG]C[C G]C[CG]AAC[CG]TGGCC[CG]GTGTCATC[CG]CTT[CG]GT[CG][[CG]]GCAAGTCCTGCCTCTTC[CG]CCTGCAGC CTGCTACCCTGCACTGC[CG]GCTCCTG[CG]GACCC[[CG]]CTTGCCACCTTGCTGCTGCAGCTGCCCCCTGGG[CG]CC[CG]A[CG]CCCACCCCACAGCTCCTGGGGGCCTG[CG]ACATTT[CG]CTGGCCAC[CG]CAG[CG]CACAGGGT[CG]TGGGGC[CG]GC[CG]CCTC[CG]GATGCTCCCAC[CG]TCAC[CG]GGGA[CG]TTTCCCCCTGCATAAT[CG]AGT GGG[CG]AG[[CG]]GACTGGGGACATTGCACTGGCCTAC[CG]CCTGACTGACCTGGGAAGC[CG]CCTGCTGAGCC A
SEQ ID NO: 806 GG[CG]G[CG]G[CG]CTAGG[CG]GC[CG]CTGGC[CG]TT[CG]G[CG]ATGGCCTCTGCAAGCTCAGCAGCTT[CG][CG]CTGG[CG]GGCA[CG][CG]CTG[CG][CG]GG[CG][CG]CTGCTGCTGG[CG]GGCATGAG[CG]TGGAC[CG]CTACCT GGC[CG]TGGTGAAGCTGCT[CG]AGG[CG]AGGCCACTG[CG]CACCC[CG][CG]CTG[CG][CG]CTGGCCT[CG]TGC TG[CG]G[CG]TCTGGGC[CG]TGG[CG]CTGCTGGC[CG]GCCTGCCCTCCCTGGTCTAC[CG]GGGGTTGCAGCCCCT GCCTGGGGGCCAGGACAGCCAGTG[CG]G[CG]AGGAGCCCTCCCA[[CG]]CCTTCCAGGGCCTCAGCTTGCTGCT GCTGCTGCTGACCTT[CG]TGCTGCCCCTGGT[CG]TCACCCTCTTCTGCTACTGC[CG]CATCT[CG][CG]C[CG]CCT G[CG]A[CG]GC[CG]C[CG]CA[CG]TGGGT[CG]GGCC[CG]GAGGAACT[[CG]]CTG[CG]CATCATCTT[CG]CCAT[CG]AGAGCA[CG]TTTGTGGGCTCCTGGCTGCCCTTCAG[CG]CCCTG[CG]GGC[CG]TCTTCCACCTGG[CG][CG]TCTG GGGG[CG]CTGC[CG]CTGC[CG]TGCCCCCTGCTGCTGG[CG]CTG[CG]CTGGGGCCTCACCATTGCCACCTGCCTG GCCTT
SEQ ID NO: 807 CAAGTGGCTCAGAAGTTCA[CG]GG[CG]GCAT[CG]GAAACAAACTGTG[CG]GTGAGTGCCCAGGGAC[CG]GGG[CG]GCCAAGGT[CG]GCC[CG][CG]GGGTCCAAGCAGTCTTCTCACCTC[CG]CATCCCAGTCAG[CG]GAGT[CG]GG GTTTCCTGGCTG[CG]GGTAGG[CG]GGAG[[CG]]AGGGAGC[CG]GGCC[CG]G[CG]GAGGATTGA[CG]AGGCC[CG][CG]TT[CG]GTGTCCTTACCCAGCCCTGCTCTA[CG]GAGA[CG]C[CG]AGAAGC[CG]G[CG]GAGAG[CG]G[CG]G GAGCCAACCCC[CG][CG]GGC[CG]C[CG]CC[CG]GAAGGC[CG]CCTG[[CG]]CCTG[CG]ACCAGAAGCCCTGCAGC TGCTCCAAAGTGGATGTCAACTA[CG][CG]TTTCTCCATGCAACAGGTAAAGACTCAG[[CG]]GGGAGCCC[CG]G GG[CG]CCCCTGCCCCTCTCTCTGCCC[CG]CCCAC[CG][CG]GC[CG]GTG[CG]GGTC[CG]G[CG]CTGAGAGC[CG] GACAGGGG[CG]T[CG]AGGTGGCAG[CG]GAGG[[CG]]GGACCTGCCAGAATCTTCAGATAAAAG[CG]AGAAATG [[CG]]GGACCTGCC[CG]CTGGGTCCAAGCCCC[CG]AACCTGGCCT[CG]GAGCTCCAAGAGGGCTCTGAGGC[CG] TGG[CG]CTCTTC
SEQ ID NO: 808 CC[CG][CG]GGGTCCAAGCAGTCTTCTCACCTC[CG]CATCCCAGTCAG[CG]GAGT[CG]GGGTTTCCTGGCTG[CG] GGTAGG[CG]GGAG[[CG]]AGGGAGC[CG]GGCC[CG]G[CG]GAGGATTGA[CG]AGGCC[CG][CG]TT[CG]GTGTCC TTACCCAGCCCTGCTCTA[CG]GAGA[CG]C[CG]AGAAGC[CG]G[CG]GAGAG[CG]G[CG]GGAGCCAACCCC[CG][CG]GGC[CG]C[CG]CC[CG]GAAGGC[CG]CCTG[[CG]]CCTG[CG]ACCAGAAGCCCTGCAGCTGCTCCAAAGTGGA TGTCAACTA[CG][CG]TTTCTCCATGCAACAGGTAAAGACTCAG[[CG]]GGGAGCCC[CG]GGG[CG]CCCCTGCCC CTCTCTCTGCCC[CG]CCCAC[CG][CG]GC[CG]GTG[CG]GGTC[CG]G[CG]CTGAGAGC[CG]GACAGGGG[CG]T[CG]AGGTGGCAG[CG]GAGG[[CG]]GGACCTGCCAGAATCTTCAGATAAAAG[CG]AGAAATG[[CG]]GGACCTGCC[C G]CTGGGTCCAAGCCCC[CG]AACCTGGCCT[CG]GAGCTCCAAGAGGGCTCTGAGGC[CG]TGG[CG]CTCTTCCCC CAG[CG][CG]GCCCTTGGGATGG[CG]GGTGGC[CG]A[CG]ATCCAGG[CG]CT[CG]TG[CG]CTCACTGAAT[CG]AT GA[CG]GCTGGCTTC

Table 1. The nucleotide sequences of the 308 DMRs are defined respectively by the nucleotide sequences of SEQ ID NO: 501 to 808.

Cancer-related CpGs for analysis

In any of the assays described herein, in a sample which has been taken from an individual, the sample comprises a population of DNA molecules.

The assay of the invention further comprises determining in the population of DNA molecules in the sample the methylation status of a panel of:

(i) one or more CpGs selected from a panel of CpGs identified in SEQ ID NOs 1 to 500 wherein the CpGs are identified at nucleotide positions 61 to 62; and/or

(ii) one or more CpGs selected from within a panel of one or more Differentially Methylated Regions (DMRs) defined by SEQ ID NOs 501 to 808, wherein the CpGs are denoted by CG

. A cancer index value is then derived based on the methylation status of the one or more CpGs in the panel, which is used to assess the presence, absence or development of cancer in the individual based on the cancer index value.

In any of the assays described herein, in DNA derived from cells in the sample the methylation status of each CpG in a panel of

(i) one or more CpGs selected from a panel of CpGs identified in SEQ ID NOs 1 to 500 wherein the CpGs are identified at nucleotide positions 61 to 62; and/or

(ii) one or more CpGs selected from within a panel of one or more Differentially Methylated Regions (DMRs) defined by SEQ ID NOs 501 to 808, wherein the CpGs are denoted by CG;

is determined.

In any of the assays described herein, in DNA derived from cells in the sample the methylation status of each CpG in a panel of one or more CpGs from a panel of CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, is determined.

In any of the assays described herein, the panel of one or more CpGs may comprise at least 50 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having a

receiver operating characteristics (ROC) area under the curve (AUC) of at least 0.92. The panel of one or more CpGs may comprise at least the CpGs identified in SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, preferably wherein the assay is characterised as having an ROC AUC of at least 0.95.

In any of the assays described herein, the panel of one or more CpGs may comprise at least 100 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having a ROC AUC of at least 0.93. The panel of one or more CpGs may comprise at least the CpGs identified in SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62, preferably wherein the assay is characterised as having a ROC AUC of at least 0.96.

In any of the assays described herein, the panel of one or more CpGs may comprise at least 150 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having a ROC AUC of at least 0.93. The panel of one or more CpGs may comprise at least the CpGs identified in SEQ ID NOs 1 to 150 and identified at nucleotide positions 61 to 62, preferably wherein the assay is characterised as having a ROC AUC of at least 0.96.

In any of the assays described herein, the panel of one or more CpGs may comprise at least 200 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.93. The panel of one or more CpGs may comprise at least the CpGs identified in SEQ ID NOs 1 to 200 and identified at nucleotide positions 61 to 62, preferably wherein the assay is characterised as having a ROC AUC of at least 0.96.

In any of the assays described herein, the panel of one or more CpGs may comprise at least the 500 CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and further wherein the assay is characterised as having a ROC AUC of at least 0.97.

In any of the above-described assays, the assay may be characterised as having a ROC AUC of 0.60 or more, 0.61 or more, 0.62 or more, 0.63 or more, 0.64 or more, 0.65 or more, 0.66 or more, 0.67 or more, 0.68 or more, 0.69 or more, 0.70 or more, 0.71 or more, 0.72 or more, 0.73 or more, 0.74 or more, 0.75 or more, 0.76 or more,

0.77 or more, 0.78 or more, 0.79 or more, 0.80 or more, 0.81 or more, 0.82 or more, 0.83 or more, 0.84 or more, 0.85 or more, 0.86 or more, 0.87 or more, 0.88 or more, 0.89 or more or 0.90 or more.

In any of the described assays, the methylation status of the one or more CpGs in the panel is preferably determined by a β-value analysis, and the cancer is endometrial cancer of ovarian cancer. Preferably, the cancer is endometrial cancer.

In any of the assays described herein, the panel of one or more CpGs may comprise at least 50 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, optionally wherein:

1. the assay is characterised as having an ROC AUC (AUC) of at least 0.95, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62;
2. the assay is characterised as having an AUC of at least 0.94, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 51 to 100 and identified at nucleotide positions 61 to 62;
3. the assay is characterised as having an ROC AUC (AUC) of at least 0.94, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 101 to 150 and identified at nucleotide positions 61 to 62;
4. the assay is characterised as having an ROC AUC (AUC) of at least 0.93, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 151 to 200 and identified at nucleotide positions 61 to 62;
5. the assay is characterised as having an ROC AUC (AUC) of at least 0.95, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 201 to 250 and identified at nucleotide positions 61 to 62;

6. the assay is characterised as having an ROC AUC (AUC) of at least 0.93, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 251 to 300 and identified at nucleotide positions 61 to 62;
7. the assay is characterised as having an ROC AUC (AUC) of at least 0.94, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 301 to 350 and identified at nucleotide positions 61 to 62;
8. the assay is characterised as having an ROC AUC (AUC) of at least 0.93, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 351 to 400 and identified at nucleotide positions 61 to 62;
9. the assay is characterised as having an ROC AUC (AUC) of at least 0.93, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 401 to 450 and identified at nucleotide positions 61 to 62; or
10. the assay is characterised as having an ROC AUC (AUC) of at least 0.92, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 451 to 500 and identified at nucleotide positions 61 to 62.

In any of the described assays, the methylation status of the one or more CpGs in the panel is preferably determined by a β-value analysis, and the cancer is endometrial cancer of ovarian cancer. Preferably, the cancer is endometrial cancer.

In any of the above-described assays, the assay may be characterised as having a ROC AUC of 0.60 or more, 0.61 or more, 0.62 or more, 0.63 or more, 0.64 or more, 0.65 or more, 0.66 or more, 0.67 or more, 0.68 or more, 0.69 or more, 0.70 or more, 0.71 or more, 0.72 or more, 0.73 or more, 0.74 or more, 0.75 or more, 0.76 or more, 0.77 or more, 0.78 or more, 0.79 or more, 0.80 or more, 0.81 or more, 0.82 or more, 0.83 or more, 0.84 or more, 0.85 or more, 0.86 or more, 0.87 or more, 0.88 or more, 0.89 or more or 0.90 or more.

In any of the assays described herein, the panel of one or more CpGs may comprise:

1. at least 50 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.95, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62;
2. at least 100 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.96, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62;
3. at least 150 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.96, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 150 and identified at nucleotide positions 61 to 62;
4. at least 200 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.96, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 200 and identified at nucleotide positions 61 to 62;
5. at least 250 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.96, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs

identified in SEQ ID NOs 1 to 250 and identified at nucleotide positions 61 to 62;

6. at least 300 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.96, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 300 and identified at nucleotide positions 61 to 62;

7. at least 350 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.96, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 350 and identified at nucleotide positions 61 to 62;

8. at least 400 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.96, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 400 and identified at nucleotide positions 61 to 62;

9. at least 450 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.97, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 450 and identified at nucleotide positions 61 to 62; or

10. at least 500 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.97, and more preferably

wherein the panel of one or more CpGs comprises at least the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500.

In any of the described assays, the methylation status of the one or more CpGs in the panel is preferably determined by a β-value analysis, and the cancer is endometrial cancer of ovarian cancer. Preferably, the cancer is endometrial cancer.

In any of the above-described assays, the assay may be characterised as having a ROC AUC of 0.60 or more, 0.61 or more, 0.62 or more, 0.63 or more, 0.64 or more, 0.65 or more, 0.66 or more, 0.67 or more, 0.68 or more, 0.69 or more, 0.70 or more, 0.71 or more, 0.72 or more, 0.73 or more, 0.74 or more, 0.75 or more, 0.76 or more, 0.77 or more, 0.78 or more, 0.79 or more, 0.80 or more, 0.81 or more, 0.82 or more, 0.83 or more, 0.84 or more, 0.85 or more, 0.86 or more, 0.87 or more, 0.88 or more, 0.89 or more or 0.90 or more.

In any of the assays described herein, the panel of one or more CpGs may comprise:

1. at least 50 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.92, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 451 to 500 and identified at nucleotide positions 61 to 62;
2. at least 100 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.93, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 401 to 500 and identified at nucleotide positions 61 to 62;
3. at least 150 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.93, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs

identified in SEQ ID NOs 351 to 500 and identified at nucleotide positions 61 to 62;

4. at least 200 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.93, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 301 to 500 and identified at nucleotide positions 61 to 62;

5. at least 250 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.93, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 251 to 500 and identified at nucleotide positions 61 to 62;

6. at least 300 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.94, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 201 to 500 and identified at nucleotide positions 61 to 62;

7. at least 350 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.94, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 151 to 500 and identified at nucleotide positions 61 to 62;

8. at least 400 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.94, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs

identified in SEQ ID NOs 101 to 500 and identified at nucleotide positions 61 to 62;

9. at least 450 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.95, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 51 to 500 and identified at nucleotide positions 61 to 62; or

10. at least 500 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.97, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500.

In any of the described assays, the methylation status of the one or more CpGs in the panel is preferably determined by a β-value analysis, and the cancer is endometrial cancer of ovarian cancer. Preferably, the cancer is endometrial cancer.

In any of the above-described assays, the assay may be characterised as having a ROC AUC of 0.60 or more, 0.61 or more, 0.62 or more, 0.63 or more, 0.64 or more, 0.65 or more, 0.66 or more, 0.67 or more, 0.68 or more, 0.69 or more, 0.70 or more, 0.71 or more, 0.72 or more, 0.73 or more, 0.74 or more, 0.75 or more, 0.76 or more, 0.77 or more, 0.78 or more, 0.79 or more, 0.80 or more, 0.81 or more, 0.82 or more, 0.83 or more, 0.84 or more, 0.85 or more, 0.86 or more, 0.87 or more, 0.88 or more, 0.89 or more or 0.90 or more.

In any of the assays described herein, the step of determining the methylation status of the one or more CpGs in the panel may comprise determining the methylation status of one or more CpGs selected from within a panel of one or more Differentially Methylated Regions (DMRs) defined by SEQ ID NOs 501 to 808, wherein selected CpGs in each DMR are denoted by CG. The nucleotide sequences of the 308 DMRs are defined respectively by the nucleotide sequences of SEQ ID NO: 501 to 808 as set out in Table 1, accepting that variation in the nucleotide sequence of any given DMR may

exist due to sequencing errors and/or variation between individuals. In each sequence shown below the cytosine of the CG dinucleotide motifs identified in square brackets and double square brackets is a cytosine of a CpG which may be included in a panel of CpGs when performing the assays of the invention.

In any of the assays described herein, the step of determining the methylation status of the one or more CpGs in the panel may comprise determining the methylation status of one or more CpGs denoted by CG within any one or more DMRs or within any combination of two or more DMRs defined by SEQ ID NOs 501 to 808, wherein selected CpGs in each DMR are denoted by CG. The DMRs are selected from the group consisting of DMRs 1 to 308 (SEQ ID NOs 501 to 808; as set out in Table 1).

The step of determining the methylation status of a panel of one or more CpGs may comprise determining a cancer index value of one or more of the CpGs denoted by CG within any one of the DMRs 1 to 308, or within any combination of two or more DMRs of 1 to 308.

The step of determining the methylation status of a panel of one or more CpGs may comprise determining a cancer index value of two or more, three or more, four or more, five or more, six or more, seven or more, eight or more, or nine or more of the CpGs denoted by CG within any one of the DMRs 1 to 308, optionally within any combination of two or more DMRs of 1 to 308.

The panel of one or more CpGs may comprise two or more CpGs of the DMR(s), three or more CpGs of the DMR(s), four or more CpGs of the DMR(s) or all CpGs of the DMR(s).

The step of determining the methylation status of a panel of one or more CpGs may comprise determining a cancer index value of least two or more, three or more, four or more, five or more, six or more, seven or more, eight or more, or nine or more of the CpGs denoted by CG within any one of the DMRs 1 to 308, or within:

a. any combination of two, three, four, five, six, seven, eight, or nine or more of DMRs 1 to 308;
b. any combination of ten, twenty, thirty, forty, fifty, sixty, seventy, eighty, or ninety or more of DMRs 1 to 308;

c. all 308 of DMRs 1 to 308;

d. one DMR defined by SEQ ID NO: 501, two DMRs defined by SEQ ID NOs: 501 to 502, three DMRs defined by SEQ ID NOs: 501 to 503, four DMRs defined by SEQ ID NOs: 501 to 504, five DMRs defined by SEQ ID NOs: 501 to 505, six DMRs defined by SEQ ID NOs: 501 to 506, seven DMRs defined by SEQ ID NOs: 501 to 507, eight DMRs defined by SEQ ID NOs: 501 to 508, or nine DMRs defined by SEQ ID NOs: 501 to 509; or

e. ten DMRs defined by SEQ ID NOs: 501 to 510, twenty DMRs defined by SEQ ID NOs: 501 to 520, thirty DMRs defined by SEQ ID NOs: 501 to 530, forty DMRs defined by SEQ ID NOs: 501 to 540, fifty DMRs defined by SEQ ID NOs: 501 to 550, sixty DMRs defined by SEQ ID NOs: 501 to 560, seventy DMRs defined by SEQ ID NOs: 501 to 570, eighty DMRs defined by SEQ ID NOs: 501 to 580, or ninety DMRs defined by SEQ ID NOs: 501 to 590; or

f. ten DMRs defined by SEQ ID NOs: 501 to 510, SEQ ID NOs: 511 to 520, SEQ ID NOs: 521 to 530, SEQ ID NOs: 531 to 540, SEQ ID NOs: 541 to 550, SEQ ID NOs: 551 to 560, SEQ ID NOs: 561 to 570, SEQ ID NOs: 571 to 580, SEQ ID NOs: 581 to 590, SEQ ID NOs: 591 to 600, SEQ ID NOs: 601 to 610, SEQ ID NOs: 611 to 620, SEQ ID NOs: 621 to 630, SEQ ID NOs: 631 to 640, SEQ ID NOs: 641 to 650, SEQ ID NOs: 651 to 660, SEQ ID NOs: 661 to 670, SEQ ID NOs: 671 to 680, SEQ ID NOs: 681 to 690, SEQ ID NOs: 691 to 700, SEQ ID NOs: 701 to 710, SEQ ID NOs: 711 to 720, SEQ ID NOs: 721 to 730, SEQ ID NOs: 731 to 740, SEQ ID NOs: 741 to 750; SEQ ID NOs: 751 to 760; SEQ ID NOs: 761 to 770; SEQ ID NOs: 771 to 780; SEQ ID NOs: 781 to 790; SEQ ID NOs: 791 to 800 or SEQ ID NOs: 801 to 808.

In any of the assays described herein, the step of determining the methylation status of a panel of one or more CpGs may comprise determining the methylation status

of one or more CpGs within any one or more DMRs selected from the group of DMRs consisting of DMRs 1 to 308 as defined by SEQ ID NOs 501 to 808, including:

1. one or more CpGs within DMR 1 as defined by SEQ ID NO: 501 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.911, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
2. one or more CpGs within DMR 2 as defined by SEQ ID NO: 502 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.903, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
3. one or more CpGs within DMR 3 as defined by SEQ ID NO: 503 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.899, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
4. one or more CpGs within DMR 4 as defined by SEQ ID NO: 504 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.899, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
5. one or more CpGs within DMR 5 as defined by SEQ ID NO: 505 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.899, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
6. one or more CpGs within DMR 6 as defined by SEQ ID NO: 506 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.897, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
7. one or more CpGs within DMR 7 as defined by SEQ ID NO: 507 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.894, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

8. one or more CpGs within DMR 8 as defined by SEQ ID NO: 508 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.894, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
9. one or more CpGs within DMR 9 as defined by SEQ ID NO: 509 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.892, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
10. one or more CpGs within DMR 10 as defined by SEQ ID NO: 510 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.891, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
11. one or more CpGs within DMR 11 as defined by SEQ ID NO: 511 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.89, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
12. one or more CpGs within DMR 12 as defined by SEQ ID NO: 512 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.888, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
13. one or more CpGs within DMR 13 as defined by SEQ ID NO: 513 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.888, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
14. one or more CpGs within DMR 14 as defined by SEQ ID NO: 514 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.888, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
15. one or more CpGs within DMR 15 as defined by SEQ ID NO: 515 and denoted by CG, preferably wherein the assay is characterised as having

an ROC AUC of at least 0.888, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

16. one or more CpGs within DMR 16 as defined by SEQ ID NO: 516 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.888, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
17. one or more CpGs within DMR 17 as defined by SEQ ID NO: 517 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.886, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
18. one or more CpGs within DMR 18 as defined by SEQ ID NO: 518 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.886, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
19. one or more CpGs within DMR 19 as defined by SEQ ID NO: 519 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.885, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
20. one or more CpGs within DMR 20 as defined by SEQ ID NO: 520 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.884, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
21. one or more CpGs within DMR 21 as defined by SEQ ID NO: 521 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.882, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
22. one or more CpGs within DMR 22 as defined by SEQ ID NO: 522 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.881, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

23. one or more CpGs within DMR 23 as defined by SEQ ID NO: 523 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.88, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
24. one or more CpGs within DMR 24 as defined by SEQ ID NO: 524 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.879, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
25. one or more CpGs within DMR 25 as defined by SEQ ID NO: 525 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.878, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
26. one or more CpGs within DMR 26 as defined by SEQ ID NO: 526 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.878, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
27. one or more CpGs within DMR 27 as defined by SEQ ID NO: 527 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.877, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
28. one or more CpGs within DMR 28 as defined by SEQ ID NO: 528 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.875, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
29. one or more CpGs within DMR 29 as defined by SEQ ID NO: 529 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.875, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
30. one or more CpGs within DMR 30 as defined by SEQ ID NO: 530 and denoted by CG, preferably wherein the assay is characterised as having

an ROC AUC of at least 0.874, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

31. one or more CpGs within DMR 31 as defined by SEQ ID NO: 531 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.874, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
32. one or more CpGs within DMR 32 as defined by SEQ ID NO: 532 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.874, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
33. one or more CpGs within DMR 33 as defined by SEQ ID NO: 533 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.874, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
34. one or more CpGs within DMR 34 as defined by SEQ ID NO: 534 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.873, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
35. one or more CpGs within DMR 35 as defined by SEQ ID NO: 535 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.873, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
36. one or more CpGs within DMR 36 as defined by SEQ ID NO: 536 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.873, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
37. one or more CpGs within DMR 37 as defined by SEQ ID NO: 537 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.873, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

38. one or more CpGs within DMR 38 as defined by SEQ ID NO: 538 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.873, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
39. one or more CpGs within DMR 39 as defined by SEQ ID NO: 539 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.872, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
40. one or more CpGs within DMR 40 as defined by SEQ ID NO: 540 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.872, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
41. one or more CpGs within DMR 41 as defined by SEQ ID NO: 541 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.871, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
42. one or more CpGs within DMR 42 as defined by SEQ ID NO: 542 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.871, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
43. one or more CpGs within DMR 43 as defined by SEQ ID NO: 543 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.87, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
44. one or more CpGs within DMR 44 as defined by SEQ ID NO: 544 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.87, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
45. one or more CpGs within DMR 45 as defined by SEQ ID NO: 545 and denoted by CG, preferably wherein the assay is characterised as having

an ROC AUC of at least 0.869, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

46. one or more CpGs within DMR 46 as defined by SEQ ID NO: 546 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.869, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
47. one or more CpGs within DMR 47 as defined by SEQ ID NO: 547 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.869, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
48. one or more CpGs within DMR 48 as defined by SEQ ID NO: 548 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.867, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
49. one or more CpGs within DMR 49 as defined by SEQ ID NO: 549 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.867, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
50. one or more CpGs within DMR 50 as defined by SEQ ID NO: 550 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.867, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
51. one or more CpGs within DMR 551 as defined by SEQ ID NO: 551 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.867, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
52. one or more CpGs within DMR 52 as defined by SEQ ID NO: 552 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.865, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

53. one or more CpGs within DMR 53 as defined by SEQ ID NO: 553 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.864, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
54. one or more CpGs within DMR 54 as defined by SEQ ID NO: 554 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.864, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
55. one or more CpGs within DMR 55 as defined by SEQ ID NO: 555 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.863, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
56. one or more CpGs within DMR 56 as defined by SEQ ID NO: 556 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.863, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
57. one or more CpGs within DMR 57 as defined by SEQ ID NO: 557 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.863, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
58. one or more CpGs within DMR 58 as defined by SEQ ID NO: 558 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.862, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
59. one or more CpGs within DMR 59 as defined by SEQ ID NO: 559 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.862, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
60. one or more CpGs within DMR 60 as defined by SEQ ID NO: 560 and denoted by CG, preferably wherein the assay is characterised as having

an ROC AUC of at least 0.861, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

61. one or more CpGs within DMR 61 as defined by SEQ ID NO: 561 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.861, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
62. one or more CpGs within DMR 62 as defined by SEQ ID NO: 562 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.861, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
63. one or more CpGs within DMR 63 as defined by SEQ ID NO: 563 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.86, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
64. one or more CpGs within DMR 64 as defined by SEQ ID NO: 564 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.86, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
65. one or more CpGs within DMR 65 as defined by SEQ ID NO: 565 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.86, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
66. one or more CpGs within DMR 66 as defined by SEQ ID NO: 566 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.86, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
67. one or more CpGs within DMR 67 as defined by SEQ ID NO: 567 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.859, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

68. one or more CpGs within DMR 68 as defined by SEQ ID NO: 568 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.859, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
69. one or more CpGs within DMR 69 as defined by SEQ ID NO: 569 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.859, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
70. one or more CpGs within DMR 70 as defined by SEQ ID NO: 570 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.859, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
71. one or more CpGs within DMR 71 as defined by SEQ ID NO: 571 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.859, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
72. one or more CpGs within DMR 72 as defined by SEQ ID NO: 572 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.858, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
73. one or more CpGs within DMR 73 as defined by SEQ ID NO: 573 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.857, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
74. one or more CpGs within DMR 74 as defined by SEQ ID NO: 574 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.857, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
75. one or more CpGs within DMR 75 as defined by SEQ ID NO: 575 and denoted by CG, preferably wherein the assay is characterised as having

an ROC AUC of at least 0.856, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

76. one or more CpGs within DMR 76 as defined by SEQ ID NO: 576 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.856, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
77. one or more CpGs within DMR 77 as defined by SEQ ID NO: 577 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.856, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
78. one or more CpGs within DMR 78 as defined by SEQ ID NO: 578 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.855, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
79. one or more CpGs within DMR 79 as defined by SEQ ID NO: 579 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.855, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
80. one or more CpGs within DMR 80 as defined by SEQ ID NO: 580 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.855, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
81. one or more CpGs within DMR 81 as defined by SEQ ID NO: 581 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.854, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
82. one or more CpGs within DMR 82 as defined by SEQ ID NO: 582 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.854, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

83. one or more CpGs within DMR 83 as defined by SEQ ID NO: 583 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.854, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
84. one or more CpGs within DMR 84 as defined by SEQ ID NO: 584 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.854, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
85. one or more CpGs within DMR 85 as defined by SEQ ID NO: 585 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.853, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
86. one or more CpGs within DMR 86 as defined by SEQ ID NO: 586 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.853, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
87. one or more CpGs within DMR 87 as defined by SEQ ID NO: 587 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.853, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
88. one or more CpGs within DMR 88 as defined by SEQ ID NO: 588 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.853, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
89. one or more CpGs within DMR 89 as defined by SEQ ID NO: 589 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.852, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
90. one or more CpGs within DMR 90 as defined by SEQ ID NO: 590 and denoted by CG, preferably wherein the assay is characterised as having

an ROC AUC of at least 0.852, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

91. one or more CpGs within DMR 91 as defined by SEQ ID NO: 591 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.852, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
92. one or more CpGs within DMR 92 as defined by SEQ ID NO: 592 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.851, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
93. one or more CpGs within DMR 93 as defined by SEQ ID NO: 593 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.851, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
94. one or more CpGs within DMR 94 as defined by SEQ ID NO: 594 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.851, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
95. one or more CpGs within DMR 95 as defined by SEQ ID NO: 595 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.851, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
96. one or more CpGs within DMR 96 as defined by SEQ ID NO: 596 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.85, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];
97. one or more CpGs within DMR 97 as defined by SEQ ID NO: 597 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.849, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

98. one or more CpGs within DMR 98 as defined by SEQ ID NO: 598 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.849, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

99. one or more CpGs within DMR 99 as defined by SEQ ID NO: 599 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.849, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

100. one or more CpGs within DMR 100 as defined by SEQ ID NO: 600 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.849, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

101. one or more CpGs within DMR 101 as defined by SEQ ID NO: 601 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.849, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

102. one or more CpGs within DMR 102 as defined by SEQ ID NO: 602 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.848, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

103. one or more CpGs within DMR 103 as defined by SEQ ID NO: 603 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.847, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

104. one or more CpGs within DMR 104 as defined by SEQ ID NO: 604 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.847, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

105. one or more CpGs within DMR 105 as defined by SEQ ID NO: 605 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.847, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

106. one or more CpGs within DMR 106 as defined by SEQ ID NO: 606 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.847, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

107. one or more CpGs within DMR 107 as defined by SEQ ID NO: 607 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.846, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

108. one or more CpGs within DMR 108 as defined by SEQ ID NO: 608 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.845, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

109. one or more CpGs within DMR 109 as defined by SEQ ID NO: 609 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.845, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

110. one or more CpGs within DMR 110 as defined by SEQ ID NO: 610 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.845, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

111. one or more CpGs within DMR 111 as defined by SEQ ID NO: 611 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.845, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

112. one or more CpGs within DMR 112 as defined by SEQ ID NO: 612 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.844, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

113. one or more CpGs within DMR 113 as defined by SEQ ID NO: 613 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.843, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

114. one or more CpGs within DMR 114 as defined by SEQ ID NO: 614 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.843, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

115. one or more CpGs within DMR 115 as defined by SEQ ID NO: 615 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.842, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

116. one or more CpGs within DMR 116 as defined by SEQ ID NO: 616 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.842, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

117. one or more CpGs within DMR 117 as defined by SEQ ID NO: 617 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.841, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

118. one or more CpGs within DMR 118 as defined by SEQ ID NO: 618 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.841, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

119. one or more CpGs within DMR 119 as defined by SEQ ID NO: 619 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.841, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

120. one or more CpGs within DMR 120 as defined by SEQ ID NO: 620 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.84, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

121. one or more CpGs within DMR 121 as defined by SEQ ID NO: 621 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.839, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

122. one or more CpGs within DMR 122 as defined by SEQ ID NO: 622 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.839, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

123. one or more CpGs within DMR 123 as defined by SEQ ID NO: 623 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.838, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

124. one or more CpGs within DMR 124 as defined by SEQ ID NO: 624 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.838, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

125. one or more CpGs within DMR 125 as defined by SEQ ID NO: 625 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.838, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

126. one or more CpGs within DMR 126 as defined by SEQ ID NO: 626 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.835, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

127. one or more CpGs within DMR 127 as defined by SEQ ID NO: 627 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.835, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

128. one or more CpGs within DMR 128 as defined by SEQ ID NO: 628 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.833, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

129. one or more CpGs within DMR 129 as defined by SEQ ID NO: 629 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.832, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

130. one or more CpGs within DMR 130 as defined by SEQ ID NO: 630 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.832, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

131. one or more CpGs within DMR 131 as defined by SEQ ID NO: 631 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.832, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

132. one or more CpGs within DMR 132 as defined by SEQ ID NO: 632 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.831, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

133. one or more CpGs within DMR 133 as defined by SEQ ID NO: 633 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.831, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

134. one or more CpGs within DMR 134 as defined by SEQ ID NO: 634 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.83, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

135. one or more CpGs within DMR 135 as defined by SEQ ID NO: 635 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.83, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

136. one or more CpGs within DMR 136 as defined by SEQ ID NO: 636 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.83, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

137. one or more CpGs within DMR 137 as defined by SEQ ID NO: 637 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.829, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

138. one or more CpGs within DMR 138 as defined by SEQ ID NO: 638 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.829, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

139. one or more CpGs within DMR 139 as defined by SEQ ID NO: 639 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.829, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

140. one or more CpGs within DMR 140 as defined by SEQ ID NO: 640 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.829, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

141. one or more CpGs within DMR 141 as defined by SEQ ID NO: 641 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.828, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

142. one or more CpGs within DMR 142 as defined by SEQ ID NO: 642 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.828, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

143. one or more CpGs within DMR 143 as defined by SEQ ID NO: 643 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.828, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

144. one or more CpGs within DMR 144 as defined by SEQ ID NO: 644 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.828, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

145. one or more CpGs within DMR 145 as defined by SEQ ID NO: 645 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.828, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

146. one or more CpGs within DMR 146 as defined by SEQ ID NO: 646 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.825, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

147. one or more CpGs within DMR 147 as defined by SEQ ID NO: 647 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.825, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

148. one or more CpGs within DMR 148 as defined by SEQ ID NO: 648 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.824, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

149. one or more CpGs within DMR 149 as defined by SEQ ID NO: 649 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.824, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

150. one or more CpGs within DMR 150 as defined by SEQ ID NO: 650 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.824, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

151. one or more CpGs within DMR 151 as defined by SEQ ID NO: 651 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.824, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

152. one or more CpGs within DMR 152 as defined by SEQ ID NO: 652 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.823, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

153. one or more CpGs within DMR 153 as defined by SEQ ID NO: 653 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.82, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

154. one or more CpGs within DMR 154 as defined by SEQ ID NO: 654 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.82, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

155. one or more CpGs within DMR 155 as defined by SEQ ID NO: 655 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.819, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

156. one or more CpGs within DMR 156 as defined by SEQ ID NO: 656 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.816, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

157. one or more CpGs within DMR 157 as defined by SEQ ID NO: 657 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.816, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

158. one or more CpGs within DMR 158 as defined by SEQ ID NO: 658 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.814, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

159. one or more CpGs within DMR 159 as defined by SEQ ID NO: 659 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.814, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

160. one or more CpGs within DMR 160 as defined by SEQ ID NO: 660 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.814, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

161. one or more CpGs within DMR 161 as defined by SEQ ID NO: 661 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.813, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

162. one or more CpGs within DMR 162 as defined by SEQ ID NO: 662 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.812, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

163. one or more CpGs within DMR 163 as defined by SEQ ID NO: 663 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.811, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

164. one or more CpGs within DMR 164 as defined by SEQ ID NO: 664 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.811, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

165. one or more CpGs within DMR 165 as defined by SEQ ID NO: 665 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.81, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

166. one or more CpGs within DMR 166 as defined by SEQ ID NO: 666 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.809, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

167. one or more CpGs within DMR 167 as defined by SEQ ID NO: 667 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.808, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

168. one or more CpGs within DMR 168 as defined by SEQ ID NO: 668 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.807, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

169. one or more CpGs within DMR 169 as defined by SEQ ID NO: 669 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.807, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

170. one or more CpGs within DMR 170 as defined by SEQ ID NO: 670 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.806, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

171. one or more CpGs within DMR 171 as defined by SEQ ID NO: 671 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.806, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

172. one or more CpGs within DMR 172 as defined by SEQ ID NO: 672 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.805, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

173. one or more CpGs within DMR 173 as defined by SEQ ID NO: 673 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.805, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

174. one or more CpGs within DMR 174 as defined by SEQ ID NO: 674 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.803, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

175. one or more CpGs within DMR 175 as defined by SEQ ID NO: 675 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.803, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

176. one or more CpGs within DMR 176 as defined by SEQ ID NO: 676 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.801, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

177. one or more CpGs within DMR 177 as defined by SEQ ID NO: 677 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.799, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

178. one or more CpGs within DMR 178 as defined by SEQ ID NO: 678 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.799, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

179. one or more CpGs within DMR 179 as defined by SEQ ID NO: 679 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.799, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

180. one or more CpGs within DMR 180 as defined by SEQ ID NO: 680 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.799, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

181. one or more CpGs within DMR 181 as defined by SEQ ID NO: 681 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.798, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

182. one or more CpGs within DMR 182 as defined by SEQ ID NO: 682 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.797, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

183. one or more CpGs within DMR 183 as defined by SEQ ID NO: 683 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.796, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

184. one or more CpGs within DMR 184 as defined by SEQ ID NO: 684 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.793, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

185. one or more CpGs within DMR 185 as defined by SEQ ID NO: 685 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.792, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

186. one or more CpGs within DMR 186 as defined by SEQ ID NO: 686 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.792, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

187. one or more CpGs within DMR 187 as defined by SEQ ID NO: 687 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.791, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

188. one or more CpGs within DMR 188 as defined by SEQ ID NO: 688 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.79, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

189. one or more CpGs within DMR 189 as defined by SEQ ID NO: 689 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.79, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

190. one or more CpGs within DMR 190 as defined by SEQ ID NO: 690 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.789, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

191. one or more CpGs within DMR 191 as defined by SEQ ID NO: 691 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.788, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

192. one or more CpGs within DMR 192 as defined by SEQ ID NO: 692 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.788, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

193. one or more CpGs within DMR 193 as defined by SEQ ID NO: 693 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.787, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

194. one or more CpGs within DMR 194 as defined by SEQ ID NO: 694 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.787, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

195. one or more CpGs within DMR 195 as defined by SEQ ID NO: 695 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.787, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

196. one or more CpGs within DMR 196 as defined by SEQ ID NO: 696 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.784, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

197. one or more CpGs within DMR 197 as defined by SEQ ID NO: 697 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.784, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

198. one or more CpGs within DMR 198 as defined by SEQ ID NO: 698 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.783, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

199. one or more CpGs within DMR 199 as defined by SEQ ID NO: 699 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.781, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

200. one or more CpGs within DMR 200 as defined by SEQ ID NO: 700 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.78, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

201. one or more CpGs within DMR 201 as defined by SEQ ID NO: 701 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.777, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

202. one or more CpGs within DMR 202 as defined by SEQ ID NO: 702 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.777, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

203. one or more CpGs within DMR 203 as defined by SEQ ID NO: 703 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.777, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

204. one or more CpGs within DMR 204 as defined by SEQ ID NO: 704 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.777, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

205. one or more CpGs within DMR 205 as defined by SEQ ID NO: 705 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.777, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

206. one or more CpGs within DMR 206 as defined by SEQ ID NO: 706 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.777, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

207. one or more CpGs within DMR 207 as defined by SEQ ID NO: 707 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.777, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

208. one or more CpGs within DMR 208 as defined by SEQ ID NO: 708 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.776, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

209. one or more CpGs within DMR 209 as defined by SEQ ID NO: 209 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.776, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

210. one or more CpGs within DMR 210 as defined by SEQ ID NO: 710 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.776, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

211. one or more CpGs within DMR 211 as defined by SEQ ID NO: 711 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.775, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

212. one or more CpGs within DMR 212 as defined by SEQ ID NO: 712 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.775, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

213. one or more CpGs within DMR 213 as defined by SEQ ID NO: 713 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.775, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

214. one or more CpGs within DMR 214 as defined by SEQ ID NO: 714 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.771, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

215. one or more CpGs within DMR 215 as defined by SEQ ID NO: 715 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.769, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

216. one or more CpGs within DMR 216 as defined by SEQ ID NO: 716 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.767, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

217. one or more CpGs within DMR 217 as defined by SEQ ID NO: 717 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.762, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

218. one or more CpGs within DMR 218 as defined by SEQ ID NO: 718 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.76, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

219. one or more CpGs within DMR 219 as defined by SEQ ID NO: 719 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.758, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

220. one or more CpGs within DMR 220 as defined by SEQ ID NO: 720 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.757, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

221. one or more CpGs within DMR 221 as defined by SEQ ID NO: 721 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.751, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

222. one or more CpGs within DMR 222 as defined by SEQ ID NO: 722 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.742, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

223. one or more CpGs within DMR 223 as defined by SEQ ID NO: 723 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.738, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

224. one or more CpGs within DMR 224 as defined by SEQ ID NO: 724 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.73, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

225. one or more CpGs within DMR 225 as defined by SEQ ID NO: 725 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.726, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

226. one or more CpGs within DMR 226 as defined by SEQ ID NO: 726 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.726, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

227. one or more CpGs within DMR 227 as defined by SEQ ID NO: 727 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.72, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

228. one or more CpGs within DMR 228 as defined by SEQ ID NO: 728 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.715, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

229. one or more CpGs within DMR 229 as defined by SEQ ID NO: 729 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.713, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

230. one or more CpGs within DMR 230 as defined by SEQ ID NO: 730 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.713, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

231. one or more CpGs within DMR 231 as defined by SEQ ID NO: 731 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.708, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

232. one or more CpGs within DMR 232 as defined by SEQ ID NO: 732 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.707, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

233. one or more CpGs within DMR 233 as defined by SEQ ID NO: 733 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.704, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

234. one or more CpGs within DMR 234 as defined by SEQ ID NO: 734 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.697, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

235. one or more CpGs within DMR 235 as defined by SEQ ID NO: 735 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.697, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

236. one or more CpGs within DMR 236 as defined by SEQ ID NO: 736 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.693, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

237. one or more CpGs within DMR 237 as defined by SEQ ID NO: 737 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.638, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

238. one or more CpGs within DMR 238 as defined by SEQ ID NO: 738 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.903, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

239. one or more CpGs within DMR 239 as defined by SEQ ID NO: 739 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.903, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

240. one or more CpGs within DMR 240 as defined by SEQ ID NO: 740 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.899, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

241. one or more CpGs within DMR 241 as defined by SEQ ID NO: 741 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.899, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

242. one or more CpGs within DMR 242 as defined by SEQ ID NO: 742 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.899, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

243. one or more CpGs within DMR 243 as defined by SEQ ID NO: 743 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.899, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

244. one or more CpGs within DMR 244 as defined by SEQ ID NO: 744 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.899, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

245. one or more CpGs within DMR 245 as defined by SEQ ID NO: 745 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.899, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

246. one or more CpGs within DMR 246 as defined by SEQ ID NO: 746 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.895, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

247. one or more CpGs within DMR 247 as defined by SEQ ID NO: 747 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.895, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

248. one or more CpGs within DMR 248 as defined by SEQ ID NO: 748 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.893, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

249. one or more CpGs within DMR 249 as defined by SEQ ID NO: 749 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.893, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

250. one or more CpGs within DMR 250 as defined by SEQ ID NO: 750 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.891, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

251. one or more CpGs within DMR 251 as defined by SEQ ID NO: 751 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.891, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

252. one or more CpGs within DMR 252 as defined by SEQ ID NO: 752 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.886, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

253. one or more CpGs within DMR 253 as defined by SEQ ID NO: 753 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.886, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

254. one or more CpGs within DMR 254 as defined by SEQ ID NO: 754 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.886, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

255. one or more CpGs within DMR 255 as defined by SEQ ID NO: 755 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.886, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

256. one or more CpGs within DMR 256 as defined by SEQ ID NO: 756 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.878, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

257. one or more CpGs within DMR 257 as defined by SEQ ID NO: 757 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.878, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

258. one or more CpGs within DMR 258 as defined by SEQ ID NO: 758 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.875, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

259. one or more CpGs within DMR 259 as defined by SEQ ID NO: 759 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.875, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

260. one or more CpGs within DMR 260 as defined by SEQ ID NO: 760 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.874, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

261. one or more CpGs within DMR 261 as defined by SEQ ID NO: 761 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.874, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

262. one or more CpGs within DMR 262 as defined by SEQ ID NO: 762 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.865, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

263. one or more CpGs within DMR 263 as defined by SEQ ID NO: 763 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.865, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

264. one or more CpGs within DMR 264 as defined by SEQ ID NO: 764 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.863, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

265. one or more CpGs within DMR 265 as defined by SEQ ID NO: 765 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.863, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

266. one or more CpGs within DMR 267 as defined by SEQ ID NO: 767 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.863, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

267. one or more CpGs within DMR 268 as defined by SEQ ID NO: 768 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.862, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

268. one or more CpGs within DMR 269 as defined by SEQ ID NO: 769 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.862, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

269. one or more CpGs within DMR 270 as defined by SEQ ID NO: 770 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.862, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

270. one or more CpGs within DMR 271 as defined by SEQ ID NO: 771 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.862, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

271. one or more CpGs within DMR 272 as defined by SEQ ID NO: 772 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.862, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

272. one or more CpGs within DMR 273 as defined by SEQ ID NO: 773 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.862, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

273. one or more CpGs within DMR 274 as defined by SEQ ID NO: 774 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.862, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

274. one or more CpGs within DMR 275 as defined by SEQ ID NO: 775 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.862, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

275. one or more CpGs within DMR 276 as defined by SEQ ID NO: 776 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.861, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

276. one or more CpGs within DMR 277 as defined by SEQ ID NO: 777 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.861, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

277. one or more CpGs within DMR 278 as defined by SEQ ID NO: 778 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.860, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

278. one or more CpGs within DMR 279 as defined by SEQ ID NO: 779 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.860, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

279. one or more CpGs within DMR 280 as defined by SEQ ID NO: 780 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.859, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

280. one or more CpGs within DMR 281 as defined by SEQ ID NO: 781 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.859, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

281. one or more CpGs within DMR 282 as defined by SEQ ID NO: 782 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.853, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

282. one or more CpGs within DMR 283 as defined by SEQ ID NO: 783 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.853, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

283. one or more CpGs within DMR 284 as defined by SEQ ID NO: 784 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.851, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

284. one or more CpGs within DMR 285 as defined by SEQ ID NO: 785 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.851, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

285. one or more CpGs within DMR 286 as defined by SEQ ID NO: 786 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.849, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

286. one or more CpGs within DMR 287 as defined by SEQ ID NO: 787 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.849, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

287. one or more CpGs within DMR 288 as defined by SEQ ID NO: 788 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.846, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

288. one or more CpGs within DMR 289 as defined by SEQ ID NO: 789 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.846, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

289. one or more CpGs within DMR 290 as defined by SEQ ID NO: 790 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.842, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

290. one or more CpGs within DMR 291 as defined by SEQ ID NO: 791 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.842, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

291. one or more CpGs within DMR 292 as defined by SEQ ID NO: 792 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.841, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

292. one or more CpGs within DMR 293 as defined by SEQ ID NO: 793 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.841, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

293. one or more CpGs within DMR 294 as defined by SEQ ID NO: 794 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.838, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

294. one or more CpGs within DMR 295 as defined by SEQ ID NO: 795 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.838, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

295. one or more CpGs within DMR 296 as defined by SEQ ID NO: 796 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.833, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

296. one or more CpGs within DMR 297 as defined by SEQ ID NO: 797 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.833, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

297. one or more CpGs within DMR 298 as defined by SEQ ID NO: 798 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.832, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

298. one or more CpGs within DMR 299 as defined by SEQ ID NO: 799 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.832, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

299. one or more CpGs within DMR 300 as defined by SEQ ID NO: 800 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.831, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

300. one or more CpGs within DMR 301 as defined by SEQ ID NO: 801 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.831, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

301. one or more CpGs within DMR 302 as defined by SEQ ID NO: 802 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.826, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

302. one or more CpGs within DMR 303 as defined by SEQ ID NO: 803 and denoted by CG, preferably wherein the assay is characterised as

having an ROC AUC of at least 0.826, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

303. one or more CpGs within DMR 304 as defined by SEQ ID NO: 804 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.806, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

304. one or more CpGs within DMR 305 as defined by SEQ ID NO: 805 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.806, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

305. one or more CpGs within DMR 306 as defined by SEQ ID NO: 806 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.911, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

306. one or more CpGs within DMR 307 as defined by SEQ ID NO: 807 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.905, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

307. one or more CpGs within DMR 308 as defined by SEQ ID NO: 808 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.905, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]],

preferably wherein the methylation status of the one or more CpGs in the panel is preferably determined by a β-value analysis, and the cancer is endometrial cancer of ovarian cancer.

In any of the assays described herein, the step of determining the methylation status of a panel of one or more CpGs comprises determining the methylation status of two or more, three or more, four or more, five or more, six or more, seven or more, eight or more, or nine or more, or all of the CpGs denoted by CG within any combination of:

i. one or more DMRs defined by SEQ ID NOs: 525, 756 and 757, preferably within all of SEQ ID NOs: 525, 756 and 757;
ii. one or more DMRs defined by SEQ ID NOs: 503, 504, 526, 740, 741, 743 and 744, preferably within all of SEQ ID NOs: 503, 504, 526, 740, 741, 743 and 744; and
iii. one or more DMRs defined by SEQ ID NOs: 525, 756, 757, 503, 504, 526, 740, 741, 743 and 744, preferably within all of SEQ ID NOs: 525, 756, 757, 503, 504, 526, 740, 741, 743 and 744.

In any one of the assays described herein, the step of determining the methylation status of the one or more CpGs in the panel may comprise or may additionally comprise determining the methylation status of each CpG within one or more of the sequences identified by SEQ ID NOs 809 to 919.

In any one of the assays described herein, the step of determining the methylation status of the one or more CpGs in the panel may preferably comprise or may preferably additionally comprise determining the methylation status of each CpG within one or more of the sequences identified by SEQ ID NOs 809, 746, 883, 811, 848, 885, 813, 850, and 887. More preferably, in any one of the assays described herein, the step of determining the methylation status of the one or more CpGs in the panel may comprise or may additionally comprise determining the methylation status of each CpG within all of the sequences identified by SEQ ID NOs 809, 746, 883, 811, 848, 885, 813, 850, and 887.

The invention also provides a variety of assays, each comprising any 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or more (or any range derivable therein) of a variety of steps and in no particular order, including methods of the following: measuring in a sample; analyzing a sample; assessing a sample; evaluating a sample; measuring nucleic acids in a sample; assessing nucleic acids in a sample; detecting nucleic acids in a sample; measuring methylation in nucleic acids in a sample; analyzing nucleic acids in a sample; assessing nucleic acids in a sample; measuring methylation at one or more CpG dinucleotides in a sample; detecting methylation at one or more CpG dinucleotides in a sample; assaying methylation at one or more CpG dinucleotides in a sample; assessing methylation at one or more CpG dinucleotides in a sample; measuring a methylation status in a sample; assaying a methylation status in a sample; detecting methylation status in a sample; determining methylation status in a sample; identifying methylation status in a sample; measuring one or more DNA methylation markers in a sample; assessing one or more DNA methylation markers in a sample; detecting one or more DNA methylation markers in a sample; measuring the presence of methylation at one or more markers in a sample; detecting the presence of methylation at one or more markers in a sample; assessing the presence of methylation at one or more markers in a sample; assaying the presence of one of more markers in a sample; measuring one or more DNA methylation markers in a sample but excluding the measuring of one or more other DNA methylation markers in the sample; assessing one or more DNA methylation markers in a sample but excluding the assessing of one or more other DNA methylation markers in the sample; analyzing one or more DNA methylation markers in a sample but excluding the analyzing of one or more other DNA methylation markers in the sample; detecting one or more DNA methylation markers in a sample but excluding the detecting of one or more other DNA methylation markers in the sample; measuring methylation status in nucleic acids from a sample from tissue from an individual other than tissue from the individual suspected of, or at risk for, being cancerous; detecting methylation status in nucleic acids from a sample from tissue from an individual other than tissue from the individual suspected of, or at risk for, being cancerous; analyzing methylation status in nucleic acids from a sample from tissue from an individual other than tissue from the

individual suspected of, or at risk for, being cancerous; assessing methylation status in nucleic acids from a sample from tissue from an individual other than tissue from the individual suspected of, or at risk for, being cancerous; measuring methylation at one or more CpG dinucleotides in a sample but excluding the measuring of methylation at one or more CpG dinucleotides in the sample; assessing methylation at one or more CpG dinucleotides in a sample but excluding the assessing of methylation at one or more CpG dinucleotides in the sample; analyzing methylation at one or more CpG dinucleotides in a sample but excluding the analyzing of methylation at one or more CpG dinucleotides in the sample; detecting methylation at one or more CpG dinucleotides in a sample but excluding the detecting of methylation at one or more CpG dinucleotides in the sample; measuring methylation at one or more CpG dinucleotides in nucleic acids from a sample from tissue from an individual other than tissue from the individual suspected of, or at risk for, being cancerous; detecting methylation at one or more CpG dinucleotides in nucleic acids from a sample from tissue from an individual other than tissue from the individual suspected of, or at risk for, being cancerous; analyzing methylation at one or more CpG dinucleotides in nucleic acids from a sample from tissue from an individual other than tissue from the individual suspected of, or at risk for, being cancerous; assessing methylation at one or more CpG dinucleotides in nucleic acids from a sample from tissue from an individual other than tissue from the individual suspected of, or at risk for, being cancerous; treating an individual for cancer when the individual has been determined to have a methylation status at one or more methylation markers; treating an individual for cancer when the individual has been determined to have methylation at one or more CpG dinucleotides;

wherein any of the aforementioned methods, or any other methods encompassed by the disclosure, may comprise any one or more of the following method steps:

measuring methylation status, wherein the measuring identifies the methylation status of one or markers from nucleic acids in a sample;

measuring methylation status, wherein the measuring identifies the presence of one or more markers from nucleic acids in a sample;

measuring the presence of one or more methylation markers from a sample;

providing DNA from a sample;

providing nucleic acids from a sample;

determining whether one or more methylation markers from nucleic acids from a sample are methylated;

measuring whether one or more methylation markers from nucleic acids from a sample are methylated;

performing a sequencing step on nucleic acids from a sample;

determining a sequence of nucleic acids from a sample;

performing bisulphite conversion on one or more markers;

performing bisulphite conversion on one or more CpG dinucleotides;

hybridizing DNA to an array comprising probes capable of determining methylated versus non-methylated markers;

hybridizing DNA to an array comprising probes capable of determining methylated versus non-methylated CpG dinucleotides;

hybridizing DNA to an array comprising probes capable of discriminating between methylated and non-methylated markers;

hybridizing DNA to an array comprising probes capable of discriminating between methylated and non-methylated CpG dinucleotides;

performing an amplification step on sequence from nucleic acids from a sample;

performing an amplification step on sequence from nucleic acids using methylation-specific primers;

performing amplification of sequence comprising one or more regions suspected of having methylation or in need of determination of a methylation status;

performing PCR on sequence comprising one or more regions suspected of having methylation or in need of determination of a methylation status;

performing a capturing step;

performing a binding step;

performing a purification step;

performing a capturing step comprising binding of polynucleotides comprising one or more methylation markers to binding molecules specific to the one or more methylation markers and collecting complexes thereof;

stratifying the grade of a cancer;

determining the risk of cancer;

determining the risk of recurrence of cancer;

obtaining a sample from an individual;

obtaining DNA from a sample from an individual;

administering a treatment to an individual;

providing DNA from a sample;

determining whether one or more methylation markers from a panel of methylation markers comprises a specific sequence; and/or

obtaining data that identifies whether each one of a group of methylation markers from a panel comprises a specific sequence.

Moreover, in some aspects of the invention, an individual who is administered a therapy or treatment has been subjected to any of the methods and steps described herein.

Described herein are assays that utilise a statistically robust panel of one or more CpGs whose methylation status can be determined to provide a reliable prediction of the presence or development of cancer in an individual. By determining the methylation status of each CpG within the panel of one or more CpGs, a cancer index value may be derived thus enabling stratification of individuals according to their risk of developing cancer or of having cancer, particularly endometrial and/or ovarian cancer, with statistically robust sensitivity and specificity. The skilled person would understand that the methylation status of each CpG within a panel of one or more CpGs can be determined by any suitable means in order to thereby derive the cancer index value. Any one method, or a combination of methods, may be used to determine the methylation status of each CpG within a panel of one or more CpGs.

Various exemplary methods for determining the methylation status of each CpG within a panel of one or more CpGs are described herein. For example, in one method a

percent methylated reference (PMR) value of a CpG may be determined. In another method the methylation β-values of a CpG may be determined. Different mechanisms may be employed to determine specific values depending on the circumstances, such as PCR-based mechanisms or array-based mechanisms.

Cancer index values as diagnostic and risk assessment tools

In any of the assays described herein, the assessment of the presence, absence or development of cancer in an individual is based on the cancer index value of the individual at the time of testing.

As explained herein, using panels of the specific CpGs disclosed herein, cancer index values can be established which correspond with cancer negative samples, because they are based on values derived from individuals known to be cancer negative and obtained from tissue samples from an anatomical site other than the endometrium or ovary, such as from the cervix, vagina, buccal area, blood and/or urine, particularly from a liquid-based cytology sample, and more preferably a cervical smear sample. Similarly, using panels of the specific CpGs disclosed herein, cancer index values can be established which correspond with cancer positive samples, because they are based on values derived from an anatomical site other than the ovary or endometrium, as noted above, from tissue samples from individuals known to be cancer positive. A user can then apply these cancer index values to assess the presence, absence or development of cancer in any test individual whose cancer status is required to be tested. As also explained herein, the assays of the invention are capable of being performed with a high degree of statistical accuracy.

As explained herein, the described assays particularly relate to the assessment of the presence, absence or development of endometrial cancer and/or ovarian cancer, particularly endometrial cancer.

A skilled person will readily appreciate that a cancer index value provides a value that indicates a “likelihood” or “risk” or “prediction” of any of the assays of the invention correctly assessing the presence, absence or development of cancer in an

individual. This is because the assessment is based upon a correlation between DNA methylation profiles of tissue samples and individual disease status. Nevertheless, as demonstrated by data set out in the Examples and elsewhere herein, the assays of the invention provide such correlations with high statistical accuracy, thus providing the skilled person with a high degree of confidence that the cancer index value which is determined for any test individual whose cancer status is required to be tested will provide an accurate correlation with actual disease status for the individual.

In the context of the present invention, "likelihood", "risk" and "prediction" may be used synonymously with each other.

Any references herein to sequences, genomic sequences and/or genomic coordinates are derived based upon Homo sapiens (human) genome assembly GRCh37 (hg19). The skilled person would understand variations in the nucleotide sequences of any given sequence, particularly DMRs 1 to 308, may exist due to sequencing errors and/or variation between individuals.

The assay of the invention represents a 'prediction' because any cancer index value (WID-EC-Index) derived in accordance with the invention is unlikely to be capable of diagnosing every individual as having or not having cancer with 100% specificity and 100% sensitivity. Rather, depending on the cancer index cutpoint threshold applied by the user for positively predicting the presence of cancer in an individual, the false positive and false negative rate will vary. In other words, the inventors have discovered that the assays of the invention can achieve variable levels of sensitivity and specificity for predicting the presence, absence or development of cancer, as defined by receiver operating characteristics, depending on the cancer index cutpoint threshold chosen and applied by the user. Such sensitivity and specificity can be seen from the data disclosed herein to be achievable at high proportions, demonstrating accurate and statistically-significant discriminatory capability.

Similarly, cancer index values which have been pre-determined to correlate with specific cancer phenotypes, such as the presence or absence of cancer, have been defined with a high level of statistical accuracy as explained further herein.

Assessing the 'development' of cancer in the context of the invention may refer to assessing whether an individual is likely or unlikely to develop cancer. The inventors have shown that the CpGs assayed in order to derive the cancer index value of the assays of the invention are representative of the cells within normal tissue from an anatomical site other than the endometrium or ovary, such as from the cervix, vagina, buccal area, blood and/or urine, particularly from a liquid-based cytology sample, and more preferably a cervical smear sample. Assessing the development of cancer in accordance with the assays of the invention may refer to assessing an increased or decreased likelihood of cancer and/or CIN3 development, particularly endometrial cancer and ovarian cancer, preferably endometrial cancer. Assessing the development of cancer in accordance with the assays of the invention may refer to assessing progression or worsening of a pre-existing cancer lesion in an individual. Assessment of the development of cancer in accordance with the assays of the invention may refer to predicting the likelihood of recurrence of cancer.

In any of the assays described herein, the step of assessing the presence or development of cancer in an individual based on a cancer index value may involve the application of a threshold value. Threshold values can provide a risk-based indication of an individual's cancer status, whether that is cancer positive, or cancer negative. Threshold values can also provide a means for identifying whether the cancer index value is intermediate between a cancer positive value and a cancer negative value. As explained herein, the cancer index value may be dynamic and subject to change depending upon genetic and/or environmental factors. Accordingly, the cancer index value may provide a means for assessing and monitoring cancer development. Cancer index values may therefore indicate at least a low risk or a high risk that the individual has a cancer positive status or has a status that is indicative of the development of cancer. If the cancer index value of an individual is determined by the assays of the invention at two or more time points, an increase or decrease in the individual's cancer index value may indicate an increased or decreased risk of the individual having or developing cancer, particularly endometrial and/or ovarian cancer, most preferably endometrial cancer.

Throughout the disclosure herein the terms "threshold value", "cutpoint", and "cutpoint threshold" are to be considered synonymous and interchangeable.

As explained further herein any assay of the invention is an assay for assessing the presence, absence or development of cancer in an individual. The types of cancer are set out further herein. As explained further herein, the assays of the invention provide means for assessing whether an individual is at risk of having or developing cancer based on specific cutpoint thresholds. Such risk assessments can be provided with a high degree of confidence based on the statistical parameters which characterise the assay. Thus in any of the assays described herein involving cancer index cutpoint thresholds, the cutpoint threshold may be used for risk assessment purposes. Equally, in any of the assays described herein involving cancer index cutpoint thresholds, the cutpoint threshold value may be used to specify whether or not an individual has cancer as a pure diagnostic test. Again, such diagnostic tests can be provided with a high degree of confidence based on the statistical parameters which characterise the assay. Accordingly, in any assay described herein which specifies that a cancer index value for the individual is a specific value or more, or is "about" a specific value or more, the individual may be assessed as having cancer. In any assay described herein which specifies that a cancer index value for the individual is less than a specific value, or is less than "about" a specific value, the individual may be assessed as not having cancer. The term "about" is to be understood as providing a range of +/- 5% of the value.

Accordingly, any assay of the invention is an assay for assessing the presence, absence or development of cancer in an individual, the assay comprising:

a. providing a sample which has been taken from the individual, the sample comprising a population of DNA molecules;

b. determining in the population of DNA molecules in the sample the methylation status of a panel of:

(i) one or more CpGs selected from a panel of CpGs identified in SEQ ID NOs 1 to 500 wherein the CpGs are identified at nucleotide positions 61 to 62; and/or

(ii) one or more CpGs selected from within a panel of one or more Differentially Methylated Regions (DMRs) defined by SEQ ID NOs 501 to 808, wherein the CpGs are denoted by CG;

c. deriving a cancer index value based on the methylation status of the one or more CpGs in the panel; and

d. assessing the presence, absence or development of cancer in the individual based on the cancer index value;

wherein the assay is characterised as having an area under the curve (AUC) of 0.60 or more as determined by receiver operating characteristics (ROC).

Any of the assays of the invention are particularly for assessing the presence or absence of cancer and/or CIN3 in an individual.

Such an assay may be performed in accordance with any of the methods disclosed and defined herein.

As explained further herein, any assay of the invention for assessing the presence, absence or development of cancer in an individual may alternatively be referred to as an assay for stratifying an individual in accordance with their cancer status.

Accordingly, any assay of the invention is an assay for stratifying an individual for the presence, absence or development of cancer in an individual, the assay comprising:

a. providing a sample which has been taken from the individual, the sample comprising a population of DNA molecules;

b. determining in the population of DNA molecules in the sample the methylation status of a panel of:

(i) one or more CpGs selected from a panel of CpGs identified in SEQ ID NOs 1 to 500 wherein the CpGs are identified at nucleotide positions 61 to 62; and/or

(ii) one or more CpGs selected from within a panel of one or more Differentially Methylated Regions (DMRs) defined by SEQ ID NOs 501 to 808, wherein the CpGs are denoted by CG;

c. deriving a cancer index value based on the methylation status of the one or more CpGs in the panel; and

d. stratifying the individual for the presence, absence or development of cancer based on the cancer index value;

wherein the assay is characterised as having an area under the curve (AUC) of 0.60 or more as determined by receiver operating characteristics (ROC).

Such an assay may be performed in accordance with any of the methods disclosed and defined herein.

Accordingly, any assay of the invention is an assay for stratifying an individual for cancer, the assay comprising:

a. providing a sample which has been taken from the individual, the sample comprising a population of DNA molecules;

b. determining in the population of DNA molecules in the sample the methylation status of a panel of:

(i) one or more CpGs selected from a panel of CpGs identified in SEQ ID NOs 1 to 500 wherein the CpGs are identified at nucleotide positions 61 to 62; and/or

(ii) one or more CpGs selected from within a panel of one or more Differentially Methylated Regions (DMRs) defined by SEQ ID NOs 501 to 808, wherein the CpGs are denoted by CG;

c. deriving a cancer index value based on the methylation status of the one or more CpGs in the panel; and

d. stratifying the individual for cancer based on the cancer index value;

wherein the assay is characterised as having an area under the curve (AUC) of 0.60 or more as determined by receiver operating characteristics (ROC).

Such an assay may be performed in accordance with any of the methods disclosed and defined herein.

The cancer index value may be derived by any suitable means. Preferably, the cancer index value may be derived by assessing the methylation status of the panel of:

(i) one or more CpGs selected from a panel of CpGs identified in SEQ ID NOs 1 to 500 wherein the CpGs are identified at nucleotide positions 61 to 62; and/or

(ii) one or more CpGs selected from within a panel of one or more Differentially Methylated Regions (DMRs) defined by SEQ ID NOs 501 to 808, wherein the CpGs are denoted by CG,

in a sample provided from an individual. The methylation status of the CpGs may be determined by any suitable means. For example, in any of the assays described herein the step of determining the methylation status of each CpG in the panel of one or more CpGs may comprise:

a. performing a sequencing step to determine the sequence of each CpG;

b. hybridising DNA to an array comprising probes capable of discriminating between methylated and non-methylated forms of the CpGs and applying a detection system to the array so as to determine the methylation status of each CpG; and/or

c. performing a PCR step using methylation-specific primers, wherein the methylation status of the CpG is determined by the presence or absence of a PCR product.

The step of determining in the population of DNA molecules in the sample the methylation status of a panel of one or more CpGs may comprises determining a β value of each CpG. Deriving the cancer index value may involve providing a methylation β-value data set comprising the methylation β-values for each CpG in the panel of one or more CpGs. Additionally, or alternatively, the step of determining in the population of DNA molecules in the sample the methylation status of a panel of one or more CpGs may comprises determining a percent methylated reference value for each of the panel

of one or more CpGs. Optionally deriving the cancer index value may also involve estimating the fraction of contaminating DNA within the DNA provided from a sample.

DNA may be DNA originating from a particular source organism, tissue or cell type. Preferably the contaminating DNA originates from one or more different cell types to one or more cell types of interest. A cell type of interest may particularly be an epithelial cell. In some aspects of the invention, it may be preferable to estimate the fraction of contaminating DNA after the step of providing a sample which has been take from an individual. The assays described herein may optionally involve estimating a contaminating DNA fraction within DNA in the sample by any suitable means. Preferably, the contaminating DNA fraction for the sample is estimated via any suitable bioinformatics analysis tool. A bioinformatics analysis tool that may be used to estimate a contaminating DNA fraction may be EpIDISH. As described herein, it may be desirable to estimate the fraction of contaminating DNA from the one or more cell types that are different to the one or more cell types of interest because the cancer index value used for predicting the presence or development of cancer in an individual may, in some instances, only be reliably derived from determining the methylation status of a set of CpGs from DNA of a particular cell type of interest. Particularly, methylation status beta-values may differ in the one or more cell types of interest within a sample relative to methylation status beta-values in contaminating DNA from different cell types within the same sample. Thus, the derived cancer index value may in some instances have a decreased predictive power without estimating and controlling for the contaminating DNA fraction within the DNA provided from the sample. In assays of the invention that involve estimating the fraction of contaminating DNA and accordingly controlling for said contaminating DNA, it is preferable to estimate an immune cell DNA fraction within the DNA provided from the sample. In particular assays of the invention, wherein the individual has an immune cell contamination of over 50% (*i.e.* wherein more than 50% of the DNA in the sample is deemed to be derived from immune cells), the assay may preferably involve controlling for the immune cell contamination by deriving the cancer index, in accordance with the invention, solely from the DNA molecules derived from epithelial cells.

Any of the assays described herein comprising a step of deriving a cancer index value based on the methylation status of the one or more CpGs in the panel may further comprise applying an algorithm to the methylation beta-value dataset to obtain the cancer index value. Preferably, in any of the assays described herein, the step of deriving the cancer index value based on the methylation status of the panel of CpGs comprises providing a methylation beta-value data set comprising the methylation beta-values for each CpG in the panel and applying an algorithm to the methylation beta-value data set to obtain the cancer index value.

In any of the assays described herein, the step of deriving the cancer index value based on the methylation status of the one or more CpGs in the panel comprises:

a. providing a methylation β-value data set comprising the methylation β-values for each CpG in the panel;
b. providing a mathematical model capable of generating the cancer index from the methylation β-value data set; and
c. applying the mathematical model to the methylation β-value data set, thereby generating the cancer index.

In any of the assays described herein, the cancer index value may be calculated by any suitable mathematical model such as an algorithm or formula. Preferably, the cancer index value is termed Women's risk Identification for Endometrial Cancer Index (WID-EC-index) and wherein the mathematical model which is applied to the methylation β-value data set to generate the cancer index is calculated by an algorithm according to the following formula:

$$WID - EC - index = \sum_{i=1}^{n} \frac{w_i \beta_i - \mu}{\sigma}$$

wherein:

1. $\beta_1, \ldots, \beta_n$ are methylation beta-values (between 0 and 1);
2. $w_1, \ldots, w_{500}$ are real valued coefficients;
3. μ and σ are real valued parameters used to scale the index; and
4. n refers to the number of CpGs in the set of test CpGs;

preferably wherein the cancer is endometrial cancer.

In any of the assays described herein, the WID-EC-index algorithm applies real valued coefficients inferred by initially training on a dataset (this dataset in the exemplary embodiments of the invention described in the Examples consisted of 144 endometrial cancer cases and 572 controls) to fit a ridge classifier using the R package glmnet with a mixing parameter value of alpha = 0 (ridge penalty) and binomial response type. Ten-fold cross-validation was used internally by the cv.glmnet function in order to determine the optimal value of the regularisation parameter lambda. The beta values from n CpGs for individual v, $\beta_1^v, \ldots, \beta_n^v$, are used as inputs to the ridge classifier. The coefficients $w_1, \ldots, w_n$ are obtained from the fitted model. The following quantity was computed for each individual v in the training set:

$$x_v = \sum_{i=1}^{n} w_i \beta_i^v$$

Any suitable real valued coefficients may be applied to the WID-EC-Index in any of the assays described herein.

The value of the parameters μ and σ are given by the mean and standard deviation of x_v in the training dataset respectively.

Thus, any suitable μ and σ real valued parameters may be applied to the WID-EC-index in any of the assays described herein. Any suitable training data set may be applied to the assays described herein in order to infer real valued parameters and coefficients that can subsequently be applied to the WID-EC-index formula according to the present invention. Exemplary ways of utilising a training dataset in accordance with the present invention are further described in the '*Statistical analyses for classifier development*' section of the Materials and Methods section of the Examples.

Exemplary μ and σ real valued parameters are provided in Table 2 for CpG subsets identified in SEQ ID NOs 1 to 500. These real valued parameters may be applied to any of the assays described herein wherein the real parameters correspond to any one of the sets of CpGs identified in SEQ ID NOs 1 to 500 and set out in the left hand column of Table 2.

SEQ ID NOs:	mu	sigma
1-50	2.880073	4.148988
1-100	3.43488	4.076555
1-150	3.897919	4.129713
1-200	3.861902	3.842672
1-250	3.774098	4.12993
1-300	3.807151	4.17154
1-350	3.662246	4.109188
1-400	3.316238	3.984151
1-450	3.351052	3.982014
1-500	3.667061	4.171657

Table 2. Exemplary μ and σ real valued parameters are provided in Table 2 for CpG subsets identified in SEQ ID NOs 1 to 500

Exemplary $w_1, \ldots, w_n$ real value coefficients are provided below for the CpGs identified at positions 61 to 62 in SEQ ID NOs 1 to 500. These real value coefficients may be applied to any of the assays described herein wherein the real parameters correspond to any one of the sets of CpGs identified in SEQ ID NOs 1 to 500 wherein the 500 real value coefficients below in turn correspond to the CpGs in turn identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500 . Accordingly, the listed coefficients are presented below in numerical order corresponding respectively to the CpGs identified in SEQ ID NOs 1 to 5000. Thus the first number below corresponds to SEQ ID NO 1, the second number corresponds to SEQ ID NO 2 etc. The exemplary real value coefficients are as follows:

2.32966, 1.95059, 1.87174, 1.86617, 1.65489, 1.60169, -1.52485, 1.4846, 1.48231, 1.47445, 1.47342, 1.4441, 1.40984, -1.40743, 1.3761, 1.32123, -1.29551, 1.29183, -1.26448, 1.26166, -1.2578, -1.23771, 1.23418, -1.19877, 1.16649, 1.16451, 1.1421, 1.13892, -1.13096, 1.12541, 1.08222, 1.04719, 1.02739, 1.0262, 1.01259, 0.94512, 0.93919, 0.93148, 0.90943, 0.9025, 0.89635, 0.89152, -0.89049, -0.88852, -0.88615, 0.88339, -0.88238, -0.84763, 0.84381, 0.84281, -0.81762, -0.80659, 0.80114, -0.79765, -0.77473, -0.77145, 0.76203, -0.75583, 0.75558, 0.7419, 0.73368, 0.73031, -0.72253, -0.71934, -0.7095, 0.70083, 0.69289, -0.68917, -0.68351, -0.67983, 0.67887, 0.67199, -0.67196, -0.67186, 0.6693, -0.66391, 0.66347, -0.64944, -0.6407, 0.63298, 0.6277, 0.6159, -0.61381, -0.61247, 0.60994, -0.60626, -0.59996, 0.58813, 0.58678, -0.58473, 0.58414, 0.57932, 0.57361, 0.56698, 0.56338, 0.55991, -0.55792, -0.5568, -0.55381, 0.54696, 0.54651, 0.54566, -0.54331, 0.54171, 0.53775, 0.53111, -0.52707, 0.52526,

0.52488, 0.52102, -0.51622, -0.51409, -0.50784, -0.50732, -0.5063, -0.5026, 0.4983, -0.49476, 0.49368, -0.49317, 0.49183, -0.49079, -0.4825, -0.47419, -0.47231, 0.47057, -0.46063, -0.45931, -0.4517, -0.45066, 0.45017, 0.44947, 0.44946, 0.44407, 0.44333, 0.44312, -0.44228, 0.4386, -0.43757, 0.43618, -0.43183, 0.43138, 0.42876, -0.42769, -0.42701, -0.42635, -0.42458, -0.42425, 0.4214, -0.41693, 0.41445, 0.41152, -0.40511, 0.4017, -0.4001, -0.39825, 0.39582, 0.3921, -0.39146, -0.39114, -0.39101, 0.39046, -0.38991, 0.38989, -0.38837, -0.38587, -0.38464, 0.38453, -0.37816, 0.37631, -0.37551, 0.37536, -0.3738, 0.37293, 0.3729, 0.37046, -0.36971, 0.36901, 0.36684, -0.36451, 0.36449, -0.36442, 0.36383, -0.36291, 0.35913, -0.35596, 0.35594, -0.35422, -0.35344, 0.35168, 0.35008, 0.34932, 0.3479, 0.33951, -0.33902, -0.33693, 0.33589, 0.33518, -0.33354, -0.32969, -0.32906, 0.32799, -0.32761, -0.32373, 0.32287, -0.32125, -0.32052, 0.31686, 0.31205, 0.30807, -0.30682, -0.30671, -0.3051, -0.30257, -0.30238, 0.29616, -0.29598, 0.29579, 0.29554, 0.29553, 0.29552, -0.29492, -0.29464, 0.29168, -0.29124, -0.29108, 0.29078, 0.28992, 0.28904, -0.28898, 0.28857, 0.28584, 0.28496, -0.28375, 0.28254, -0.28172, 0.28088, 0.28033, 0.28024, 0.27964, 0.27814, 0.27351, -0.27199, -0.26681, -0.26572, -0.26482, 0.26282, -0.26196, 0.26167, -0.25997, 0.25947, -0.2582, -0.25679, -0.25527, 0.25448, -0.25443, 0.25302, 0.25204, 0.25198, -0.25098, -0.24987, -0.24811, -0.24735, 0.24589, 0.24566, -0.24389, 0.24355, 0.2433, -0.24253, -0.24066, -0.23859, 0.2381, 0.23454, -0.23433, 0.23349, -0.2332, -0.23185, -0.23092, 0.22721, 0.22664, -0.22602, 0.22147, 0.22089, 0.21875, 0.21869, 0.21644, -0.2164, -0.21569, -0.21555, 0.21494, -0.21491, 0.21266, -0.21264, -0.21258, -0.21237, 0.20801, 0.2073, -0.2054, -0.20527, 0.20216, -0.20175, 0.20159, 0.19936, -0.19924, 0.19851, -0.19521, 0.19502, -0.19436, 0.1942, -0.19284, -0.19253, -0.19086, -0.19076, 0.18983, -0.18908, -0.18795, 0.18669, 0.18616, 0.18415, 0.18398, -0.18331, 0.18297, 0.1817, 0.18094, -0.17951, -0.17894, 0.17722, -0.17719, 0.1771, 0.17613, -0.17517, -0.1745, -0.1739, -0.17205, 0.17203, -0.17156, -0.17088, 0.17084, -0.16955, -0.16933, -0.16659, 0.16417, -0.16366, -0.16063, -0.15928, -0.15883, -0.15631, -0.15543, -0.15504, -0.15367, -0.15211, 0.15155, -0.15136, -0.14875, -0.14763, -0.14623, 0.14084, -0.14027, 0.13945, -0.13918, -0.13807, 0.13787, 0.13747, -0.13745, -0.1358, -0.1354, 0.13442, 0.13287, -0.13083, -0.13017, -0.12858, -0.12794, 0.1279, -0.12639, 0.12472, 0.12451, -0.12409, -0.12237, 0.12222, -0.12063, 0.1202, -0.1186, -0.11855, -0.11781, 0.1171, 0.11674, 0.11558, -0.11356, -0.11325, -0.11304, 0.11228, -0.11198, -0.11176, -0.11094, -0.11023, 0.10822, 0.10798, -0.10794, 0.10786, -0.10719, -0.10512, 0.10485, -0.10472, 0.10422, -0.10366, -0.10352, 0.10349, 0.10115, 0.09742, 0.09554, 0.09475, -0.09452, 0.09413, 0.09279, 0.09095, -0.09058, -0.08692, 0.08546, 0.08527, 0.08234, 0.08225, 0.08034, -0.07898, -0.07844, 0.07581, 0.07534, -0.07492, -0.07315, -0.06965, -0.06891, -0.06813, -0.06763, 0.06733, -0.06613, -0.06587, 0.06558, -0.0645, -0.06294, 0.06163, -0.06075, -0.06061, 0.05772, 0.05563, -0.05531, -0.05395, -0.05349, -0.05207, -0.05088, -0.04909, 0.04894, 0.04817, -0.0475, 0.04684, -0.0437, -0.04325, 0.04069, 0.04061, 0.03859, -0.0379, -0.03773, 0.03649, 0.03592, -0.03564, 0.03468, 0.03356, -0.03242, 0.03235, 0.02751, -0.0273, -0.02729, 0.02726, -0.02588, -0.02556, -0.02538, -0.02536, -0.02408, 0.02189, 0.01846, -0.01608, 0.01572, 0.01462, -0.01254, -

0.0117, 0.01122, -0.01112, -0.01092, -0.00938, -0.00906, -0.00851, -0.00846, -0.00818, -0.00662, -0.00621, -0.00543, 0.00291, 0.00232, 0.00112, -0.00063, -0.00034, and -0.00021.

The predicting the presence, absence or development of cancer in an individual may particularly involve a threshold cancer index value being applied in order to assess or stratify an individual has having or not having cancer or of having a high or low risk of cancer development.

The assays of the invention may involve a threshold index being applied in order to assess the presence or absence of cancer and/or CIN3 in an individual. The assessment may be characterised by receiver operating characteristics, particularly and area under the curve (AUC), sensitivity, and specificity, indicative of the reliability of the threshold being applied in order to assess the presence or absence of cancer and/or CIN3 in an individual.

In any of the assays described herein, wherein when the cancer index value for the individual is about -0.201 or more, the individual is assessed as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, or wherein when the cancer index value for the individual is less than about -0.201, the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, and more preferably wherein the assessing the presence, absence or development of cancer in an individual is based on the WID-EC-Index. The panel of one or more CpGs used to derive the cancer index value may comprise:

1. at least 50 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 88% and the specificity is at least 76%;
2. at least 100 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 88% and specificity is at least 78%;

3. at least 150 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 88% and specificity is at least 76%;
4. at least 200 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 88% and specificity is at least 78%;
5. at least 250 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 88% and specificity is at least 78%;
6. at least 300 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 89% and specificity is at least 79%;
7. at least 350 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 88% and specificity is at least 78%;
8. at least 400 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 90% and specificity is at least 79%;
9. at least 450 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 89% and specificity is at least 79%; or
10. at least 500 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 95% and specificity is at least 76%.

In any of the assays described herein, wherein when the cancer index value for the individual is about -0.201 or more, the individual is assessed as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, or wherein when the cancer index value for the individual is less than about -0.201, the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, preferably wherein the assay comprises determining methylation β-

values for each CpG in the panel of one or more CpGs, and more preferably wherein the assessing the presence, absence or development of cancer in an individual is based on the WID-EC-Index. The panel of one or more CpGs used to derive the cancer index value may comprise:

a. at least 50 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 88% and the specificity is at least 76%;
b. at least the CpGs defined by SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 90% and specificity is at least 80%;
c. at least the CpGs defined by SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 92% and specificity is at least 79%; or
d. at least the CpGs defined by SEQ ID NOs 1 to 150 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 93% and specificity is at least 80%.

In any of the assays described herein, wherein when the cancer index value for the individual is about -0.201 or more, the individual is assessed as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, or wherein when the cancer index value for the individual is less than about -0.201, the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, and more preferably wherein the assessing the presence, absence or development of cancer in an individual is based on the WID-EC-Index. The panel of one or more CpGs used to derive the cancer index value may comprise:

1. at least the CpGs defined by SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 90% and specificity is at least 80%;

2. at least the CpGs defined by SEQ ID NOs 51 to 100 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 89% and specificity is at least 79%;
3. at least the CpGs defined by SEQ ID NOs 101 to 150 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 92% and specificity is at least 80%;
4. at least the CpGs defined by SEQ ID NOs 151 to 200 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 89% and specificity is at least 71%;
5. at least the CpGs defined by SEQ ID NOs 201 to 250 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 90% and specificity is at least 76%;
6. at least the CpGs defined by SEQ ID NOs 251 to 300 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 89% and specificity is at least 79%;
7. at least the CpGs defined by SEQ ID NOs 301 to 350 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 89% and specificity is at least 80%;
8. at least the CpGs defined by SEQ ID NOs 351 to 400 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 90% and specificity is at least 77%;
9. at least the CpGs defined by SEQ ID NOs 401 to 450 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 88% and specificity is at least 76%;
10. at least the CpGs defined by SEQ ID NOs 451 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 88% and specificity is at least 76%;
11. at least the CpGs defined by SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 90% and specificity is at least 80%;

12. at least the CpGs defined by SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 92% and specificity is at least 79%;
13. at least the CpGs defined by SEQ ID NOs 1 to 150 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 93% and specificity is at least 80%;
14. at least the CpGs defined by SEQ ID NOs 1 to 200 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 93% and specificity is at least 78%;
15. at least the CpGs defined by SEQ ID NOs 1 to 250 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 95% and specificity is at least 78%;
16. at least the CpGs defined by SEQ ID NOs 1 to 300 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 95% and specificity is at least 77%;
17. at least the CpGs defined by SEQ ID NOs 1 to 350 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 95% and specificity is at least 77%;
18. at least the CpGs defined by SEQ ID NOs 1 to 400 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 95% and specificity is at least 78%;
19. at least the CpGs defined by SEQ ID NOs 1 to 450 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 95% and specificity is at least 78%;
20. at least the CpGs defined by SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 95% and specificity is at least 76%;
21. at least the CpGs defined by SEQ ID NOs 451 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 88% and specificity is at least 76%;

22. at least the CpGs defined by SEQ ID NOs 401 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 88% and specificity is at least 78%;
23. at least the CpGs defined by SEQ ID NOs 351 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 88% and specificity is at least 76%;
24. at least the CpGs defined by SEQ ID NOs 301 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 88% and specificity is at least 78%;
25. at least the CpGs defined by SEQ ID NOs 251 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 88% and specificity is at least 78%;
26. at least the CpGs defined by SEQ ID NOs 201 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 89% and specificity is at least 79%;
27. at least the CpGs defined by SEQ ID NOs 151 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 88% and specificity is at least 78%;
28. at least the CpGs defined by SEQ ID NOs 101 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 90% and specificity is at least 79%;
29. at least the CpGs defined by SEQ ID NOs 51 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 89% and specificity is at least 79%; or
30. at least the CpGs defined by SEQ ID NOs 1 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 95% and specificity is at least 76%.

In any of the described assays, the methylation status of the one or more CpGs in the panel is preferably determined by a β-value analysis, and the cancer is endometrial cancer of ovarian cancer. Preferably, the cancer is endometrial cancer.

In any of the assays described herein, wherein when the cancer index value for the individual is about 0.269 or more, the individual is assessed as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, or wherein when the cancer index value for the individual is less than about 0.269, the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, and more preferably wherein the assessing the presence, absence or development of cancer in an individual is based on the WID-EC-Index. The panel of one or more CpGs used to derive the cancer index value may comprise:

1. at least 50 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 75% and the specificity is at least 94%;
2. at least 100 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 73% and specificity is at least 96%;
3. at least 150 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 74% and specificity is at least 95%;
4. at least 200 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 73% and specificity is at least 96%;
5. at least 250 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 73% and specificity is at least 96%;
6. at least 300 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 73% and specificity is at least 97%;

7. at least 350 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 73% and specificity is at least 96%;
8. at least 400 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 77% and specificity is at least 96%;
9. at least 450 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 77% and specificity is at least 97%; or
10. at least 500 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 79% and specificity is at least 96%.

In any of the assays described herein, wherein when the cancer index value for the individual is about 0.269 or more, the individual is assessed as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, or wherein when the cancer index value for the individual is less than about 0.269, the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, and more preferably wherein the assessing the presence, absence or development of cancer in an individual is based on the WID-EC-Index. The panel of one or more CpGs used to derive the cancer index value may comprise:

a. at least 50 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 75% and the specificity is at least 94%;
b. at least the CpGs defined by SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 73% and specificity is at least 98%;

c. at least the CpGs defined by SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 75% and specificity is at least 98%;

d. at least the CpGs defined by SEQ ID NOs 1 to 150 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 79% and specificity is at least 97%.

In any of the assays described herein, wherein when the cancer index value for the individual is about 0.269 or more, the individual is assessed as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, or wherein when the cancer index value for the individual is less than about 0.269, the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, and more preferably wherein the assessing the presence, absence or development of cancer in an individual is based on the WID-EC-Index. The panel of one or more CpGs used to derive the cancer index value may comprise:

1. at least the CpGs defined by SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 73% and specificity is at least 98%;
2. at least the CpGs defined by SEQ ID NOs 51 to 100 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 73% and specificity is at least 98%;
3. at least the CpGs defined by SEQ ID NOs 101 to 150 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 74% and specificity is at least 96%;
4. at least the CpGs defined by SEQ ID NOs 151 to 200 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 77% and specificity is at least 95%;

5. at least the CpGs defined by SEQ ID NOs 201 to 250 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 75% and specificity is at least 97%;
6. at least the CpGs defined by SEQ ID NOs 251 to 300 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 71% and specificity is at least 96%;
7. at least the CpGs defined by SEQ ID NOs 301 to 350 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 70% and specificity is at least 97%;
8. at least the CpGs defined by SEQ ID NOs 351 to 400 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 73% and specificity is at least 96%;
9. at least the CpGs defined by SEQ ID NOs 401 to 450 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 71% and specificity is at least 95%;
10. at least the CpGs defined by SEQ ID NOs 451 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 75% and specificity is at least 94%;
11. at least the CpGs defined by SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 73% and specificity is at least 98%;
12. at least the CpGs defined by SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 75% and specificity is at least 98%;
13. at least the CpGs defined by SEQ ID NOs 1 to 150 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 79% and specificity is at least 97%;
14. at least the CpGs defined by SEQ ID NOs 1 to 200 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 79% and specificity is at least 97%;

15. at least the CpGs defined by SEQ ID NOs 1 to 250 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 79% and specificity is at least 96%;
16. at least the CpGs defined by SEQ ID NOs 1 to 300 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 79% and specificity is at least 96%;
17. at least the CpGs defined by SEQ ID NOs 1 to 350 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 79% and specificity is at least 97%;
18. at least the CpGs defined by SEQ ID NOs 1 to 400 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 79% and specificity is at least 96%;
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20. at least the CpGs defined by SEQ ID NOs 1 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 79% and specificity is at least 96%;
21. at least the CpGs defined by SEQ ID NOs 451 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 75% and specificity is at least 94%;
22. at least the CpGs defined by SEQ ID NOs 401 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 73% and specificity is at least 96%;
23. at least the CpGs defined by SEQ ID NOs 351 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 74% and specificity is at least 95%;
24. at least the CpGs defined by SEQ ID NOs 301 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 73% and specificity is at least 96%;

25. at least the CpGs defined by SEQ ID NOs 251 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 73% and specificity is at least 96%;
26. at least the CpGs defined by SEQ ID NOs 201 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 73% and specificity is at least 97%;
27. at least the CpGs defined by SEQ ID NOs 151 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 73% and specificity is at least 96%;
28. at least the CpGs defined by SEQ ID NOs 101 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 77% and specificity is at least 96%;
29. at least the CpGs defined by SEQ ID NOs 51 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 77% and specificity is at least 97%; or
30. at least the CpGs defined by SEQ ID NOs 1 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 79% and specificity is at least 96%.

In any of the described assays, the methylation status of the one or more CpGs in the panel is preferably determined by a β-value analysis, and the cancer is endometrial cancer of ovarian cancer. Preferably, the cancer is endometrial cancer.

In any of the assays described herein, wherein when the cancer index value for the individual is about 1.072 or more, the individual is assessed as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, or wherein when the cancer index value for the individual is less than about 1.072, the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, and more preferably wherein the assessing the presence, absence or development of cancer in an individual is based on

the WID-EC-Index. The panel of one or more CpGs used to derive the cancer index value may comprise:

1. at least 50 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 58% and the specificity is at least 99%;
2. at least 100 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 53% and specificity is at least 99%;
3. at least 150 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 53% and specificity is at least 99%;
4. at least 200 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 53% and specificity is at least 99%;
5. at least 250 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 53% and specificity is at least 99%;
6. at least 300 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 55% and specificity is at least 99%;
7. at least 350 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 58% and specificity is at least 99%;
8. at least 400 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 58% and specificity is at least 99%;
9. at least 450 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 59% and specificity is 100%; or

10. at least 500 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 64% and specificity is 100%.

In any of the assays described herein, wherein when the cancer index value for the individual is about 1.072 or more, the individual is assessed as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, or wherein when the cancer index value for the individual is less than about 1.072, the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, and more preferably wherein the assessing the presence, absence or development of cancer in an individual is based on the WID-EC-Index. The panel of one or more CpGs used to derive the cancer index value may comprise:

a. at least 50 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 58% and the specificity is at least 99%;
b. at least the CpGs defined by SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 60% and specificity is 100%;
c. at least the CpGs defined by SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 63% and specificity is 100%;
d. at least the CpGs defined by SEQ ID NOs 1 to 150 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 64% and specificity is 100%.

In any of the assays described herein, wherein when the cancer index value for the individual is about 1.072 or more, the individual is assessed as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, or wherein when the cancer index value for the individual is less than about 1.072, the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3

development, preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, and more preferably wherein the assessing the presence, absence or development of cancer in an individual is based on the WID-EC-Index. The panel of one or more CpGs used to derive the cancer index value may comprise:

1. at least the CpGs defined by SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 60% and specificity is 100%;
2. at least the CpGs defined by SEQ ID NOs 51 to 100 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 60% and specificity is at least 99%;
3. at least the CpGs defined by SEQ ID NOs 101 to 150 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 58% and specificity is 100%;
4. at least the CpGs defined by SEQ ID NOs 151 to 200 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 60% and specificity is at least 99%;
5. at least the CpGs defined by SEQ ID NOs 201 to 250 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 58% and specificity is at least 99%;
6. at least the CpGs defined by SEQ ID NOs 251 to 300 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 53% and specificity is at least 99%;
7. at least the CpGs defined by SEQ ID NOs 301 to 350 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 52% and specificity is 100%;
8. at least the CpGs defined by SEQ ID NOs 351 to 400 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 56% and specificity is at least 99%;

9. at least the CpGs defined by SEQ ID NOs 401 to 450 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 52% and specificity is at least 99%;
10. at least the CpGs defined by SEQ ID NOs 451 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 58% and specificity is at least 99%;
11. at least the CpGs defined by SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 60% and specificity is 100%;
12. at least the CpGs defined by SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 63% and specificity is 100%;
13. at least the CpGs defined by SEQ ID NOs 1 to 150 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 64% and specificity is 100%;
14. at least the CpGs defined by SEQ ID NOs 1 to 200 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 64% and specificity is 100%;
15. at least the CpGs defined by SEQ ID NOs 1 to 250 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 64% and specificity is 100%;
16. at least the CpGs defined by SEQ ID NOs 1 to 300 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 64% and specificity is 100%;
17. at least the CpGs defined by SEQ ID NOs 1 to 350 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 64% and specificity is 100%;
18. at least the CpGs defined by SEQ ID NOs 1 to 400 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 63% and specificity is 100%;

19. at least the CpGs defined by SEQ ID NOs 1 to 450 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 64% and specificity is 100%;
20. at least the CpGs defined by SEQ ID NOs 1 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 64% and specificity is 100%;
21. at least the CpGs defined by SEQ ID NOs 451 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 58% and specificity is at least 99%;
22. at least the CpGs defined by SEQ ID NOs 401 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 53% and specificity is at least 99%;
23. at least the CpGs defined by SEQ ID NOs 351 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 53% and specificity is at least 99%;
24. at least the CpGs defined by SEQ ID NOs 301 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 53% and specificity is at least 99%;
25. at least the CpGs defined by SEQ ID NOs 251 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 53% and specificity is at least 99%;
26. at least the CpGs defined by SEQ ID NOs 201 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 55% and specificity is at least 99%;
27. at least the CpGs defined by SEQ ID NOs 151 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 58% and specificity is at least 99%;
28. at least the CpGs defined by SEQ ID NOs 101 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 58% and specificity is at least 99%;

29. at least the CpGs defined by SEQ ID NOs 51 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 59% and specificity is 100%; or
30. at least the CpGs defined by SEQ ID NOs 1 to 500 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 64% and specificity is 100%.

In any of the described assays, the methylation status of the one or more CpGs in the panel is preferably determined by a β-value analysis, and the cancer is endometrial cancer of ovarian cancer. Preferably, the cancer is endometrial cancer.

The ROC data set out in Tables 3, 4 and 5 corresponding to each specified panel of SEQ ID NOs: 1 to 500 are derived by determining a cancer index value from said panel.

Table 3

CpG Subset (SEQ ID NO)	AUC (internal validation)	Sensitivity (q = 1.072)	Specificity (q = 1.072)	Sensitivity (q = 0.269)	Specificity (q = 0.269)	Sensitivity (q = -0.201)	Specificity (q = -0.201)
1-50	0.95	0.6	1	0.73	0.98	0.9	0.8
51-100	0.94	0.6	0.99	0.73	0.98	0.89	0.79
101-150	0.94	0.58	1	0.74	0.96	0.92	0.8
151-200	0.93	0.6	0.99	0.77	0.95	0.89	0.71
201-250	0.95	0.58	0.99	0.75	0.97	0.9	0.76
251-300	0.93	0.53	0.99	0.71	0.96	0.89	0.79
301-350	0.94	0.52	1	0.7	0.97	0.89	0.8
351-400	0.93	0.56	0.99	0.73	0.96	0.9	0.77
401-450	0.93	0.52	0.99	0.71	0.95	0.88	0.76
451-500	0.92	0.58	0.99	0.75	0.94	0.88	0.76

Table 4

CpG Subset (SEQ ID NO)	AUC (internal validation)	Sensitivity (q = 1.072)	Specificity (q = 1.072)	Sensitivity (q = 0.269)	Specificity (q = 0.269)	Sensitivity (q = -0.201)	Specificity (q = -0.201)
1-50	0.95	0.6	1	0.73	0.98	0.9	0.8
1-100	0.96	0.63	1	0.75	0.98	0.92	0.79
1-150	0.96	0.64	1	0.79	0.97	0.93	0.8
1-200	0.96	0.64	1	0.79	0.97	0.93	0.78
1-250	0.96	0.64	1	0.79	0.96	0.95	0.78
1-300	0.96	0.64	1	0.79	0.96	0.95	0.77
1-350	0.96	0.64	1	0.79	0.97	0.95	0.77
1-400	0.96	0.63	1	0.79	0.96	0.95	0.78
1-450	0.97	0.64	1	0.79	0.96	0.95	0.78
1-500	0.97	0.64	1	0.79	0.96	0.95	0.76

Table 5

CpG subset (SEQ ID NO)	AUC (internal validation)	Sensitivity (q = 1.072)	Specificity (q = 1.072)	Sensitivity (q = 0.269)	Specificity (q = 0.269)	Sensitivity (q = -0.201)	Specificity (q = -0.201)
1-500	0.97	0.64	1	0.79	0.96	0.95	0.76
51-500	0.95	0.59	1	0.77	0.97	0.89	0.79
101-500	0.94	0.58	0.99	0.77	0.96	0.9	0.79
151-500	0.94	0.58	0.99	0.73	0.96	0.88	0.78
201-500	0.94	0.55	0.99	0.73	0.97	0.89	0.79
251-500	0.93	0.53	0.99	0.73	0.96	0.88	0.78
301-500	0.93	0.53	0.99	0.73	0.96	0.88	0.78
351-500	0.93	0.53	0.99	0.74	0.95	0.88	0.76
401-500	0.93	0.53	0.99	0.73	0.96	0.88	0.78
451-500	0.92	0.58	0.99	0.75	0.94	0.88	0.76

The predicting of the presence, absence, or development of cancer in an individual may particularly involve determining the mean β-value across any panel of one or more CpGs defined herein. A threshold mean β-value may be applied in order to stratify an individual as having or not having cancer, or of having a high or low risk of cancer development, preferably wherein the cancer is endometrial or ovarian cancer, more preferably wherein the cancer is endometrial cancer.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.025 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.025 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.050 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.050 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.075 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.075 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.100 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.100 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.125 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.125 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.150 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.150 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.175 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.175 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.200 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.200 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.225 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.225 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.250 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.250 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.275 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.275 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.300 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.300 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.325 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or

b. when the cancer index for the individual is less than about 0.325 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.350 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.350 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.375 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.375 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.400 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.400 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.425 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.425 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.450 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.450 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.475 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or
b. when the cancer index for the individual is less than about 0.475 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.500 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or

b. when the cancer index for the individual is less than about 0.500 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.525 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or

b. when the cancer index for the individual is less than about 0.525 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein, wherein:

a. when the cancer index for the individual is about 0.550 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or

b. when the cancer index for the individual is less than about 0.550 the individual is classified as not having cancer;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

In any of the assays described herein:

1. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 1 defined by SEQ ID NO: 501, and wherein when the cancer index for the individual

is about 0.209 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 1, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 501;

2. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 1 defined by SEQ ID NO: 501, and wherein when the cancer index for the individual is less than about 0.209 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 1, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 501;
3. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 2 defined by SEQ ID NO: 502, and wherein when the cancer index for the individual is about 0.271 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 77.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpG from DMR 2, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 502;
4. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 2 defined by SEQ ID NO: 502, and wherein when the cancer index for the individual is less than about 0.271 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 77.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 2, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 502;
5. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 3 defined by SEQ ID NO: 503, and wherein when the cancer index for the individual is about 0.123 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 3, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 503;

6. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 3 defined by SEQ ID NO: 503, and wherein when the cancer index for the individual is less than about 0.123 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 3, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 503;
7. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 4 defined by SEQ ID NO: 504, and wherein when the cancer index for the individual is about 0.123 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 4, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 504;
8. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 4 defined by SEQ ID NO: 504, and wherein when the cancer index for the individual is less than about 0.123 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 4, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 504;
9. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 5 defined by SEQ ID NO: 505, and wherein when the cancer index for the individual is about 0.105 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 5, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 505;
10. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 5 defined by SEQ ID NO: 505, and wherein when the cancer index for the individual

is less than about 0.105 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 5, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 505;

11. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 6 defined by SEQ ID NO: 506, and wherein when the cancer index for the individual is about 0.056 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 6, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 506;
12. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 6 defined by SEQ ID NO: 506, and wherein when the cancer index for the individual is less than about 0.056 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 6, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 506;
13. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 7 defined by SEQ ID NO: 507, and wherein when the cancer index for the individual is about 0.155 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 7, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 507;
14. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 7 defined by SEQ ID NO: 507, and wherein when the cancer index for the individual is less than about 0.155 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 7, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 507;

15. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 8 defined by SEQ ID NO: 508, and wherein when the cancer index for the individual is about 0.083 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 8, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 508;
16. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 8 defined by SEQ ID NO: 508, and wherein when the cancer index for the individual is less than about 0.083 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 8, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 508;
17. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 9 defined by SEQ ID NO: 509, and wherein when the cancer index for the individual is about 0.168 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 9, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 509;
18. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 9 defined by SEQ ID NO: 509, and wherein when the cancer index for the individual is less than about 0.168 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 9, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 509;
19. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 10 defined by SEQ ID NO: 510, and wherein when the cancer index for the

individual is about 0.265 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 10, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 510;

20. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 10 defined by SEQ ID NO: 510, and wherein when the cancer index for the individual is less than about 0.265 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 10, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 510;
21. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 11 defined by SEQ ID NO: 511, and wherein when the cancer index for the individual is about 0.128 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 11, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 511;
22. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 11 defined by SEQ ID NO: 511, and wherein when the cancer index for the individual is less than about 0.128 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 11, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 511;
23. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 12 defined by SEQ ID NO: 512, and wherein when the cancer index for the individual is about 0.127 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 12, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 512;

24. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 12 defined by SEQ ID NO: 512, and wherein when the cancer index for the individual is less than about 0.127 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 12, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 512;
25. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 13 defined by SEQ ID NO: 513, and wherein when the cancer index for the individual is about 0.127 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 13, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 513;
26. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 13 defined by SEQ ID NO: 513, and wherein when the cancer index for the individual is less than about 0.127 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 13, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 513;
27. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 14 defined by SEQ ID NO: 514, and wherein when the cancer index for the individual is about 0.133 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 74.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 14, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 514;
28. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 14 defined by SEQ ID NO: 514, and wherein when the cancer index for the

individual is less than about 0.133 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 74.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 14, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 514;

29. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 15 defined by SEQ ID NO: 515, and wherein when the cancer index for the individual is about 0.125 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 15, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 515;
30. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 15 defined by SEQ ID NO: 515, and wherein when the cancer index for the individual is less than about 0.125 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 15, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 515;
31. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 16 defined by SEQ ID NO: 516, and wherein when the cancer index for the individual is about 0.127 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 16, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 516;
32. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 16 defined by SEQ ID NO: 516, and wherein when the cancer index for the individual is less than about 0.127 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from

DMR 16, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 516;

33. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 17 defined by SEQ ID NO: 517, and wherein when the cancer index for the individual is about 0.113 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 17, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 517;
34. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 17 defined by SEQ ID NO: 517, and wherein when the cancer index for the individual is less than about 0.113 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 17, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 517;
35. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 18 defined by SEQ ID NO: 518, and wherein when the cancer index for the individual is about 0.113 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 18, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 518;
36. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 18 defined by SEQ ID NO: 518, and wherein when the cancer index for the individual is less than about 0.113 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 18, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 518;
37. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 19 defined by SEQ ID NO: 519, and wherein when the cancer index for the

individual is about 0.143 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 19, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 519;

38. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 19 defined by SEQ ID NO: 519, and wherein when the cancer index for the individual is less than about 0.143 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 19, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 519;
39. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 20 defined by SEQ ID NO: 520, and wherein when the cancer index for the individual is about 0.095 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 20, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 520;
40. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 20 defined by SEQ ID NO: 520, and wherein when the cancer index for the individual is less than about 0.095 the individual is classified as not having cancer or as having a low high risk of cancer development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 20, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 520;
41. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 21 defined by SEQ ID NO: 521, and wherein when the cancer index for the individual is about 0.146 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 21, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 521;

42. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 21 defined by SEQ ID NO: 521, and wherein when the cancer index for the individual is less than about 0.146 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 21, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 521;
43. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 22 defined by SEQ ID NO: 522, and wherein when the cancer index for the individual is about 0.098 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty-two CpGs from DMR 22, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 522;
44. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 22 defined by SEQ ID NO: 522, and wherein when the cancer index for the individual is less than about 0.098 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty-two CpGs from DMR 22, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 522;
45. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 23 defined by SEQ ID NO: 523, and wherein when the cancer index for the individual is about 0.177 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 23, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 523;
46. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 23 defined by SEQ ID NO: 523, and wherein when the cancer index for the

individual is less than about 0.177 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 23, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 523;

47. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 24 defined by SEQ ID NO: 524, and wherein when the cancer index for the individual is about 0.098 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty-one CpGs from DMR 24, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 524;
48. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 24 defined by SEQ ID NO: 524, and wherein when the cancer index for the individual is less than about 0.098 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty-one CpGs from DMR 24, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 524;
49. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 25 defined by SEQ ID NO: 525, and wherein when the cancer index for the individual is about 0.039 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 74.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 25, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 525;
50. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 25 defined by SEQ ID NO: 525, and wherein when the cancer index for the individual is less than about 0.039 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 74.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR

25, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 525;

51. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 26 defined by SEQ ID NO: 526, and wherein when the cancer index for the individual is about 0.154 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 26, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 526;
52. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 26 defined by SEQ ID NO: 526, and wherein when the cancer index for the individual is less than about 0.154 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 26, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 526;
53. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 27 defined by SEQ ID NO: 527, and wherein when the cancer index for the individual is about 0.1 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty-one CpGs from DMR 27, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 527;
54. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 27 defined by SEQ ID NO: 527, and wherein when the cancer index for the individual is less than about 0.1 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty-one CpGs from DMR 27, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 527;
55. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 28 defined by SEQ ID NO: 528, and wherein when the cancer index for the

individual is about 0.124 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty-three CpGs from DMR 28, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 528;

56. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 28 defined by SEQ ID NO: 528, and wherein when the cancer index for the individual is less than about 0.124 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty-three CpGs from DMR 28, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 528;
57. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 29 defined by SEQ ID NO: 529, and wherein when the cancer index for the individual is about 0.171 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least ten CpGs from DMR 29, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 529;
58. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 29 defined by SEQ ID NO: 529, and wherein when the cancer index for the individual is less than about 0.171 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least ten CpGs from DMR 29, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 529;
59. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 30 defined by SEQ ID NO: 530, and wherein when the cancer index for the individual is about 0.108 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty-two CpGs from DMR

30, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 530;

60. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 30 defined by SEQ ID NO: 530, and wherein when the cancer index for the individual is less than about 0.108 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty-two CpGs from DMR 30, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 530;
61. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 31 defined by SEQ ID NO: 531, and wherein when the cancer index for the individual is about 0.108 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty-two CpGs from DMR 31, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 531;
62. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 31 defined by SEQ ID NO: 531, and wherein when the cancer index for the individual is less than about 0.108 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty-two CpGs from DMR 31, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 531;
63. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 32 defined by SEQ ID NO: 532, and wherein when the cancer index for the individual is about 0.091 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 32, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 532;
64. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 32 defined by SEQ ID NO: 532, and wherein when the cancer index for the

individual is less than about 0.091 the individual is classified as not having cancer or as having a low high risk of cancer development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 32, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 532;

65. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 33 defined by SEQ ID NO: 533, and wherein when the cancer index for the individual is about 0.174 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 33, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 533;
66. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 33 defined by SEQ ID NO: 533, and wherein when the cancer index for the individual is less than about 0.174 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 33, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 533;
67. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 34 defined by SEQ ID NO: 534, and wherein when the cancer index for the individual is about 0.123 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty CpGs from DMR 34, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 534;
68. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 34 defined by SEQ ID NO: 534, and wherein when the cancer index for the individual is less than about 0.123 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty CpGs from

DMR 34, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 534;

69. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 35 defined by SEQ ID NO: 535, and wherein when the cancer index for the individual is about 0.123 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty CpGs from DMR 35, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 535;
70. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 35 defined by SEQ ID NO: 535, and wherein when the cancer index for the individual is less than about 0.123 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty CpGs from DMR 35, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 535;
71. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 36 defined by SEQ ID NO: 536, and wherein when the cancer index for the individual is about 0.176 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 36, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 536;
72. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 36 defined by SEQ ID NO: 536, and wherein when the cancer index for the individual is less than about 0.176 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 36, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 536;
73. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 37 defined by SEQ ID NO: 537, and wherein when the cancer index for the

individual is about 0.257 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 37, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 537;

74. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 37 defined by SEQ ID NO: 537, and wherein when the cancer index for the individual is less than about 0.257 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 37, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 537;
75. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 38 defined by SEQ ID NO: 538, and wherein when the cancer index for the individual is about 0.123 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty CpGs from DMR 38, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 538;
76. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 38 defined by SEQ ID NO: 538, and wherein when the cancer index for the individual is less than about 0.123 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twenty CpGs from DMR 38, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 538;
77. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 39 defined by SEQ ID NO: 539, and wherein when the cancer index for the individual is about 0.195 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 39, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 539;

78. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 39 defined by SEQ ID NO: 539, and wherein when the cancer index for the individual is less than about 0.195 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 39, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 539;
79. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 40 defined by SEQ ID NO: 540, and wherein when the cancer index for the individual is about 0.195 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 40, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 540;
80. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 40 defined by SEQ ID NO: 540, and wherein when the cancer index for the individual is less than about 0.195 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 40, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 540;
81. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 41 defined by SEQ ID NO: 541, and wherein when the cancer index for the individual is about 0.051 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 41, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 541;
82. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 41 defined by SEQ ID NO: 41, and wherein when the cancer index for the individual

is less than about 0.051 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 341, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 541;

83. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 42 defined by SEQ ID NO: 542, and wherein when the cancer index for the individual is about 0.055 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twelve CpGs from DMR 42, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 542;
84. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 42 defined by SEQ ID NO: 542, and wherein when the cancer index for the individual is less than about 0.055 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twelve CpGs from DMR 42, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 542;
85. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 43 defined by SEQ ID NO: 543, and wherein when the cancer index for the individual is about 0.098 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 43, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 543;
86. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 43 defined by SEQ ID NO: 543, and wherein when the cancer index for the individual is less than about 0.098 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR

43, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 543;

87. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 44 defined by SEQ ID NO: 544, and wherein when the cancer index for the individual is about 0.071 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 44, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 544;
88. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 44 defined by SEQ ID NO: 544, and wherein when the cancer index for the individual is less than about 0.071 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 44, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 544;
89. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 45 defined by SEQ ID NO: 545, and wherein when the cancer index for the individual is about 0.094 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twelve CpGs from DMR 45, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 545;
90. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 45 defined by SEQ ID NO: 545, and wherein when the cancer index for the individual is less than about 0.094 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least twelve CpGs from DMR 45, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 545;
91. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 46 defined by SEQ ID NO: 546, and wherein when the cancer index for the

individual is about 0.374 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 46, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 546;

92. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 46 defined by SEQ ID NO: 546, and wherein when the cancer index for the individual is less than about 0.374 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 46, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 546;
93. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 47 defined by SEQ ID NO: 547, and wherein when the cancer index for the individual is about 0.104 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 47, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 547;
94. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 47 defined by SEQ ID NO: 547, and wherein when the cancer index for the individual is less than about 0.104 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 47, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 547;
95. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 48 defined by SEQ ID NO: 548, and wherein when the cancer index for the individual is about 0.119 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 48, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 548;

96. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 48 defined by SEQ ID NO: 548, and wherein when the cancer index for the individual is less than about 0.119 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 48, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 548;
97. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 49 defined by SEQ ID NO: 549, and wherein when the cancer index for the individual is about 0.119 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 49, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 549;
98. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 49 defined by SEQ ID NO: 549, and wherein when the cancer index for the individual is less than about 0.119 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 49, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 549;
99. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 50 defined by SEQ ID NO: 550, and wherein when the cancer index for the individual is about 0.168 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 50, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 550;
100. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 50 defined by SEQ ID NO: 550, and wherein when the cancer index for the

individual is less than about 0.168 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 50, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 550;

101. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 51 defined by SEQ ID NO: 551, and wherein when the cancer index for the individual is about 0.231 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 51, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 551;

102. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 51 defined by SEQ ID NO: 551, and wherein when the cancer index for the individual is less than about 0.231 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 51, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 551;

103. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 52 defined by SEQ ID NO: 552, and wherein when the cancer index for the individual is about 0.101 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 52, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 552;

104. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 52 defined by SEQ ID NO: 552, and wherein when the cancer index for the individual is less than about 0.101 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR

52, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 552;

105. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 53 defined by SEQ ID NO: 553, and wherein when the cancer index for the individual is about 0.259 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 53, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 553;

106. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 53 defined by SEQ ID NO: 553, and wherein when the cancer index for the individual is less than about 0.259 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 53, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 553;

107. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 54 defined by SEQ ID NO: 554, and wherein when the cancer index for the individual is about 0.259 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 54, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 554;

108. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 54 defined by SEQ ID NO: 554, and wherein when the cancer index for the individual is less than about 0.259 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 54, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 554;

109. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 55 defined by SEQ ID NO: 555, and wherein when the cancer index for the

individual is about 0.279 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 55, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 555;

110. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 55 defined by SEQ ID NO: 555, and wherein when the cancer index for the individual is less than about 0.279 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 55, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 555;

111. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 56 defined by SEQ ID NO: 556, and wherein when the cancer index for the individual is about 0.14 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 56, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 556;

112. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 56 defined by SEQ ID NO: 556, and wherein when the cancer index for the individual is less than about 0.14 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 56, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 556;

113. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 57 defined by SEQ ID NO: 557, and wherein when the cancer index for the individual is about 0.093 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 57, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 557;

114. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 57 defined by SEQ ID NO: 557, and wherein when the cancer index for the individual is less than about 0.093 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 57, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 557;

115. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 58 defined by SEQ ID NO: 558, and wherein when the cancer index for the individual is about 0.119 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 58, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 558;

116. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 58 defined by SEQ ID NO: 558, and wherein when the cancer index for the individual is less than about 0.119 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 58, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 558;

117. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 59 defined by SEQ ID NO: 559, and wherein when the cancer index for the individual is about 0.119 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 59, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 559;

118. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 59 defined by SEQ ID NO: 559, and wherein when the cancer index for the

individual is less than about 0.119 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 59, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 559;

119. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 60 defined by SEQ ID NO: 560, and wherein when the cancer index for the individual is about 0.311 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 60, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 560;

120. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 60 defined by SEQ ID NO: 560, and wherein when the cancer index for the individual is less than about 0.311 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 60, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 560;

121. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 61 defined by SEQ ID NO: 561, and wherein when the cancer index for the individual is about 0.073 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 61, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 561;

122. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 61 defined by SEQ ID NO: 561, and wherein when the cancer index for the individual is less than about 0.073 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from

DMR 61, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 561;

123. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 62 defined by SEQ ID NO: 562, and wherein when the cancer index for the individual is about 0.073 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 62, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 562;

124. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 62 defined by SEQ ID NO: 562, and wherein when the cancer index for the individual is less than about 0.073 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 62, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 562;

125. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 63 defined by SEQ ID NO: 563, and wherein when the cancer index for the individual is about 0.171 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 63, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 563;

126. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 63 defined by SEQ ID NO: 563, and wherein when the cancer index for the individual is less than about 0.171 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 63, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 563;

127. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 64 defined by SEQ ID NO: 564, and wherein when the cancer index for the

individual is about 0.206 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 64, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 564;

128. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 64 defined by SEQ ID NO: 564, and wherein when the cancer index for the individual is less than about 0.206 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 64, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 564;

129. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 65 defined by SEQ ID NO: 565, and wherein when the cancer index for the individual is about 0.206 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 65, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 565;

130. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 65 defined by SEQ ID NO: 565, and wherein when the cancer index for the individual is less than about 0.206 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 65, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 565;

131. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 66 defined by SEQ ID NO: 566, and wherein when the cancer index for the individual is about 0.171 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 66, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 566;

132. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 66 defined by SEQ ID NO: 566, and wherein when the cancer index for the individual is less than about 0.171 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 66, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 566;

133. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 67 defined by SEQ ID NO: 567, and wherein when the cancer index for the individual is about 0.133 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 67, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 567;

134. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 67 defined by SEQ ID NO: 567, and wherein when the cancer index for the individual is less than about 0.133 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 67, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 567;

135. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 68 defined by SEQ ID NO: 568, and wherein when the cancer index for the individual is about 0.233 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 68, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 568;

136. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 68 defined by SEQ ID NO: 568, and wherein when the cancer index for the

individual is less than about 0.233 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 68, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 568;

137. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 69 defined by SEQ ID NO: 569, and wherein when the cancer index for the individual is about 0.09 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 69, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 569;

138. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 69 defined by SEQ ID NO: 569, and wherein when the cancer index for the individual is less than about 0.09 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 69, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 569;

139. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 70 defined by SEQ ID NO: 570, and wherein when the cancer index for the individual is about 0.072 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 70, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 570;

140. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 70 defined by SEQ ID NO: 570, and wherein when the cancer index for the individual is less than about 0.072 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from

DMR 70, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 570;

141. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 71 defined by SEQ ID NO: 571, and wherein when the cancer index for the individual is about 0.129 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 71, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 571;
142. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 71 defined by SEQ ID NO: 571, and wherein when the cancer index for the individual is less than about 0.129 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 71, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 571;
143. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 72 defined by SEQ ID NO: 572, and wherein when the cancer index for the individual is about 0.257 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 72, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 572;
144. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 72 defined by SEQ ID NO: 572, and wherein when the cancer index for the individual is less than about 0.257 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 72, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 572;
145. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 73 defined by SEQ ID NO: 573, and wherein when the cancer index for the

individual is about 0.189 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 73, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 573;

146. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 73 defined by SEQ ID NO: 573, and wherein when the cancer index for the individual is less than about 0.189 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 73, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 573;

147. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 74 defined by SEQ ID NO: 574, and wherein when the cancer index for the individual is about 0.175 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 74, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 574;

148. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 74 defined by SEQ ID NO: 574, and wherein when the cancer index for the individual is less than about 0.175 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 74, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 574;

149. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 75 defined by SEQ ID NO: 575, and wherein when the cancer index for the individual is about 0.157 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 75, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 575;

150. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 75 defined by SEQ ID NO: 575, and wherein when the cancer index for the individual is less than about 0.157 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 75, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 575;

151. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 76 defined by SEQ ID NO: 576, and wherein when the cancer index for the individual is about 0.172 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 76, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 576;

152. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 76 defined by SEQ ID NO: 576, and wherein when the cancer index for the individual is less than about 0.172 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 76, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 576;

153. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 77 defined by SEQ ID NO: 577, and wherein when the cancer index for the individual is about 0.059 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 77, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 577;

154. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 77 defined by SEQ ID NO: 577, and wherein when the cancer index for the

individual is less than about 0.059 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 77, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 577;

155. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 78 defined by SEQ ID NO: 578, and wherein when the cancer index for the individual is about 0.064 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least ten CpGs from DMR 78, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 578;

156. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 78 defined by SEQ ID NO: 578, and wherein when the cancer index for the individual is less than about 0.064 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least ten CpGs from DMR 78, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 578;

157. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 79 defined by SEQ ID NO: 579, and wherein when the cancer index for the individual is about 0.043 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 79, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 579;

158. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 79 defined by SEQ ID NO: 579, and wherein when the cancer index for the individual is less than about 0.043 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR

79, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 579;

159. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 80 defined by SEQ ID NO: 580, and wherein when the cancer index for the individual is about 0.178 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 80, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 580;

160. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 80 defined by SEQ ID NO: 580, and wherein when the cancer index for the individual is less than about 0.178 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 80, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 580;

161. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 81 defined by SEQ ID NO: 581, and wherein when the cancer index for the individual is about 0.169 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eighteen CpGs from DMR 81, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 581;

162. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 81 defined by SEQ ID NO: 581, and wherein when the cancer index for the individual is less than about 0.169 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eighteen CpGs from DMR 81, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 581;

163. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 82 defined by SEQ ID NO: 582, and wherein when the cancer index for the

individual is about 0.169 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eighteen CpGs from DMR 82, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 582;

164. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 82 defined by SEQ ID NO: 582, and wherein when the cancer index for the individual is less than about 0.169 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eighteen CpGs from DMR 82, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 582;

165. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 83 defined by SEQ ID NO: 583, and wherein when the cancer index for the individual is about 0.162 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nineteen CpGs from DMR 83, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 583;

166. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 83 defined by SEQ ID NO: 583, and wherein when the cancer index for the individual is less than about 0.162 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nineteen CpGs from DMR 83, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 583;

167. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 84 defined by SEQ ID NO: 584, and wherein when the cancer index for the individual is about 0.075 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 84, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 584;

168. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 84 defined by SEQ ID NO: 584, and wherein when the cancer index for the individual is less than about 0.075 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 84, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 584;

169. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 85 defined by SEQ ID NO: 585, and wherein when the cancer index for the individual is about 0.219 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 85, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 585;

170. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 85 defined by SEQ ID NO: 585, and wherein when the cancer index for the individual is less than about 0.219 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 85, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 585;

171. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 86 defined by SEQ ID NO: 586, and wherein when the cancer index for the individual is about 0.219 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 86, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 586;

172. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 86 defined by SEQ ID NO: 586, and wherein when the cancer index for the

individual is less than about 0.219 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 86, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 586;

173. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 87 defined by SEQ ID NO: 587, and wherein when the cancer index for the individual is about 0.126 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 87, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 587;

174. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 87 defined by SEQ ID NO: 587, and wherein when the cancer index for the individual is less than about 0.126 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 87, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 587;

175. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 88 defined by SEQ ID NO: 588, and wherein when the cancer index for the individual is about 0.058 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 88, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 588;

176. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 88 defined by SEQ ID NO: 588, and wherein when the cancer index for the individual is less than about 0.058 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from

DMR 88, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 588;

177. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 89 defined by SEQ ID NO: 589, and wherein when the cancer index for the individual is about 0.147 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 89, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 589;

178. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 89 defined by SEQ ID NO: 589, and wherein when the cancer index for the individual is less than about 0.147 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 89, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 589;

179. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 90 defined by SEQ ID NO: 590, and wherein when the cancer index for the individual is about 0.179 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eleven CpGs from DMR 90, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 590;

180. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 90 defined by SEQ ID NO: 590, and wherein when the cancer index for the individual is less than about 0.179 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eleven CpGs from DMR 90, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 590;

181. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 91 defined by SEQ ID NO: 591, and wherein when the cancer index for the

individual is about 0.179 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eleven CpGs from DMR 91, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 591;

182. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 91 defined by SEQ ID NO: 591, and wherein when the cancer index for the individual is less than about 0.179 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eleven CpGs from DMR 91, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 591;

183. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 92 defined by SEQ ID NO: 592, and wherein when the cancer index for the individual is about 0.198 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 92, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 592;

184. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 92 defined by SEQ ID NO: 592, and wherein when the cancer index for the individual is less than about 0.198 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 92, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 592;

185. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 93 defined by SEQ ID NO: 593, and wherein when the cancer index for the individual is about 0.198 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 93, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 593;

186. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 93 defined by SEQ ID NO: 593, and wherein when the cancer index for the individual is less than about 0.198 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 93, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 593;

187. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 94 defined by SEQ ID NO: 594, and wherein when the cancer index for the individual is about 0.387 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 94, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 594;

188. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 94 defined by SEQ ID NO: 594, and wherein when the cancer index for the individual is less than about 0.387 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 94, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 594;

189. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 95 defined by SEQ ID NO: 595, and wherein when the cancer index for the individual is about 0.165 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 95, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 595;

190. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 95 defined by SEQ ID NO: 595, and wherein when the cancer index for the

individual is less than about 0.165 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 95, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 595;

191. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 96 defined by SEQ ID NO: 596, and wherein when the cancer index for the individual is about 0.109 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 96, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 596;

192. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 96 defined by SEQ ID NO: 596, and wherein when the cancer index for the individual is less than about 0.109 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 96, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 596;

193. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 97 defined by SEQ ID NO: 597, and wherein when the cancer index for the individual is about 0.063 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eleven CpGs from DMR 97, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 597;

194. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 97 defined by SEQ ID NO: 597, and wherein when the cancer index for the individual is less than about 0.063 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eleven CpGs from

DMR 97, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 597;

195. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 98 defined by SEQ ID NO: 598, and wherein when the cancer index for the individual is about 0.253 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 98, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 598;

196. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 98 defined by SEQ ID NO: 598, and wherein when the cancer index for the individual is less than about 0.253 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 98, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 598;

197. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 99 defined by SEQ ID NO: 599, and wherein when the cancer index for the individual is about 0.253 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 99, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 599;

198. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 99 defined by SEQ ID NO: 599, and wherein when the cancer index for the individual is less than about 0.253 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 99, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 599;

199. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 100 defined by SEQ ID NO: 600, and wherein when the cancer index for the

individual is about 0.178 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 51.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 100, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 600;

200. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 100 defined by SEQ ID NO: 600, and wherein when the cancer index for the individual is less than about 0.178 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 51.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 100, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 600;

201. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 101 defined by SEQ ID NO: 601, and wherein when the cancer index for the individual is about 0.208 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 101, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 601;

202. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 101 defined by SEQ ID NO: 601, and wherein when the cancer index for the individual is less than about 0.208 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 101, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 601;

203. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 102 defined by SEQ ID NO: 602, and wherein when the cancer index for the individual is about 0.186 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least fourteen CpGs from DMR 102,

and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 602;

204. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 102 defined by SEQ ID NO: 602, and wherein when the cancer index for the individual is less than about 0.186 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least fourteen CpGs from DMR 102, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 602;

205. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 103 defined by SEQ ID NO: 603, and wherein when the cancer index for the individual is about 0.106 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 103, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 603;

206. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 103 defined by SEQ ID NO: 603, and wherein when the cancer index for the individual is less than about 0.106 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 103, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 603;

207. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 104 defined by SEQ ID NO: 604, and wherein when the cancer index for the individual is about 0.315 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 104, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 604;

208. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 104 defined by SEQ ID NO: 604, and wherein when the cancer index for the

individual is less than about 0.315 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 104, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 604;

209. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 105 defined by SEQ ID NO: 605, and wherein when the cancer index for the individual is about 0.16 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 105, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 605;

210. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 105 defined by SEQ ID NO: 605, and wherein when the cancer index for the individual is less than about 0.16 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 105, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 605;

211. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 106 defined by SEQ ID NO: 606, and wherein when the cancer index for the individual is about 0.192 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 106, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 606;

212. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 106 defined by SEQ ID NO: 606, and wherein when the cancer index for the individual is less than about 0.192 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from

DMR 106, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 606;

213. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 107 defined by SEQ ID NO: 607, and wherein when the cancer index for the individual is about 0.17 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 51.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 107, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 607;

214. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 107 defined by SEQ ID NO: 607, and wherein when the cancer index for the individual is less than about 0.17 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 51.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 107, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 607;

215. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 108 defined by SEQ ID NO: 608, and wherein when the cancer index for the individual is about 0.245 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 108, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 608;

216. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 108 defined by SEQ ID NO: 608, and wherein when the cancer index for the individual is less than about 0.245 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 108, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 608;

217. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 109 defined by SEQ ID NO: 609, and wherein when the cancer index for the

individual is about 0.245 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 109, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 609;

218. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 109 defined by SEQ ID NO: 609, and wherein when the cancer index for the individual is less than about 0.245 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 109, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 609;

219. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 110 defined by SEQ ID NO: 610, and wherein when the cancer index for the individual is about 0.245 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 110, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 610;

220. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 110 defined by SEQ ID NO: 610, and wherein when the cancer index for the individual is less than about 0.245 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 110, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 610;

221. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 111 defined by SEQ ID NO: 611, and wherein when the cancer index for the individual is about 0.245 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 111, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 611;

222. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 111 defined by SEQ ID NO: 611, and wherein when the cancer index for the individual is less than about 0.245 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 111, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 611;

223. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 112 defined by SEQ ID NO: 612, and wherein when the cancer index for the individual is about 0.079 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 112, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 612;

224. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 112 defined by SEQ ID NO: 612, and wherein when the cancer index for the individual is less than about 0.079 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 112, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 612;

225. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 113 defined by SEQ ID NO: 613, and wherein when the cancer index for the individual is about 0.178 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 113, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 613;

226. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 113 defined by SEQ ID NO: 613, and wherein when the cancer index for the

individual is less than about 0.178 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 113, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 613;

227. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 114 defined by SEQ ID NO: 614, and wherein when the cancer index for the individual is about 0.178 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 114, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 614;

228. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 114 defined by SEQ ID NO: 614, and wherein when the cancer index for the individual is less than about 0.178 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 114, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 614;

229. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 115 defined by SEQ ID NO: 615, and wherein when the cancer index for the individual is about 0.079 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 115, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 615;

230. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 115 defined by SEQ ID NO: 615, and wherein when the cancer index for the individual is less than about 0.079 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR

115, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 615;

231. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 116 defined by SEQ ID NO: 616, and wherein when the cancer index for the individual is about 0.185 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 116, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 616;

232. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 116 defined by SEQ ID NO: 616, and wherein when the cancer index for the individual is less than about 0.185 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 116, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 616;

233. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 117 defined by SEQ ID NO: 617, and wherein when the cancer index for the individual is about 0.323 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 117, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 617;

234. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 117 defined by SEQ ID NO: 617, and wherein when the cancer index for the individual is less than about 0.323 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 117, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 617;

235. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 118 defined by SEQ ID NO: 618, and wherein when the cancer index for the

individual is about 0.044 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 118, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 618;

236. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 118 defined by SEQ ID NO: 618, and wherein when the cancer index for the individual is less than about 0.044 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 118, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 618;

237. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 119 defined by SEQ ID NO: 619, and wherein when the cancer index for the individual is about 0.059 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 119, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 619;

238. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 119 defined by SEQ ID NO: 619, and wherein when the cancer index for the individual is less than about 0.059 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 119, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 619;

239. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 120 defined by SEQ ID NO: 620, and wherein when the cancer index for the individual is about 0.089 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 120, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 620;

240. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 120 defined by SEQ ID NO: 620, and wherein when the cancer index for the individual is less than about 0.089 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 120, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 620;

241. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 121 defined by SEQ ID NO: 621, and wherein when the cancer index for the individual is about 0.261 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 121, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 621;

242. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 121 defined by SEQ ID NO: 621, and wherein when the cancer index for the individual is less than about 0.261 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 121, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 621;

243. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 122 defined by SEQ ID NO: 622, and wherein when the cancer index for the individual is about 0.108 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 122, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 622;

244. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 122 defined by SEQ ID NO: 622, and wherein when the cancer index for the

individual is less than about 0.108 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 122, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 622;

245. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 123 defined by SEQ ID NO: 623, and wherein when the cancer index for the individual is about 0.062 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 123, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 623;

246. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 123 defined by SEQ ID NO: 623, and wherein when the cancer index for the individual is less than about 0.062 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 123, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 623;

247. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 124 defined by SEQ ID NO: 624, and wherein when the cancer index for the individual is about 0.086 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 124, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 624;

248. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 124 defined by SEQ ID NO: 624, and wherein when the cancer index for the individual is less than about 0.086 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from

DMR 124, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 624;

249. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 125 defined by SEQ ID NO: 625, and wherein when the cancer index for the individual is about 0.146 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 125, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 625;

250. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 125 defined by SEQ ID NO: 625, and wherein when the cancer index for the individual is less than about 0.146 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 125, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 625;

251. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 126 defined by SEQ ID NO: 626, and wherein when the cancer index for the individual is about 0.209 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 47.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 126, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 626;

252. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 126 defined by SEQ ID NO: 626, and wherein when the cancer index for the individual is less than about 0.209 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 47.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 126, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 626;

253. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 127 defined by SEQ ID NO: 627, and wherein when the cancer index for the

individual is about 0.077 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 127, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 627;

254. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 127 defined by SEQ ID NO: 627, and wherein when the cancer index for the individual is less than about 0.077 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 127, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 627;

255. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 128 defined by SEQ ID NO: 628, and wherein when the cancer index for the individual is about 0.051 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 128, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 628;

256. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 128 defined by SEQ ID NO: 628, and wherein when the cancer index for the individual is less than about 0.051 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 128, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 628;

257. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 129 defined by SEQ ID NO: 629, and wherein when the cancer index for the individual is about 0.174 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 129, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 629;

258. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 129 defined by SEQ ID NO: 629, and wherein when the cancer index for the individual is less than about 0.174 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 129, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 629;

259. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 130 defined by SEQ ID NO: 630, and wherein when the cancer index for the individual is about 0.148 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 130, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 630;

260. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 130 defined by SEQ ID NO: 630, and wherein when the cancer index for the individual is less than about 0.148 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 130, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 630;

261. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 131 defined by SEQ ID NO: 631, and wherein when the cancer index for the individual is about 0.069 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 131, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 631;

262. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 131 defined by SEQ ID NO: 631, and wherein when the cancer index for the

individual is less than about 0.069 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 131, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 631;

263. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 132 defined by SEQ ID NO: 632, and wherein when the cancer index for the individual is about 0.136 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 132, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 632;

264. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 132 defined by SEQ ID NO: 632, and wherein when the cancer index for the individual is less than about 0.136 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 132, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 632;

265. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 133 defined by SEQ ID NO: 633, and wherein when the cancer index for the individual is about 0.103 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 133, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 633;

266. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 133 defined by SEQ ID NO: 633, and wherein when the cancer index for the individual is less than about 0.103 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from

DMR 133, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 633;

267. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 134 defined by SEQ ID NO: 634, and wherein when the cancer index for the individual is about 0.157 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 134, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 634;

268. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 134 defined by SEQ ID NO: 634, and wherein when the cancer index for the individual is less than about 0.157 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 134, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 634;

269. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 135 defined by SEQ ID NO: 635, and wherein when the cancer index for the individual is about 0.18 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least ten CpGs from DMR 135, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 635;

270. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 135 defined by SEQ ID NO: 635, and wherein when the cancer index for the individual is less than about 0.18 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least ten CpGs from DMR 135, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 635;

271. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 136 defined by SEQ ID NO: 636, and wherein when the cancer index for the

individual is about 0.298 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 51.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 136, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 636;

272. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 136 defined by SEQ ID NO: 636, and wherein when the cancer index for the individual is less than about 0.298 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 51.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 136, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 636;

273. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 137 defined by SEQ ID NO: 637, and wherein when the cancer index for the individual is about 0.048 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 137, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 637;

274. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 137 defined by SEQ ID NO: 637, and wherein when the cancer index for the individual is less than about 0.048 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 137, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 637;

275. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 138 defined by SEQ ID NO: 638, and wherein when the cancer index for the individual is about 0.048 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 138,

and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 638;

276. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 138 defined by SEQ ID NO: 638, and wherein when the cancer index for the individual is less than about 0.048 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 138, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 638;

277. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 139 defined by SEQ ID NO: 639, and wherein when the cancer index for the individual is about 0.154 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 139, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 639;

278. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 139 defined by SEQ ID NO: 639, and wherein when the cancer index for the individual is less than about 0.154 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 139, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 639;

279. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 140 defined by SEQ ID NO: 640, and wherein when the cancer index for the individual is about 0.048 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 140, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 640;

280. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 140 defined by SEQ ID NO: 640, and wherein when the cancer index for the

individual is less than about 0.048 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 140, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 640;

281. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 141 defined by SEQ ID NO: 641, and wherein when the cancer index for the individual is about 0.083 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 141, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 641;

282. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 141 defined by SEQ ID NO: 641, and wherein when the cancer index for the individual is less than about 0.083 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 141, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 641;

283. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 142 defined by SEQ ID NO: 642, and wherein when the cancer index for the individual is about 0.188 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 142, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 642;

284. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 142 defined by SEQ ID NO: 642, and wherein when the cancer index for the individual is less than about 0.188 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from

DMR 142, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 642;

285. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 143 defined by SEQ ID NO: 643, and wherein when the cancer index for the individual is about 0.183 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 143, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 643;

286. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 143 defined by SEQ ID NO: 643, and wherein when the cancer index for the individual is less than about 0.183 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 143, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 643;

287. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 144 defined by SEQ ID NO: 644, and wherein when the cancer index for the individual is about 0.101 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 144, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 644;

288. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 144 defined by SEQ ID NO: 644, and wherein when the cancer index for the individual is less than about 0.101 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 144, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 644;

289. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 145 defined by SEQ ID NO: 645, and wherein when the cancer index for the

individual is about 0.034 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 145, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 645;

290. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 145 defined by SEQ ID NO: 645, and wherein when the cancer index for the individual is less than about 0.034 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 145, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 645;

291. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 146 defined by SEQ ID NO: 646, and wherein when the cancer index for the individual is about 0.037 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 146, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 646;

292. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 146 defined by SEQ ID NO: 646, and wherein when the cancer index for the individual is less than about 0.037 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 146, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 646;

293. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 147 defined by SEQ ID NO: 647, and wherein when the cancer index for the individual is about 0.072 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 147, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 647;

294. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 147 defined by SEQ ID NO: 647, and wherein when the cancer index for the individual is less than about 0.072 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 147, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 647;

295. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 148 defined by SEQ ID NO: 648, and wherein when the cancer index for the individual is about 0.552 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 148, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 648;

296. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 148 defined by SEQ ID NO: 648, and wherein when the cancer index for the individual is less than about 0.552 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 148, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 648;

297. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 149 defined by SEQ ID NO: 649, and wherein when the cancer index for the individual is about 0.214 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least thirteen CpGs from DMR 149, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 649;

298. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 149 defined by SEQ ID NO: 649, and wherein when the cancer index for the

individual is less than about 0.214 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least thirteen CpGs from DMR 149, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 649;

299. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 150 defined by SEQ ID NO: 650, and wherein when the cancer index for the individual is about 0.065 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 150, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 650;

300. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 150 defined by SEQ ID NO: 650, and wherein when the cancer index for the individual is less than about 0.065 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 150, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 650;

301. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 151 defined by SEQ ID NO: 651, and wherein when the cancer index for the individual is about 0.185 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 151, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 651;

302. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 151 defined by SEQ ID NO: 651, and wherein when the cancer index for the individual is less than about 0.185 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from

DMR 151, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 651;

303. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 152 defined by SEQ ID NO: 652, and wherein when the cancer index for the individual is about 0.294 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 47.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 152, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 652;

304. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 152 defined by SEQ ID NO: 652, and wherein when the cancer index for the individual is less than about 0.294 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 47.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 152, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 652;

305. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 153 defined by SEQ ID NO: 653, and wherein when the cancer index for the individual is about 0.129 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 153, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 653;

306. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 153 defined by SEQ ID NO: 653, and wherein when the cancer index for the individual is less than about 0.129 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 153, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 653;

307. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 154 defined by SEQ ID NO: 654, and wherein when the cancer index for the

individual is about 0.138 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 154, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 654;

308. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 154 defined by SEQ ID NO: 654, and wherein when the cancer index for the individual is less than about 0.138 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 154, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 654;

309. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 155 defined by SEQ ID NO: 655, and wherein when the cancer index for the individual is about 0.118 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 155, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 655;

310. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 155 defined by SEQ ID NO: 655, and wherein when the cancer index for the individual is less than about 0.118 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 155, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 655;

311. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 156 defined by SEQ ID NO: 656, and wherein when the cancer index for the individual is about 0.254 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 156, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 656;

312. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 156 defined by SEQ ID NO: 656, and wherein when the cancer index for the individual is less than about 0.254 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 156, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 656;

313. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 157 defined by SEQ ID NO: 657, and wherein when the cancer index for the individual is about 0.18 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 157, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 657;

314. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 157 defined by SEQ ID NO: 657, and wherein when the cancer index for the individual is less than about 0.18 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 157, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 657;

315. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 158 defined by SEQ ID NO: 658, and wherein when the cancer index for the individual is about 0.301 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 158, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 658;

316. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 158 defined by SEQ ID NO: 658, and wherein when the cancer index for the

individual is less than about 0.301 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 158, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 658;

317. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 159 defined by SEQ ID NO: 659, and wherein when the cancer index for the individual is about 0.176 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 159, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 659;

318. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 159 defined by SEQ ID NO: 659, and wherein when the cancer index for the individual is less than about 0.176 the individual is classified as not having cancer or as having a high risk of cancer development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 159, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 659;

319. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 160 defined by SEQ ID NO: 660, and wherein when the cancer index for the individual is about 0.411 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 47.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 160, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 660;

320. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 160 defined by SEQ ID NO: 660, and wherein when the cancer index for the individual is less than about 0.411 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 47.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR

160, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 660;

321. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 161 defined by SEQ ID NO: 661, and wherein when the cancer index for the individual is about 0.072 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 161, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 661;

322. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 161 defined by SEQ ID NO: 661, and wherein when the cancer index for the individual is less than about 0.072 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 161, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 661;

323. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 162 defined by SEQ ID NO: 662, and wherein when the cancer index for the individual is about 0.358 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 41.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 162, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 662;

324. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 162 defined by SEQ ID NO: 662, and wherein when the cancer index for the individual is less than about 0.358 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 41.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 162, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 662;

325. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 163 defined by SEQ ID NO: 663, and wherein when the cancer index for the

individual is about 0.313 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 44.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 163, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 663;

326. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 163 defined by SEQ ID NO: 663, and wherein when the cancer index for the individual is less than about 0.313 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 44.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 163, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 663;

327. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 164 defined by SEQ ID NO: 664, and wherein when the cancer index for the individual is about 0.221 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 164, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 664;

328. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 164 defined by SEQ ID NO: 664, and wherein when the cancer index for the individual is less than about 0.221 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 164, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 664;

329. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 165 defined by SEQ ID NO: 665, and wherein when the cancer index for the individual is about 0.256 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 44.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 165, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 665;

330. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 165 defined by SEQ ID NO: 665, and wherein when the cancer index for the individual is less than about 0.256 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 44.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 165, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 665;

331. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 166 defined by SEQ ID NO: 666, and wherein when the cancer index for the individual is about 0.202 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 166, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 666;

332. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 166 defined by SEQ ID NO: 666, and wherein when the cancer index for the individual is less than about 0.202 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 166, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 666;

333. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 167 defined by SEQ ID NO: 667, and wherein when the cancer index for the individual is about 0.345 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 167, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 667;

334. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 167 defined by SEQ ID NO: 667, and wherein when the cancer index for the

individual is less than about 0.345 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 167, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 667;

335. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 168 defined by SEQ ID NO: 668, and wherein when the cancer index for the individual is about 0.165 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 51.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 168, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 668;

336. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 168 defined by SEQ ID NO: 668, and wherein when the cancer index for the individual is less than about 0.165 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 51.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 168, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 668;

337. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 169 defined by SEQ ID NO: 669, and wherein when the cancer index for the individual is about 0.134 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 47.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 169, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 669;

338. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 169 defined by SEQ ID NO: 669, and wherein when the cancer index for the individual is less than about 0.134 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 47.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR

169, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 669;

339. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 170 defined by SEQ ID NO: 670, and wherein when the cancer index for the individual is about 0.3 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 170, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 670;

340. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 170 defined by SEQ ID NO: 670, and wherein when the cancer index for the individual is less than about 0.3 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 170, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 670;

341. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 171 defined by SEQ ID NO: 671, and wherein when the cancer index for the individual is about 0.153 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 45.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 171, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 671;

342. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 171 defined by SEQ ID NO: 671, and wherein when the cancer index for the individual is less than about 0.153 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 45.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 171, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 671;

343. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 172 defined by SEQ ID NO: 672, and wherein when the cancer index for the

individual is about 0.416 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 47.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 172, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 672;

344. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 172 defined by SEQ ID NO: 672, and wherein when the cancer index for the individual is less than about 0.416 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 47.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 172, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 672;

345. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 173 defined by SEQ ID NO: 673, and wherein when the cancer index for the individual is about 0.416 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 47.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 173, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 673;

346. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 173 defined by SEQ ID NO: 673, and wherein when the cancer index for the individual is less than about 0.416 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 47.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 173, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 673;

347. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 174 defined by SEQ ID NO: 674, and wherein when the cancer index for the individual is about 0.223 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 174, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 674;

348. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 174 defined by SEQ ID NO: 674, and wherein when the cancer index for the individual is less than about 0.223 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 174, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 674;

349. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 175 defined by SEQ ID NO: 675, and wherein when the cancer index for the individual is about 0.232 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 175, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 675;

350. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 175 defined by SEQ ID NO: 675, and wherein when the cancer index for the individual is less than about 0.232 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 175, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 675;

351. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 176 defined by SEQ ID NO: 676, and wherein when the cancer index for the individual is about 0.047 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 176, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 676;

352. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 176 defined by SEQ ID NO: 676, and wherein when the cancer index for the

individual is less than about 0.047 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 176, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 676;

353. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 177 defined by SEQ ID NO: 677, and wherein when the cancer index for the individual is about 0.162 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 177, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 677;

354. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 177 defined by SEQ ID NO: 677, and wherein when the cancer index for the individual is less than about 0.162 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 177, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 677;

355. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 178 defined by SEQ ID NO: 678, and wherein when the cancer index for the individual is about 0.311 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 178, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 678;

356. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 178 defined by SEQ ID NO: 678, and wherein when the cancer index for the individual is less than about 0.311 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from

DMR 178, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 678;

357. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 179 defined by SEQ ID NO: 679, and wherein when the cancer index for the individual is about 0.17 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least fourteen CpGs from DMR 179, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 679;

358. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 179 defined by SEQ ID NO: 679, and wherein when the cancer index for the individual is less than about 0.17 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least fourteen CpGs from DMR 179, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 679;

359. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 180 defined by SEQ ID NO: 680, and wherein when the cancer index for the individual is about 0.314 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 180, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 680;

360. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 180 defined by SEQ ID NO: 680, and wherein when the cancer index for the individual is less than about 0.314 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 180, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 680;

361. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 181 defined by SEQ ID NO: 681, and wherein when the cancer index for the

individual is about 0.2 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 181, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 681;

362. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 181 defined by SEQ ID NO: 681, and wherein when the cancer index for the individual is less than about 0.2 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 181, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 681;

363. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 182 defined by SEQ ID NO: 682, and wherein when the cancer index for the individual is about 0.08 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 182, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 682;

364. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 182 defined by SEQ ID NO: 682, and wherein when the cancer index for the individual is less than about 0.08 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 182, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 682;

365. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 183 defined by SEQ ID NO: 683, and wherein when the cancer index for the individual is about 0.089 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 45.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 183, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 683;

366. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 183 defined by SEQ ID NO: 683, and wherein when the cancer index for the individual is less than about 0.089 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 45.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 183, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 683;

367. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 184 defined by SEQ ID NO: 684, and wherein when the cancer index for the individual is about 0.253 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 40.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 184, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 684;

368. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 184 defined by SEQ ID NO: 684, and wherein when the cancer index for the individual is less than about 0.253 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 40.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 184, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 684;

369. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 185 defined by SEQ ID NO: 685, and wherein when the cancer index for the individual is about 0.274 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 185, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 685;

370. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 185 defined by SEQ ID NO: 685, and wherein when the cancer index for the

individual is less than about 0.274 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 185, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 685;

371. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 186 defined by SEQ ID NO: 686, and wherein when the cancer index for the individual is about 0.451 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 186, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 686;

372. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 186 defined by SEQ ID NO: 686, and wherein when the cancer index for the individual is less than about 0.451 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 186, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 686;

373. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 187 defined by SEQ ID NO: 687, and wherein when the cancer index for the individual is about 0.346 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 37.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 187, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 687;

374. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 187 defined by SEQ ID NO: 687, and wherein when the cancer index for the individual is less than about 0.346 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 37.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR

187, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 687;

375. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 188 defined by SEQ ID NO: 688, and wherein when the cancer index for the individual is about 0.181 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 188, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 688;

376. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 188 defined by SEQ ID NO: 688, and wherein when the cancer index for the individual is less than about 0.181 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 188, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 688;

377. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 189 defined by SEQ ID NO: 689, and wherein when the cancer index for the individual is about 0.181 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 189, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 689;

378. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 189 defined by SEQ ID NO: 689, and wherein when the cancer index for the individual is less than about 0.181 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 189, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 689;

379. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 190 defined by SEQ ID NO: 690, and wherein when the cancer index for the

individual is about 0.287 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 190, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 690;

380. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 190 defined by SEQ ID NO: 690, and wherein when the cancer index for the individual is less than about 0.287 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 190, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 690;

381. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 191 defined by SEQ ID NO: 691, and wherein when the cancer index for the individual is about 0.057 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 191, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 691;

382. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 191 defined by SEQ ID NO: 691, and wherein when the cancer index for the individual is less than about 0.057 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 59.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 191, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 691;

383. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 192 defined by SEQ ID NO: 692, and wherein when the cancer index for the individual is about 0.292 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 192,

and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 692;

384. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 192 defined by SEQ ID NO: 692, and wherein when the cancer index for the individual is less than about 0.292 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 192, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 692;

385. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 193 defined by SEQ ID NO: 693, and wherein when the cancer index for the individual is about 0.11 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 51.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 193, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 693;

386. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 193 defined by SEQ ID NO: 693, and wherein when the cancer index for the individual is less than about 0.11 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 51.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 193, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 693;

387. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 194 defined by SEQ ID NO: 694, and wherein when the cancer index for the individual is about 0.081 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 51.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 194, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 694;

388. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 194 defined by SEQ ID NO: 694, and wherein when the cancer index for the

individual is less than about 0.081 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 51.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 194, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 694;

389. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 195 defined by SEQ ID NO: 695, and wherein when the cancer index for the individual is about 0.11 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 51.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 195, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 695;

390. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 195 defined by SEQ ID NO: 695, and wherein when the cancer index for the individual is less than about 0.11 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 51.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 195, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 695;

391. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 196 defined by SEQ ID NO: 696, and wherein when the cancer index for the individual is about 0.057 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from DMR 196, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 696;

392. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 196 defined by SEQ ID NO: 696, and wherein when the cancer index for the individual is less than about 0.057 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least seven CpGs from

DMR 196, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 696;

393. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 197 defined by SEQ ID NO: 697, and wherein when the cancer index for the individual is about 0.076 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 197, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 697;

394. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 197 defined by SEQ ID NO: 697, and wherein when the cancer index for the individual is less than about 0.076 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 52.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 197, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 697;

395. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 198 defined by SEQ ID NO: 698, and wherein when the cancer index for the individual is about 0.076 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 47.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 198, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 698;

396. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 198 defined by SEQ ID NO: 698, and wherein when the cancer index for the individual is less than about 0.076 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 47.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 198, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 698;

397. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 199 defined by SEQ ID NO: 699, and wherein when the cancer index for the

individual is about 0.198 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 41.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 199, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 699;

398. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 199 defined by SEQ ID NO: 699, and wherein when the cancer index for the individual is less than about 0.198 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 41.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 199, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 699;

399. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 200 defined by SEQ ID NO: 700, and wherein when the cancer index for the individual is about 0.183 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 200, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 700;

400. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 200 defined by SEQ ID NO: 700, and wherein when the cancer index for the individual is less than about 0.183 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 200, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 700;

401. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 201 defined by SEQ ID NO: 701, and wherein when the cancer index for the individual is about 0.063 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least ten CpGs from DMR 201, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 701;

402. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 201 defined by SEQ ID NO: 701, and wherein when the cancer index for the individual is less than about 0.063 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least ten CpGs from DMR 201, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 701;

403. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 202 defined by SEQ ID NO: 702, and wherein when the cancer index for the individual is about 0.095 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 202, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 702;

404. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 202 defined by SEQ ID NO: 702, and wherein when the cancer index for the individual is less than about 0.095 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 202, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 702;

405. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 203 defined by SEQ ID NO: 703, and wherein when the cancer index for the individual is about 0.426 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 42.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 203, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 703;

406. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 203 defined by SEQ ID NO: 703, and wherein when the cancer index for the

individual is less than about 0.426 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 42.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 203, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 703;

407. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 204 defined by SEQ ID NO: 704, and wherein when the cancer index for the individual is about 0.095 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 204, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 704;

408. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 204 defined by SEQ ID NO: 704, and wherein when the cancer index for the individual is less than about 0.095 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 204, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 704;

409. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 205 defined by SEQ ID NO: 705, and wherein when the cancer index for the individual is about 0.074 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 45.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 205, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 705;

410. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 205 defined by SEQ ID NO: 705, and wherein when the cancer index for the individual is less than about 0.074 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 45.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR

205, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 705;

411. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 206 defined by SEQ ID NO: 706, and wherein when the cancer index for the individual is about 0.426 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 42.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 206, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 706;

412. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 206 defined by SEQ ID NO: 706, and wherein when the cancer index for the individual is less than about 0.426 or more the individual is classified not having cancer or as having a low risk of cancer development, and wherein the sensitivity of the assay is at least 42.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 206, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 706;

413. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 207 defined by SEQ ID NO: 707, and wherein when the cancer index for the individual is about 0.109 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 51.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 207, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 707;

414. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 207 defined by SEQ ID NO: 707, and wherein when the cancer index for the individual is less than about 0.109 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 51.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 207, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 707;

415. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 208 defined by SEQ ID NO: 708, and wherein when the cancer index for the

individual is about 0.099 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 208, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 708;

416. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 208 defined by SEQ ID NO: 708, and wherein when the cancer index for the individual is less than about 0.099 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 208, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 708;

417. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 209 defined by SEQ ID NO: 709, and wherein when the cancer index for the individual is about 0.099 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 209, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 709;

418. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 209 defined by SEQ ID NO: 709, and wherein when the cancer index for the individual is less than about 0.099 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 209, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 709;

419. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 210 defined by SEQ ID NO: 710, and wherein when the cancer index for the individual is about 0.099 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 210, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 710;

420. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 210 defined by SEQ ID NO: 710, and wherein when the cancer index for the individual is less than about 0.099 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 210, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 710;

421. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 211 defined by SEQ ID NO: 711, and wherein when the cancer index for the individual is about 0.392 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 44.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 211, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 711;

422. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 211 defined by SEQ ID NO: 711, and wherein when the cancer index for the individual is less than about 0.392 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 44.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 211, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 711;

423. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 212 defined by SEQ ID NO: 712, and wherein when the cancer index for the individual is about 0.245 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 212, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 712;

424. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 212 defined by SEQ ID NO: 712, and wherein when the cancer index for the

individual is less than about 0.245 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 212, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 712;

425. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 213 defined by SEQ ID NO: 713, and wherein when the cancer index for the individual is about 0.362 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 34.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 213, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 713;

426. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 213 defined by SEQ ID NO: 713, and wherein when the cancer index for the individual is less than about 0.362 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 34.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least six CpGs from DMR 213, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 713;

427. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 214 defined by SEQ ID NO: 714, and wherein when the cancer index for the individual is about 0.049 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 214, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 714;

428. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 214 defined by SEQ ID NO: 714, and wherein when the cancer index for the individual is less than about 0.049 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from

DMR 214, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 714;

429. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 215 defined by SEQ ID NO: 715, and wherein when the cancer index for the individual is about 0.263 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 44.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 215, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 715;

430. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 215 defined by SEQ ID NO: 715, and wherein when the cancer index for the individual is less than about 0.263 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 44.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpGs from DMR 215, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 715;

431. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 216 defined by SEQ ID NO: 716, and wherein when the cancer index for the individual is about 0.533 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 40.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 216, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 716;

432. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 216 defined by SEQ ID NO: 716, and wherein when the cancer index for the individual is less than about 0.533 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 40.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 216, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 716;

433. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 217 defined by SEQ ID NO: 717, and wherein when the cancer index for the

individual is about 0.171 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 44.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 217, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 717;

434. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 217 defined by SEQ ID NO: 717, and wherein when the cancer index for the individual is less than about 0.171 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 44.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 217, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 717;

435. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 218 defined by SEQ ID NO: 718, and wherein when the cancer index for the individual is about 0.257 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 36.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 218, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 718;

436. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 218 defined by SEQ ID NO: 718, and wherein when the cancer index for the individual is less than about 0.257 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 36.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 218, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 718;

437. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 219 defined by SEQ ID NO: 719, and wherein when the cancer index for the individual is about 0.162 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 219, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 719;

438. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 219 defined by SEQ ID NO: 719, and wherein when the cancer index for the individual is less than about 0.162 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 219, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 719;

439. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 220 defined by SEQ ID NO: 720, and wherein when the cancer index for the individual is about 0.211 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 40.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 220, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 720;

440. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 220 defined by SEQ ID NO: 720, and wherein when the cancer index for the individual is less than about 0.211 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 40.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 220, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 720;

441. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 221 defined by SEQ ID NO: 721, and wherein when the cancer index for the individual is about 0.296 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 33.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 221, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 721;

442. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 221 defined by SEQ ID NO: 721, and wherein when the cancer index for the

individual is less than about 0.296 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 33.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 221, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 721;

443. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 222 defined by SEQ ID NO: 722, and wherein when the cancer index for the individual is about 0.361 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 32.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 222, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 722;

444. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 222 defined by SEQ ID NO: 722, and wherein when the cancer index for the individual is less than about 0.361 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 32.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 222, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 722;

445. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 223 defined by SEQ ID NO: 723, and wherein when the cancer index for the individual is about 0.056 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least ten CpGs from DMR 223, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 723;

446. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 223 defined by SEQ ID NO: 723, and wherein when the cancer index for the individual is less than about 0.056 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 49.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least ten CpGs from DMR

223, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 723;

447. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 224 defined by SEQ ID NO: 724, and wherein when the cancer index for the individual is about 0.257 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 34.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 224, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 724;

448. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 224 defined by SEQ ID NO: 724, and wherein when the cancer index for the individual is less than about 0.257 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 34.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 224, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 724;

449. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 225 defined by SEQ ID NO: 725, and wherein when the cancer index for the individual is about 0.409 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 36.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 225, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 725;

450. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 225 defined by SEQ ID NO: 725, and wherein when the cancer index for the individual is less than about 0.409 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 36.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 225, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 725;

451. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 226 defined by SEQ ID NO: 726, and wherein when the cancer index for the

individual is about 0.46 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 26.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 226, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 726;

452. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 226 defined by SEQ ID NO: 726, and wherein when the cancer index for the individual is less than about 0.46 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 26.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 226, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 726;

453. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 227 defined by SEQ ID NO: 727, and wherein when the cancer index for the individual is about 0.086 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least ten CpGs from DMR 227, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 727;

454. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 227 defined by SEQ ID NO: 727, and wherein when the cancer index for the individual is less than about 0.086 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least ten CpGs from DMR 227, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 727;

455. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 228 defined by SEQ ID NO: 728, and wherein when the cancer index for the individual is about 0.081 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 228, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 728;

456. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 228 defined by SEQ ID NO: 728, and wherein when the cancer index for the individual is less than about 0.081 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least nine CpGs from DMR 228, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 728;

457. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 229 defined by SEQ ID NO: 729, and wherein when the cancer index for the individual is about 0.257 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 33.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eighteen CpGs from DMR 229, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 729;

458. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 229 defined by SEQ ID NO: 729, and wherein when the cancer index for the individual is less than about 0.257 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 33.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eighteen CpGs from DMR 229, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 729;

459. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 230 defined by SEQ ID NO: 730, and wherein when the cancer index for the individual is about 0.088 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 230, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 730;

460. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 230 defined by SEQ ID NO: 730, and wherein when the cancer index for the

individual is less than about 0.088 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least eight CpGs from DMR 230, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 730;

461. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 231 defined by SEQ ID NO: 731, and wherein when the cancer index for the individual is about 0.025 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 44.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 231, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 731;

462. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 231 defined by SEQ ID NO: 731, and wherein when the cancer index for the individual is less than about 0.025 the individual is classified as not having cancer or as having a low of cancer development, and wherein the sensitivity of the assay is at least 44.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 231, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 731;

463. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 232 defined by SEQ ID NO: 732, and wherein when the cancer index for the individual is about 0.459 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 25.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 232, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 732;

464. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 232 defined by SEQ ID NO: 732, and wherein when the cancer index for the individual is less than about 0.459 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 25.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR

232, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 732;

465. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 233 defined by SEQ ID NO: 733, and wherein when the cancer index for the individual is about 0.089 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 45.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 233, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 733;

466. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 233 defined by SEQ ID NO: 733, and wherein when the cancer index for the individual is less than about 0.089 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 45.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least two CpGs from DMR 233, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 733;

467. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 234 defined by SEQ ID NO: 734, and wherein when the cancer index for the individual is about 0.199 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 44.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 234, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 734;

468. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 234 defined by SEQ ID NO: 734, and wherein when the cancer index for the individual is less than about 0.199 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 44.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 234, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 734;

469. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 235 defined by SEQ ID NO: 735, and wherein when the cancer index for the

individual is about 0.329 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 15.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 235, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 735;

470. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 235 defined by SEQ ID NO: 735, and wherein when the cancer index for the individual is less than about 0.329 or more the individual is classified not having cancer or as having a low risk of cancer development, and wherein the sensitivity of the assay is at least 15.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 235, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 735;

471. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 236 defined by SEQ ID NO: 736, and wherein when the cancer index for the individual is about 0.271 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 27.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 236, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 736;

472. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 236 defined by SEQ ID NO: 736, and wherein when the cancer index for the individual is less than about 0.271 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 27.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least four CpGs from DMR 236, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 736;

473. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 237 defined by SEQ ID NO: 737, and wherein when the cancer index for the individual is about 0.297 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 36.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 237, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 737;

474. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 237 defined by SEQ ID NO: 737, and wherein when the cancer index for the individual is less than about 0.297 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 36.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 237, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 737;

475. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 238 defined by SEQ ID NO: 738, and wherein when the cancer index for the individual is about 0.271 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 77.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 238, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 738;

476. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 238 defined by SEQ ID NO: 738, and wherein when the cancer index for the individual is less than about 0.271 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 77.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 238, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 738;

477. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 239 defined by SEQ ID NO: 739, and wherein when the cancer index for the individual is about 0.271 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 77.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 239, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 739;

478. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 239 defined by SEQ ID NO: 739, and wherein when the cancer index for the

individual is less than about 0.271 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 77.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 239, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 739;

479. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 240 defined by SEQ ID NO: 740, and wherein when the cancer index for the individual is about 0.123 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 240, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 740;

480. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 240 defined by SEQ ID NO: 740, and wherein when the cancer index for the individual is less than about 0.123 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 240, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 740;

481. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 241 defined by SEQ ID NO: 741, and wherein when the cancer index for the individual is about 0.123 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 239, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 741;

482. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 241 defined by SEQ ID NO: 741, and wherein when the cancer index for the individual is less than about 0.123 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from

DMR 241, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 741;

483. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 242 defined by SEQ ID NO: 742, and wherein when the cancer index for the individual is about 0.105 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 242, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 742;

484. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 242 defined by SEQ ID NO: 742, and wherein when the cancer index for the individual is less than about 0.105 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 242, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 742;

485. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 243 defined by SEQ ID NO: 743, and wherein when the cancer index for the individual is about 0.123 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 243, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 743;

486. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 243 defined by SEQ ID NO: 743, and wherein when the cancer index for the individual is less than about 0.123 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 243, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 743;

487. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 244 defined by SEQ ID NO: 744, and wherein when the cancer index for the

individual is about 0.123 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 244, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 744;

488. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 244 defined by SEQ ID NO: 744, and wherein when the cancer index for the individual is less than about 0.123 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 244, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 744;

489. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 245 defined by SEQ ID NO: 745, and wherein when the cancer index for the individual is about 0.105 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 245, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 745;

490. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 245 defined by SEQ ID NO: 745, and wherein when the cancer index for the individual is less than about 0.105 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 245, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 745;

491. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 246 defined by SEQ ID NO: 746, and wherein when the cancer index for the individual is about 0.119 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 246, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 746;

492. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 246 defined by SEQ ID NO: 746, and wherein when the cancer index for the individual is less than about 0.119 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 246, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 746;

493. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 247 defined by SEQ ID NO: 747, and wherein when the cancer index for the individual is about 0.119 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 247, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 747;

494. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 247 defined by SEQ ID NO: 747, and wherein when the cancer index for the individual is less than about 0.119 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 247, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 747;

495. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 248 defined by SEQ ID NO: 748, and wherein when the cancer index for the individual is about 0.083 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 248, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 748;

496. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 248 defined by SEQ ID NO: 748, and wherein when the cancer index for the

individual is less than about 0.083 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 248, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 748;

497. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 249 defined by SEQ ID NO: 749, and wherein when the cancer index for the individual is about 0.083 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 249, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 749;

498. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 249 defined by SEQ ID NO: 749, and wherein when the cancer index for the individual is less than about 0.083 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 249, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 749;

499. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 250 defined by SEQ ID NO: 750, and wherein when the cancer index for the individual is about 0.265 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 250, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 750;

500. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 250 defined by SEQ ID NO: 750, and wherein when the cancer index for the individual is less than about 0.265 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from

DMR 250, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 750;

501. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 251 defined by SEQ ID NO: 751, and wherein when the cancer index for the individual is about 0.265 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 251, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 751;
502. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 251 defined by SEQ ID NO: 751, and wherein when the cancer index for the individual is less than about 0.265 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 251, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 751;
503. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 252 defined by SEQ ID NO: 752, and wherein when the cancer index for the individual is about 0.113 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 252, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 752;
504. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 252 defined by SEQ ID NO: 752, and wherein when the cancer index for the individual is less than about 0.113 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 252, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 752;
505. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 252 defined by SEQ ID NO: 752, and wherein when the cancer index for the

individual is about 0.113 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 252, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 752;

506. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 252 defined by SEQ ID NO: 752, and wherein when the cancer index for the individual is less than about 0.113 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 252, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 752;

507. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 253 defined by SEQ ID NO: 753, and wherein when the cancer index for the individual is about 0.113 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 253, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 753;

508. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 253 defined by SEQ ID NO: 753, and wherein when the cancer index for the individual is less than about 0.113 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 253, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 753;

509. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 254 defined by SEQ ID NO: 754, and wherein when the cancer index for the individual is about 0.113 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 254, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 754;

510. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 254 defined by SEQ ID NO: 754, and wherein when the cancer index for the individual is less than about 0.113 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 254, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 754;

511. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 255 defined by SEQ ID NO: 755, and wherein when the cancer index for the individual is about 0.113 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 255, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 755;

512. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 255 defined by SEQ ID NO: 755, and wherein when the cancer index for the individual is less than about 0.113 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 255, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 755;

513. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 256 defined by SEQ ID NO: 756, and wherein when the cancer index for the individual is about 0.039 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 74.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 256, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 756;

514. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 256 defined by SEQ ID NO: 756, and wherein when the cancer index for the

individual is less than about 0.039 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 74.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 256, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 756;

515. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 257 defined by SEQ ID NO: 757, and wherein when the cancer index for the individual is about 0.039 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 74.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 257, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 757;

516. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 257 defined by SEQ ID NO: 757, and wherein when the cancer index for the individual is less than about 0.039 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 74.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 257, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 757;

517. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 258 defined by SEQ ID NO: 758, and wherein when the cancer index for the individual is about 0.171 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 258, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 758;

518. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 258 defined by SEQ ID NO: 758, and wherein when the cancer index for the individual is less than about 0.171 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from

DMR 258, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 758;

519. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 259 defined by SEQ ID NO: 759, and wherein when the cancer index for the individual is about 0.171 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 259, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 759;

520. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 259 defined by SEQ ID NO: 759, and wherein when the cancer index for the individual is less than about 0.171 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 62.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 259, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 759;

521. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 260 defined by SEQ ID NO: 760, and wherein when the cancer index for the individual is about 0.091 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 260, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 760;

522. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 260 defined by SEQ ID NO: 760, and wherein when the cancer index for the individual is less than about 0.091 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 260, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 760;

523. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 261 defined by SEQ ID NO: 761, and wherein when the cancer index for the

individual is about 0.091 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 261, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 761;

524. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 261 defined by SEQ ID NO: 761, and wherein when the cancer index for the individual is less than about 0.091 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 261, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 761;

525. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 262 defined by SEQ ID NO: 762, and wherein when the cancer index for the individual is about 0.101 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 262, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 762;

526. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 262 defined by SEQ ID NO: 762, and wherein when the cancer index for the individual is less than about 0.101 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 262, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 762;

527. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 263 defined by SEQ ID NO: 763, and wherein when the cancer index for the individual is about 0.101 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 263, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 763;

528. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 263 defined by SEQ ID NO: 763, and wherein when the cancer index for the individual is less than about 0.101 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 60.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 263, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 763;

529. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 264 defined by SEQ ID NO: 764, and wherein when the cancer index for the individual is about 0.140 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 264, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 764;

530. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 264 defined by SEQ ID NO: 764, and wherein when the cancer index for the individual is less than about 0.140 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 264, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 764;

531. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 265 defined by SEQ ID NO: 765, and wherein when the cancer index for the individual is about 0.082 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 265, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 765;

532. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 265 defined by SEQ ID NO: 765, and wherein when the cancer index for the

individual is less than about 0.082 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 265, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 765;

533. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 266 defined by SEQ ID NO: 766, and wherein when the cancer index for the individual is about 0.140 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 266, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 766;

534. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 266 defined by SEQ ID NO: 766, and wherein when the cancer index for the individual is less than about 0.140 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 266, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 766;

535. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 267 defined by SEQ ID NO: 767, and wherein when the cancer index for the individual is about 0.082 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 267, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 767;

536. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 267 defined by SEQ ID NO: 767, and wherein when the cancer index for the individual is less than about 0.082 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from

DMR 267, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 767;

537. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 268 defined by SEQ ID NO: 768, and wherein when the cancer index for the individual is about 0.146 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 268, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 768;

538. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 268 defined by SEQ ID NO: 768, and wherein when the cancer index for the individual is less than about 0.146 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 268, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 768;

539. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 269 defined by SEQ ID NO: 769, and wherein when the cancer index for the individual is about 0.146 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 269, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 769;

540. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 269 defined by SEQ ID NO: 769, and wherein when the cancer index for the individual is less than about 0.146 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 269, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 769;

541. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 270 defined by SEQ ID NO: 770, and wherein when the cancer index for the

individual is about 0.146 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 270, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 770;

542. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 270 defined by SEQ ID NO: 770, and wherein when the cancer index for the individual is less than about 0.146 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 270, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 770;

543. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 271 defined by SEQ ID NO: 771, and wherein when the cancer index for the individual is about 0.146 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 271, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 771;

544. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 271 defined by SEQ ID NO: 771, and wherein when the cancer index for the individual is less than about 0.146 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 271, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 771;

545. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 272 defined by SEQ ID NO: 772, and wherein when the cancer index for the individual is about 0.146 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 272, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 772;

546. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 272 defined by SEQ ID NO: 772, and wherein when the cancer index for the individual is less than about 0.146 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 272, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 772;

547. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 273 defined by SEQ ID NO: 773, and wherein when the cancer index for the individual is about 0.146 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 273, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 773;

548. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 273 defined by SEQ ID NO: 773, and wherein when the cancer index for the individual is less than about 0.146 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 273, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 773;

549. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 274 defined by SEQ ID NO: 774, and wherein when the cancer index for the individual is about 0.146 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 274, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 774;

550. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 274 defined by SEQ ID NO: 774, and wherein when the cancer index for the

individual is less than about 0.146 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 274, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 774;

551. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 275 defined by SEQ ID NO: 775, and wherein when the cancer index for the individual is about 0.146 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 275, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 775;

552. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 275 defined by SEQ ID NO: 775, and wherein when the cancer index for the individual is less than about 0.146 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 68.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 275, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 775;

553. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 276 defined by SEQ ID NO: 776, and wherein when the cancer index for the individual is about 0.311 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 276, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 776;

554. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 276 defined by SEQ ID NO: 776, and wherein when the cancer index for the individual is less than about 0.311 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from

DMR 276, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 776;

555. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 277 defined by SEQ ID NO: 777, and wherein when the cancer index for the individual is about 0.311 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 277, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 777;

556. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 277 defined by SEQ ID NO: 777, and wherein when the cancer index for the individual is less than about 0.311 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 277, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 777;

557. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 278 defined by SEQ ID NO: 778, and wherein when the cancer index for the individual is about 0.171 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 278, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 778;

558. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 278 defined by SEQ ID NO: 778, and wherein when the cancer index for the individual is less than about 0.171 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 278, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 778;

559. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 279 defined by SEQ ID NO: 779, and wherein when the cancer index for the

individual is about 0.171 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 279, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 779;

560. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 279 defined by SEQ ID NO: 779, and wherein when the cancer index for the individual is less than about 0.171 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 66.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 279, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 779;

561. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 280 defined by SEQ ID NO: 780, and wherein when the cancer index for the individual is about 0.129 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 280, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 780;

562. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 280 defined by SEQ ID NO: 780, and wherein when the cancer index for the individual is less than about 0.171 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 280, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 780;

563. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 281 defined by SEQ ID NO: 781, and wherein when the cancer index for the individual is about 0.129 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 281, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 781;

564. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 281 defined by SEQ ID NO: 781, and wherein when the cancer index for the individual is less than about 0.171 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 281, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 781;

565. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 282 defined by SEQ ID NO: 782, and wherein when the cancer index for the individual is about 0.219 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 282, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 782;

566. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 282 defined by SEQ ID NO: 782, and wherein when the cancer index for the individual is less than about 0.219 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 282, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 782;

567. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 283 defined by SEQ ID NO: 783, and wherein when the cancer index for the individual is about 0.219 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 283, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 783;

568. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 283 defined by SEQ ID NO: 783, and wherein when the cancer index for the

individual is less than about 0.219 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 64.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 283, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 783;

569. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 284 defined by SEQ ID NO: 784, and wherein when the cancer index for the individual is about 0.198 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 284, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 784;

570. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 284 defined by SEQ ID NO: 784, and wherein when the cancer index for the individual is less than about 0.198 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 284, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 784;

571. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 285 defined by SEQ ID NO: 785, and wherein when the cancer index for the individual is about 0.198 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 285, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 785;

572. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 285 defined by SEQ ID NO: 785, and wherein when the cancer index for the individual is less than about 0.198 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from

DMR 285, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 785;

573. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 286 defined by SEQ ID NO: 786, and wherein when the cancer index for the individual is about 0.063 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 286, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 786;

574. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 286 defined by SEQ ID NO: 786, and wherein when the cancer index for the individual is less than about 0.063 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 286, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 786;

575. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 287 defined by SEQ ID NO: 787, and wherein when the cancer index for the individual is about 0.063 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 287, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 787;

576. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 287 defined by SEQ ID NO: 787, and wherein when the cancer index for the individual is less than about 0.063 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 287, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 787;

577. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 288 defined by SEQ ID NO: 788, and wherein when the cancer index for the

individual is about 0.080 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 288, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 788;

578. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 288 defined by SEQ ID NO: 788, and wherein when the cancer index for the individual is less than about 0.080 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 288, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 788;

579. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 289 defined by SEQ ID NO: 789, and wherein when the cancer index for the individual is about 0.080 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 289, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 789;

580. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 289 defined by SEQ ID NO: 789, and wherein when the cancer index for the individual is less than about 0.080 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 289, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 789;

581. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 290 defined by SEQ ID NO: 790, and wherein when the cancer index for the individual is about 0.185 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 290, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 790;

582. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 290 defined by SEQ ID NO: 790, and wherein when the cancer index for the individual is less than about 0.185 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 290, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 790;

583. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 291 defined by SEQ ID NO: 791, and wherein when the cancer index for the individual is about 0.185 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 291, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 791;

584. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 291 defined by SEQ ID NO: 791, and wherein when the cancer index for the individual is less than about 0.185 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 53.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 291, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 791;

585. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 292 defined by SEQ ID NO: 792, and wherein when the cancer index for the individual is about 0.044 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 292, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 792;

586. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 292 defined by SEQ ID NO: 792, and wherein when the cancer index for the

individual is less than about 0.044 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 292, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 792;

587. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 293 defined by SEQ ID NO: 793, and wherein when the cancer index for the individual is about 0.044 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 293, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 793;

588. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 293 defined by SEQ ID NO: 793, and wherein when the cancer index for the individual is less than about 0.044 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 63.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 293, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 793;

589. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 294 defined by SEQ ID NO: 794, and wherein when the cancer index for the individual is about 0.086 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 294, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 794;

590. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 294 defined by SEQ ID NO: 794, and wherein when the cancer index for the individual is less than about 0.086 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from

DMR 294, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 794;

591. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 295 defined by SEQ ID NO: 795, and wherein when the cancer index for the individual is about 0.086 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 295, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 795;

592. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 295 defined by SEQ ID NO: 795, and wherein when the cancer index for the individual is less than about 0.086 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 295, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 795;

593. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 296 defined by SEQ ID NO: 796, and wherein when the cancer index for the individual is about 0.051 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 296, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 796;

594. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 296 defined by SEQ ID NO: 796, and wherein when the cancer index for the individual is less than about 0.051 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 296, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 796;

595. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 297 defined by SEQ ID NO: 797, and wherein when the cancer index for the

individual is about 0.051 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 297, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 797;

596. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 297 defined by SEQ ID NO: 797, and wherein when the cancer index for the individual is less than about 0.051 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 67.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 297, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 797;

597. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 298 defined by SEQ ID NO: 798, and wherein when the cancer index for the individual is about 0.174 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 298, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 798;

598. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 298 defined by SEQ ID NO: 798, and wherein when the cancer index for the individual is less than about 0.174 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 298, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 798;

599. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 299 defined by SEQ ID NO: 799, and wherein when the cancer index for the individual is about 0.174 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 299, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 799;

600. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 299 defined by SEQ ID NO: 799, and wherein when the cancer index for the individual is less than about 0.174 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 58.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 299, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 799;

601. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 300 defined by SEQ ID NO: 800, and wherein when the cancer index for the individual is about 0.136 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 300, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 800;

602. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 300 defined by SEQ ID NO: 800, and wherein when the cancer index for the individual is less than about 0.136 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 300, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 800;

603. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 301 defined by SEQ ID NO: 801, and wherein when the cancer index for the individual is about 0.136 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 301, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 801;

604. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 301 defined by SEQ ID NO: 801, and wherein when the cancer index for the

individual is less than about 0.136 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 48.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 301, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 801;

605. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 302 defined by SEQ ID NO: 802, and wherein when the cancer index for the individual is about 0.293 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 302, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 802;

606. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 302 defined by SEQ ID NO: 802, and wherein when the cancer index for the individual is less than about 0.293 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 302, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 802;

607. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 303 defined by SEQ ID NO: 803, and wherein when the cancer index for the individual is about 0.293 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 303, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 803;

608. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 303 defined by SEQ ID NO: 803, and wherein when the cancer index for the individual is less than about 0.293 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 55.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from

DMR 303, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 803;

609. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 304 defined by SEQ ID NO: 804, and wherein when the cancer index for the individual is about 0.300 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 304, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 804;

610. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 304 defined by SEQ ID NO: 804, and wherein when the cancer index for the individual is less than about 0.300 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 304, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 804;

611. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 305 defined by SEQ ID NO: 805, and wherein when the cancer index for the individual is about 0.300 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 305, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 805;

612. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 305 defined by SEQ ID NO: 805, and wherein when the cancer index for the individual is less than about 0.300 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 56.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 305, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 805;

613. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 306 defined by SEQ ID NO: 806, and wherein when the cancer index for the

individual is about 0.209 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 306, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 806;

614. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 306 defined by SEQ ID NO: 806, and wherein when the cancer index for the individual is less than about 0.209 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 306, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 806;

615. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 307 defined by SEQ ID NO: 807, and wherein when the cancer index for the individual is about 0.104 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 307, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 807;

616. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 307 defined by SEQ ID NO: 807, and wherein when the cancer index for the individual is less than about 0.104 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 307, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 807;

617. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 308 defined by SEQ ID NO: 808, and wherein when the cancer index for the individual is about 0.104 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 308, and

more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 808;

618. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 308 defined by SEQ ID NO: 808, and wherein when the cancer index for the individual is less than about 0.104 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 308, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 808.

In any of the described assays, the methylation status of the one or more CpGs in the panel is preferably determined by a β-value analysis, and the cancer is endometrial cancer of ovarian cancer. Preferably, the cancer is endometrial cancer.

The ROC data set out in Table 6 corresponding to each of SEQ ID NOs: 501 to 808 are derived by determining a cancer index value from a panel of CpGs in each instance whereby the panel comprises the CpGs denoted by [[CG]].

In any of the assays of the invention described herein, the individual may be stratified according to their cancer index value, and consequently be defined according to their cancer and/or CIN3 status and/or cancer and/or CIN3 risk. In any of the assays described herein, wherein when the cancer index value for the individual is:

a. less than about -0.660 the individual is assessed as not having cancer and/or CIN3;
b. about -0.660 or more and less than about -0.430 the individual is assessed as having a low risk of cancer and/or CIN3;
c. about -0.430 or more and less than about -0.230 the individual is assessed as having a moderate risk of cancer and/or CIN3;
d. about -0.230 or more the individual is assessed as having a high risk of cancer and/or CIN3;

preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, more preferably wherein the cancer is endometrial cancer.

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Table 6.

SEQ ID NO	chr	start	stop	Mean EC cases	Mean controls	cutoff	specificity	sensitivity	auc
501	chr1	2.01E+08	2.01E+08	0.306	0.103	0.209	0.95	0.7	0.911
502	chr19	39260654	39261254	0.393	0.108	0.271	0.95	0.77	0.903
503	chr2	1.27E+08	1.27E+08	0.292	0.05	0.123	0.95	0.73	0.899
504	chr2	1.27E+08	1.27E+08	0.292	0.05	0.123	0.95	0.73	0.899
505	chr10	26506776	26507376	0.198	0.07	0.105	0.95	0.71	0.899
506	chr10	16562170	16562770	0.149	0.038	0.056	0.95	0.66	0.897
507	chr8	70983267	70983867	0.259	0.101	0.155	0.95	0.67	0.894
508	chr10	26222906	26223506	0.226	0.047	0.083	0.95	0.71	0.893
509	chr11	71954682	71955282	0.309	0.124	0.168	0.95	0.62	0.892
510	chr1	2.08E+08	2.08E+08	0.346	0.093	0.265	0.95	0.6	0.891
511	chr8	70983899	70984499	0.234	0.072	0.128	0.95	0.64	0.89
512	chr2	74726333	74726933	0.243	0.06	0.127	0.95	0.64	0.888
513	chr2	74726400	74727000	0.243	0.06	0.127	0.95	0.64	0.888
514	chr20	59827621	59828221	0.288	0.061	0.133	0.95	0.74	0.888
515	chr8	24771166	24771766	0.202	0.067	0.125	0.95	0.64	0.888
516	chr2	74726349	74726949	0.243	0.06	0.127	0.95	0.64	0.888
517	chr1	50886482	50887082	0.272	0.067	0.113	0.95	0.71	0.886
518	chr1	50886649	50887249	0.272	0.067	0.113	0.95	0.71	0.886
519	chr2	467879	468479	0.239	0.075	0.143	0.95	0.64	0.885
520	chr5	1886694	1887294	0.212	0.054	0.095	0.95	0.66	0.884
521	chr2	74726410	74727010	0.247	0.065	0.146	0.95	0.63	0.882
522	chr6	29521120	29521720	0.239	0.045	0.098	0.95	0.68	0.881
523	chr8	23564190	23564790	0.269	0.12	0.177	0.95	0.59	0.88
524	chr6	29521056	29521656	0.241	0.044	0.098	0.95	0.68	0.879
525	chr6	28367271	28367871	0.193	0.029	0.039	0.95	0.74	0.878
526	chr2	1.27E+08	1.27E+08	0.279	0.066	0.154	0.95	0.68	0.878
527	chr6	29521188	29521788	0.243	0.046	0.1	0.95	0.7	0.877
528	chr6	29521206	29521806	0.254	0.058	0.124	0.95	0.67	0.875
529	chr2	74726434	74727034	0.254	0.073	0.171	0.95	0.62	0.875
530	chr6	29521201	29521801	0.245	0.05	0.108	0.95	0.68	0.874
531	chr6	29521199	29521799	0.245	0.05	0.108	0.95	0.68	0.874
532	chr3	1.3E+08	1.3E+08	0.232	0.05	0.091	0.95	0.7	0.874
533	chr16	56696929	56697529	0.294	0.097	0.174	0.95	0.62	0.874
534	chr6	29521302	29521902	0.251	0.059	0.123	0.95	0.67	0.873
535	chr6	29521324	29521924	0.251	0.059	0.123	0.95	0.67	0.873
536	chr4	1399889	1400489	0.241	0.097	0.176	0.95	0.67	0.873
537	chr17	35299300	35299900	0.327	0.119	0.257	0.95	0.63	0.873
538	chr6	29521331	29521931	0.251	0.059	0.123	0.95	0.67	0.873
539	chr14	38724375	38724975	0.263	0.076	0.195	0.95	0.63	0.872
540	chr14	38724348	38724948	0.263	0.076	0.195	0.95	0.63	0.872
541	chr17	58498677	58499277	0.193	0.037	0.051	0.95	0.71	0.871
542	chr6	29760205	29760805	0.168	0.045	0.055	0.95	0.7	0.871

543	chr8	687084	687684	0.244	0.036	0.098	0.95	0.6	0.87
544	chr10	47007902	47008502	0.186	0.036	0.071	0.95	0.67	0.87
545	chr5	1887064	1887664	0.181	0.052	0.094	0.95	0.63	0.869
546	chr5	2750458	2751058	0.412	0.174	0.374	0.95	0.6	0.869
547	chr17	58498765	58499365	0.263	0.084	0.104	0.95	0.71	0.869
548	chr10	1.09E+08	1.09E+08	0.213	0.046	0.119	0.95	0.6	0.867
549	chr10	1.09E+08	1.09E+08	0.213	0.046	0.119	0.95	0.6	0.867
550	chr18	11148469	11149069	0.251	0.092	0.168	0.95	0.59	0.867
551	chr10	8097341	8097941	0.278	0.076	0.231	0.95	0.55	0.867
552	chr9	842333	842933	0.224	0.049	0.101	0.95	0.6	0.865
553	chr10	1.35E+08	1.35E+08	0.317	0.137	0.259	0.95	0.58	0.864
554	chr10	1.35E+08	1.35E+08	0.317	0.137	0.259	0.95	0.58	0.864
555	chr10	22633926	22634526	0.301	0.147	0.279	0.95	0.49	0.863
556	chr18	11148614	11149214	0.244	0.077	0.14	0.95	0.64	0.863
557	chr2	2.29E+08	2.29E+08	0.212	0.052	0.093	0.95	0.63	0.863
558	chr10	1.3E+08	1.3E+08	0.249	0.071	0.119	0.95	0.66	0.862
559	chr10	1.3E+08	1.3E+08	0.249	0.071	0.119	0.95	0.66	0.862
560	chr10	8097389	8097989	0.323	0.098	0.311	0.95	0.55	0.861
561	chr11	636875	637475	0.204	0.04	0.073	0.95	0.66	0.861
562	chr11	636873	637473	0.204	0.04	0.073	0.95	0.66	0.861
563	chr3	1.3E+08	1.3E+08	0.278	0.078	0.171	0.95	0.66	0.86
564	chr13	79169983	79170583	0.276	0.113	0.206	0.95	0.59	0.86
565	chr13	79170003	79170603	0.276	0.113	0.206	0.95	0.59	0.86
566	chr3	1.3E+08	1.3E+08	0.278	0.078	0.171	0.95	0.66	0.86
567	chr13	1.13E+08	1.13E+08	0.214	0.064	0.133	0.95	0.62	0.859
568	chr16	6069101	6069701	0.254	0.112	0.233	0.95	0.49	0.859
569	chr8	65281885	65282485	0.184	0.041	0.09	0.95	0.66	0.859
570	chr10	1.33E+08	1.33E+08	0.186	0.037	0.072	0.95	0.62	0.859
571	chr12	50297493	50298093	0.248	0.075	0.129	0.95	0.71	0.859
572	chr13	1.13E+08	1.13E+08	0.282	0.131	0.257	0.95	0.55	0.858
573	chr14	1.04E+08	1.04E+08	0.246	0.08	0.189	0.95	0.52	0.857
574	chr21	38076742	38077342	0.24	0.107	0.175	0.95	0.59	0.857
575	chr10	26222800	26223400	0.261	0.109	0.157	0.95	0.64	0.856
576	chr2	29033480	29034080	0.281	0.114	0.172	0.95	0.7	0.856
577	chr20	61638274	61638874	0.164	0.038	0.059	0.95	0.66	0.856
578	chr19	44952430	44953030	0.142	0.042	0.064	0.95	0.6	0.855
579	chr3	1.69E+08	1.69E+08	0.206	0.027	0.043	0.95	0.62	0.855
580	chr5	1.15E+08	1.15E+08	0.216	0.099	0.178	0.95	0.52	0.855
581	chr6	29520928	29521528	0.276	0.101	0.169	0.95	0.67	0.854
582	chr6	29520920	29521520	0.276	0.101	0.169	0.95	0.67	0.854
583	chr6	29520972	29521572	0.271	0.097	0.162	0.95	0.67	0.854
584	chr2	45155691	45156291	0.178	0.045	0.075	0.95	0.66	0.854
585	chr22	50623392	50623992	0.331	0.088	0.219	0.95	0.64	0.853
586	chr22	50623387	50623987	0.331	0.088	0.219	0.95	0.64	0.853
587	chr18	56940118	56940718	0.228	0.074	0.126	0.95	0.64	0.853
588	chr7	49812802	49813402	0.179	0.032	0.058	0.95	0.63	0.853

589	chr1	50513570	50514170	0.226	0.08	0.147	0.95	0.59	0.852
590	chr17	42092103	42092703	0.26	0.138	0.179	0.95	0.64	0.852
591	chr17	42092070	42092670	0.26	0.138	0.179	0.95	0.64	0.852
592	chr6	35108639	35109239	0.256	0.057	0.198	0.95	0.56	0.851
593	chr6	35108621	35109221	0.256	0.057	0.198	0.95	0.56	0.851
594	chr2	99439233	99439833	0.414	0.129	0.387	0.95	0.56	0.851
595	chr18	70533998	70534598	0.237	0.085	0.165	0.95	0.64	0.851
596	chr8	24772009	24772609	0.168	0.053	0.109	0.95	0.59	0.85
597	chr6	29760110	29760710	0.166	0.05	0.063	0.95	0.7	0.849
598	chr20	23015632	23016232	0.31	0.125	0.253	0.95	0.53	0.849
599	chr20	23015636	23016236	0.31	0.125	0.253	0.95	0.53	0.849
600	chr10	1.11E+08	1.11E+08	0.219	0.079	0.178	0.95	0.51	0.849
601	chr4	9783098	9783698	0.288	0.112	0.208	0.95	0.56	0.849
602	chr6	29520852	29521452	0.278	0.116	0.186	0.95	0.64	0.848
603	chr5	524203	524803	0.168	0.056	0.106	0.95	0.56	0.847
604	chr3	1.47E+08	1.47E+08	0.316	0.148	0.315	0.95	0.48	0.847
605	chr1	1.76E+08	1.76E+08	0.225	0.091	0.16	0.95	0.58	0.847
606	chr8	35092578	35093178	0.228	0.085	0.192	0.95	0.56	0.847
607	chr10	1.11E+08	1.11E+08	0.197	0.08	0.17	0.95	0.51	0.846
608	chr4	9782892	9783492	0.315	0.154	0.245	0.95	0.55	0.845
609	chr4	9782898	9783498	0.315	0.154	0.245	0.95	0.55	0.845
610	chr4	9782906	9783506	0.315	0.154	0.245	0.95	0.55	0.845
611	chr4	9782896	9783496	0.315	0.154	0.245	0.95	0.55	0.845
612	chr8	1.41E+08	1.41E+08	0.194	0.043	0.079	0.95	0.62	0.844
613	chr7	1.54E+08	1.54E+08	0.204	0.062	0.178	0.95	0.55	0.843
614	chr7	1.54E+08	1.54E+08	0.204	0.062	0.178	0.95	0.55	0.843
615	chr8	31496666	31497266	0.168	0.045	0.079	0.95	0.58	0.842
616	chr19	15343965	15344565	0.24	0.094	0.185	0.95	0.53	0.842
617	chr2	38301456	38302056	0.369	0.1	0.323	0.95	0.53	0.841
618	chr3	50378131	50378731	0.165	0.026	0.044	0.95	0.63	0.841
619	chr10	94834463	94835063	0.145	0.034	0.059	0.95	0.62	0.841
620	chr4	779580	780180	0.193	0.049	0.089	0.95	0.62	0.84
621	chr1	1566387	1566987	0.356	0.183	0.261	0.95	0.63	0.839
622	chr3	2139956	2140556	0.153	0.048	0.108	0.95	0.55	0.839
623	chr6	29894319	29894919	0.244	0.046	0.062	0.95	0.68	0.838
624	chr8	97171601	97172201	0.166	0.048	0.086	0.95	0.58	0.838
625	chr4	1.73E+08	1.73E+08	0.186	0.083	0.146	0.95	0.49	0.838
626	chr11	66188222	66188822	0.229	0.145	0.209	0.95	0.47	0.835
627	chr19	58095359	58095959	0.197	0.048	0.077	0.95	0.64	0.835
628	chr5	40680837	40681437	0.173	0.03	0.051	0.95	0.67	0.833
629	chr2	29033426	29034026	0.273	0.101	0.174	0.95	0.58	0.832
630	chr7	70597621	70598221	0.188	0.075	0.148	0.95	0.59	0.832
631	chr2	45169248	45169848	0.162	0.04	0.069	0.95	0.59	0.832
632	chr9	1.01E+08	1.01E+08	0.169	0.038	0.136	0.95	0.48	0.831
633	chr6	1.23E+08	1.23E+08	0.165	0.051	0.103	0.95	0.56	0.831
634	chr8	98289929	98290529	0.205	0.095	0.157	0.95	0.58	0.83

635	chr17	48546021	48546621	0.26	0.102	0.18	0.95	0.56	0.83
636	chr19	22805884	22806484	0.324	0.142	0.298	0.95	0.51	0.83
637	chr10	44880245	44880845	0.167	0.03	0.048	0.95	0.55	0.829
638	chr10	44880408	44881008	0.167	0.03	0.048	0.95	0.55	0.829
639	chr7	1.57E+08	1.57E+08	0.273	0.072	0.154	0.95	0.59	0.829
640	chr10	44880430	44881030	0.167	0.03	0.048	0.95	0.55	0.829
641	chr6	29894379	29894979	0.213	0.053	0.083	0.95	0.66	0.828
642	chr18	11149170	11149770	0.281	0.098	0.188	0.95	0.52	0.828
643	chr6	29894041	29894641	0.319	0.092	0.183	0.95	0.64	0.828
644	chr6	1.23E+08	1.23E+08	0.167	0.05	0.101	0.95	0.56	0.828
645	chr10	1.19E+08	1.19E+08	0.18	0.025	0.034	0.95	0.66	0.828
646	chr5	60921591	60922191	0.175	0.027	0.037	0.95	0.58	0.825
647	chr20	25062147	25062747	0.203	0.038	0.072	0.95	0.55	0.825
648	chr2	1.21E+08	1.21E+08	0.548	0.441	0.552	0.95	0.49	0.824
649	chr7	95025536	95026136	0.268	0.125	0.214	0.95	0.53	0.824
650	chr8	1.11E+08	1.11E+08	0.132	0.035	0.065	0.95	0.53	0.824
651	chr20	54578784	54579384	0.236	0.11	0.185	0.95	0.49	0.824
652	chr1	34642202	34642802	0.319	0.205	0.294	0.95	0.47	0.823
653	chr5	40681421	40682021	0.227	0.083	0.129	0.95	0.59	0.82
654	chr3	6902545	6903145	0.186	0.06	0.138	0.95	0.52	0.82
655	chr4	1.22E+08	1.22E+08	0.201	0.073	0.118	0.95	0.53	0.819
656	chr6	35108582	35109182	0.298	0.127	0.254	0.95	0.56	0.816
657	chr19	57182818	57183418	0.225	0.085	0.18	0.95	0.48	0.816
658	chr16	31580689	31581289	0.325	0.24	0.301	0.95	0.53	0.814
659	chr18	55094949	55095549	0.228	0.076	0.176	0.95	0.52	0.814
660	chr11	14926704	14927304	0.404	0.242	0.411	0.95	0.47	0.814
661	chr2	1.4E+08	1.4E+08	0.178	0.034	0.072	0.95	0.56	0.813
662	chr6	1.69E+08	1.69E+08	0.315	0.094	0.358	0.95	0.41	0.812
663	chr2	91634983	91635583	0.335	0.146	0.313	0.95	0.44	0.811
664	chr1	1.13E+08	1.13E+08	0.261	0.107	0.221	0.95	0.48	0.811
665	chr11	70508110	70508710	0.254	0.117	0.256	0.95	0.44	0.81
666	chr1	2.37E+08	2.37E+08	0.261	0.111	0.202	0.95	0.55	0.809
667	chr19	52222398	52222998	0.346	0.225	0.345	0.95	0.48	0.808
668	chr21	38077373	38077973	0.196	0.09	0.165	0.95	0.51	0.807
669	chr2	2.03E+08	2.03E+08	0.166	0.057	0.134	0.95	0.47	0.807
670	chr1	2.33E+08	2.33E+08	0.347	0.213	0.3	0.95	0.56	0.806
671	chr1	1.2E+08	1.2E+08	0.171	0.094	0.153	0.95	0.45	0.806
672	chr11	626875	627475	0.384	0.171	0.416	0.95	0.47	0.805
673	chr11	626870	627470	0.384	0.171	0.416	0.95	0.47	0.805
674	chr19	22444293	22444893	0.234	0.126	0.223	0.95	0.48	0.803
675	chr3	42947265	42947865	0.289	0.186	0.232	0.95	0.6	0.803
676	chr1	18434276	18434876	0.136	0.029	0.047	0.95	0.6	0.801
677	chr13	50701319	50701919	0.231	0.063	0.162	0.95	0.55	0.799
678	chr1	3567346	3567946	0.328	0.21	0.311	0.95	0.52	0.799
679	chr6	29760473	29761073	0.237	0.147	0.17	0.95	0.53	0.799
680	chr1	2.37E+08	2.37E+08	0.359	0.228	0.314	0.95	0.56	0.799

681	chr7	98245706	98246306	0.235	0.133	0.2	0.95	0.48	0.798
682	chr4	1.26E+08	1.26E+08	0.176	0.046	0.08	0.95	0.59	0.797
683	chr21	22370138	22370738	0.142	0.043	0.089	0.95	0.45	0.796
684	chr12	75602930	75603530	0.245	0.181	0.253	0.95	0.4	0.793
685	chr1	3567112	3567712	0.289	0.177	0.274	0.95	0.49	0.792
686	chr11	32355024	32355624	0.447	0.355	0.451	0.95	0.49	0.792
687	chr6	1.05E+08	1.05E+08	0.346	0.242	0.346	0.95	0.37	0.791
688	chr12	4918781	4919381	0.227	0.078	0.181	0.95	0.52	0.79
689	chr12	4918838	4919438	0.227	0.078	0.181	0.95	0.52	0.79
690	chr1	2.33E+08	2.33E+08	0.312	0.197	0.287	0.95	0.53	0.789
691	chr12	1.08E+08	1.08E+08	0.14	0.035	0.057	0.95	0.59	0.788
692	chr2	85811132	85811732	0.307	0.19	0.292	0.95	0.49	0.788
693	chr2	1747812	1748412	0.227	0.059	0.11	0.95	0.51	0.787
694	chr10	1.01E+08	1.01E+08	0.189	0.035	0.081	0.95	0.51	0.787
695	chr2	1747832	1748432	0.227	0.059	0.11	0.95	0.51	0.787
696	chr15	35046903	35047503	0.151	0.036	0.057	0.95	0.58	0.784
697	chr2	5835931	5836531	0.159	0.045	0.076	0.95	0.52	0.784
698	chr6	73331773	73332373	0.231	0.045	0.076	0.95	0.47	0.783
699	chr7	1.57E+08	1.57E+08	0.212	0.092	0.198	0.95	0.41	0.781
700	chr10	1.35E+08	1.35E+08	0.241	0.128	0.183	0.95	0.56	0.78
701	chr20	2780962	2781562	0.137	0.046	0.063	0.95	0.58	0.777
702	chr14	52535847	52536447	0.168	0.063	0.095	0.95	0.53	0.777
703	chr3	1.3E+08	1.3E+08	0.421	0.293	0.426	0.95	0.42	0.777
704	chr14	52535875	52536475	0.168	0.063	0.095	0.95	0.53	0.777
705	chr3	238315	238915	0.133	0.032	0.074	0.95	0.45	0.777
706	chr3	1.3E+08	1.3E+08	0.421	0.293	0.426	0.95	0.42	0.777
707	chr10	7449812	7450412	0.21	0.082	0.109	0.95	0.51	0.777
708	chr18	74962067	74962667	0.204	0.05	0.099	0.95	0.53	0.776
709	chr18	74962059	74962659	0.204	0.05	0.099	0.95	0.53	0.776
710	chr18	74962069	74962669	0.204	0.05	0.099	0.95	0.53	0.776
711	chr1	1.49E+08	1.49E+08	0.359	0.184	0.392	0.95	0.44	0.775
712	chr1	1.8E+08	1.8E+08	0.276	0.173	0.245	0.95	0.48	0.775
713	chr18	13641440	13642040	0.297	0.154	0.362	0.95	0.34	0.775
714	chr10	73846957	73847557	0.15	0.037	0.049	0.95	0.58	0.771
715	chr17	1173848	1174448	0.267	0.12	0.263	0.95	0.44	0.769
716	chr6	43612608	43613208	0.5	0.427	0.533	0.95	0.4	0.767
717	chr7	97360952	97361552	0.196	0.107	0.171	0.95	0.44	0.762
718	chr19	57610570	57611170	0.248	0.173	0.257	0.95	0.36	0.76
719	chr5	1.69E+08	1.69E+08	0.221	0.11	0.162	0.95	0.48	0.758
720	chr12	1.27E+08	1.27E+08	0.218	0.09	0.211	0.95	0.4	0.757
721	chr1	36043101	36043701	0.257	0.138	0.296	0.95	0.33	0.751
722	chr6	1.06E+08	1.06E+08	0.321	0.213	0.361	0.95	0.32	0.742
723	chr19	56904645	56905245	0.126	0.043	0.056	0.95	0.49	0.738
724	chr2	2.09E+08	2.09E+08	0.254	0.142	0.257	0.95	0.34	0.73
725	chr14	1.02E+08	1.02E+08	0.378	0.293	0.409	0.95	0.36	0.726
726	chr8	1.45E+08	1.45E+08	0.358	0.235	0.46	0.95	0.26	0.726

727	chr11	20690634	20691234	0.155	0.041	0.086	0.95	0.48	0.72
728	chr11	20690861	20691461	0.153	0.043	0.081	0.95	0.48	0.715
729	chr6	29691700	29692300	0.255	0.181	0.257	0.95	0.33	0.713
730	chr11	20690826	20691426	0.165	0.045	0.088	0.95	0.48	0.713
731	chr3	3840830	3841430	0.101	0.018	0.025	0.95	0.44	0.708
732	chr2	25499746	25500346	0.37	0.263	0.459	0.95	0.25	0.707
733	chr1	1.11E+08	1.11E+08	0.195	0.049	0.089	0.95	0.45	0.704
734	chr17	77721689	77722289	0.202	0.132	0.199	0.95	0.44	0.697
735	chr3	1.25E+08	1.25E+08	0.188	0.113	0.329	0.95	0.15	0.697
736	chr11	1.23E+08	1.23E+08	0.216	0.15	0.271	0.95	0.27	0.693
737	chr16	88700616	88701216	0.249	0.183	0.297	0.95	0.36	0.638
738	chr19	39260654	39261253	0.393	0.108	0.271	0.95	0.77	0.903
739	chr19	39260654	39261253	0.393	0.108	0.271	0.95	0.77	0.903
740	chr2	127413636	127414235	0.292	0.05	0.123	0.95	0.73	0.899
741	chr2	127413531	127414130	0.292	0.05	0.123	0.95	0.73	0.899
742	chr10	26506776	26507375	0.198	0.07	0.105	0.95	0.71	0.899
743	chr2	127413636	127414235	0.292	0.05	0.123	0.95	0.73	0.899
744	chr2	127413531	127414130	0.292	0.05	0.123	0.95	0.73	0.899
745	chr10	26506776	26507375	0.198	0.07	0.105	0.95	0.71	0.899
746	chr8	24771026	24771625	0.209	0.059	0.119	0.95	0.67	0.895
747	chr8	24771026	24771625	0.209	0.059	0.119	0.95	0.67	0.895
748	chr10	26222906	26223505	0.226	0.047	0.083	0.95	0.71	0.893
749	chr10	26222906	26223505	0.226	0.047	0.083	0.95	0.71	0.893
750	chr1	208132487	208133086	0.346	0.093	0.265	0.95	0.6	0.891
751	chr1	208132487	208133086	0.346	0.093	0.265	0.95	0.6	0.891
752	chr1	50886482	50887081	0.272	0.067	0.113	0.95	0.71	0.886
753	chr1	50886649	50887248	0.272	0.067	0.113	0.95	0.71	0.886
754	chr1	50886482	50887081	0.272	0.067	0.113	0.95	0.71	0.886
755	chr1	50886649	50887248	0.272	0.067	0.113	0.95	0.71	0.886
756	chr6	28367271	28367870	0.193	0.029	0.039	0.95	0.74	0.878
757	chr6	28367271	28367870	0.193	0.029	0.039	0.95	0.74	0.878
758	chr2	74726434	74727033	0.254	0.073	0.171	0.95	0.62	0.875
759	chr2	74726434	74727033	0.254	0.073	0.171	0.95	0.62	0.875
760	chr3	129693491	129694090	0.232	0.05	0.091	0.95	0.7	0.874
761	chr3	129693491	129694090	0.232	0.05	0.091	0.95	0.7	0.874
762	chr9	842333	842932	0.224	0.049	0.101	0.95	0.6	0.865
763	chr9	842333	842932	0.224	0.049	0.101	0.95	0.6	0.865
764	chr18	11148614	11149213	0.244	0.077	0.14	0.95	0.64	0.863
765	chr20	59828228	59828827	0.216	0.045	0.082	0.95	0.67	0.863
766	chr18	11148614	11149213	0.244	0.077	0.14	0.95	0.64	0.863
767	chr20	59828228	59828827	0.216	0.045	0.082	0.95	0.67	0.863
768	chr6	29520919	29521918	0.261	0.086	0.146	0.95	0.68	0.862
769	chr6	29520919	29521918	0.261	0.086	0.146	0.95	0.68	0.862

770	chr6	29520919	29521918	0.261	0.086	0.146	0.95	0.68	0.862
771	chr6	29520919	29521918	0.261	0.086	0.146	0.95	0.68	0.862
772	chr6	29520919	29521918	0.261	0.086	0.146	0.95	0.68	0.862
773	chr6	29520919	29521918	0.261	0.086	0.146	0.95	0.68	0.862
774	chr6	29520919	29521918	0.261	0.086	0.146	0.95	0.68	0.862
775	chr6	29520919	29521918	0.261	0.086	0.146	0.95	0.68	0.862
776	chr10	8097389	8097988	0.323	0.098	0.311	0.95	0.55	0.861
777	chr10	8097389	8097988	0.323	0.098	0.311	0.95	0.55	0.861
778	chr3	129693286	129693885	0.278	0.078	0.171	0.95	0.66	0.86
779	chr3	129693286	129693885	0.278	0.078	0.171	0.95	0.66	0.86
780	chr12	50297493	50298092	0.248	0.075	0.129	0.95	0.71	0.859
781	chr12	50297493	50298092	0.248	0.075	0.129	0.95	0.71	0.859
782	chr22	50623387	50623986	0.331	0.088	0.219	0.95	0.64	0.853
783	chr22	50623387	50623986	0.331	0.088	0.219	0.95	0.64	0.853
784	chr6	35108639	35109238	0.256	0.057	0.198	0.95	0.56	0.851
785	chr6	35108639	35109238	0.256	0.057	0.198	0.95	0.56	0.851
786	chr6	29760110	29760709	0.166	0.05	0.063	0.95	0.7	0.849
787	chr6	29760110	29760709	0.166	0.05	0.063	0.95	0.7	0.849
788	chr10	106401217	106401816	0.186	0.038	0.08	0.95	0.58	0.846
789	chr10	106401217	106401816	0.186	0.038	0.08	0.95	0.58	0.846
790	chr19	15343965	15344564	0.24	0.094	0.185	0.95	0.53	0.842
791	chr19	15343965	15344564	0.24	0.094	0.185	0.95	0.53	0.842
792	chr3	50378131	50378730	0.165	0.026	0.044	0.95	0.63	0.841
793	chr3	50378131	50378730	0.165	0.026	0.044	0.95	0.63	0.841
794	chr8	97171601	97172200	0.166	0.048	0.086	0.95	0.58	0.838
795	chr8	97171601	97172200	0.166	0.048	0.086	0.95	0.58	0.838
796	chr5	40680837	40681436	0.173	0.03	0.051	0.95	0.67	0.833
797	chr5	40680837	40681436	0.173	0.03	0.051	0.95	0.67	0.833
798	chr2	29033426	29034025	0.273	0.101	0.174	0.95	0.58	0.832
799	chr2	29033426	29034025	0.273	0.101	0.174	0.95	0.58	0.832
800	chr9	100616307	100616906	0.169	0.038	0.136	0.95	0.48	0.831
801	chr9	100616307	100616906	0.169	0.038	0.136	0.95	0.48	0.831
802	chr4	107425	108024	0.331	0.211	0.293	0.95	0.55	0.826
803	chr4	107425	108024	0.331	0.211	0.293	0.95	0.55	0.826
804	chr1	232941768	232941767	0.347	0.213	0.3	0.95	0.56	0.806
805	chr1	232941768	232941767	0.347	0.213	0.3	0.95	0.56	0.806
806	chr1	200842456	200843056	0.306	0.103	0.209	0.95	0.7	0.911
807	chr10	26506553	26507153	0.227	0.068	0.104	0.95	0.71	0.905
808	chr10	26506633	26507233	0.227	0.068	0.104	0.95	0.71	0.905

The predicting of the presence, absence, or development of cancer in an individual may particularly involve determining percent methylated reference for the panel of one or more CpGs. A threshold percent methylated reference value may be applied in order to stratify an individual as having or not having cancer and/or CIN3, or as having a high or low risk of cancer and/or CIN3 development, preferably wherein the cancer is endometrial or ovarian cancer, more preferably wherein the cancer is endometrial cancer.

In any of the assays described herein, the step of determining the methylation status of the one or more CpGs in the panel may comprise determining each CpG within:

1. SEQ ID NO 809 and/or SEQ ID NO 846 and/or SEQ ID NO 883 and wherein when the cancer index value is about 0.282 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 809 and/or SEQ ID NO 846 and/or SEQ ID NO 883;
2. SEQ ID NO 809 and/or SEQ ID NO 846 and/or SEQ ID NO 883 and wherein when the cancer index value is less than about 0.282 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 809 and/or SEQ ID NO 846 and/or SEQ ID NO 883;
3. SEQ ID NO 810 and/or SEQ ID NO 847 and/or SEQ ID NO 884 and wherein when the cancer index value is about 0.212 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 55.00%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 810 and/or SEQ ID NO 847 and/or SEQ ID NO 884;
4. SEQ ID NO 810 and/or SEQ ID NO 847 and/or SEQ ID NO 884 and wherein when the cancer index value is less than about 0.212 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 55.00%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the

percent methylated reference for sequence defined by SEQ ID NO 810 and/or SEQ ID NO 847 and/or SEQ ID NO 884;

5. SEQ ID NO 811 and/or SEQ ID NO 848 and/or SEQ ID NO 885 and wherein when the cancer index value is about 0.002 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 90.00%, the specificity of the assay is about 80.00%, and the AUC is about 0.98, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 811 and/or SEQ ID NO 848 and/or SEQ ID NO 885 ;
6. SEQ ID NO 811 and/or SEQ ID NO 848 and/or SEQ ID NO 885 and wherein when the cancer index value is less than about 0.002 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 90.00%, the specificity of the assay is about 80.00%, and the AUC is about 0.98, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 811 and/or SEQ ID NO 848 and/or SEQ ID NO 885;
7. SEQ ID NO 812 and/or SEQ ID NO 849 and/or SEQ ID NO 886 and wherein when the cancer index value is about 0.026 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 90.00%, and the AUC is about 0.98, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 812 and/or SEQ ID NO 849 and/or SEQ ID NO 886;
8. SEQ ID NO 812 and/or SEQ ID NO 849 and/or SEQ ID NO 886 815 and wherein when the cancer index value is less than about 0.026 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 90.00%, and the AUC is about 0.98, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 812 and/or SEQ ID NO 849 and/or SEQ ID NO 886;
9. SEQ ID NO 813 and/or SEQ ID NO 850 and/or SEQ ID NO 887 and wherein when the cancer index value is about 0.003 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 85.00%, and the AUC is about 0.97, preferably wherein the cancer index value is the percent methylated

reference for sequence defined by SEQ ID NO 813 and/or SEQ ID NO 850 and/or SEQ ID NO 887;

10. SEQ ID NO 813 and/or SEQ ID NO 850 and/or SEQ ID NO 887 and wherein when the cancer index value is less than about 0.003 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 85.00%, and the AUC is about 0.97, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 813 and/or SEQ ID NO 850 and/or SEQ ID NO 887;
11. SEQ ID NO 814 and/or SEQ ID NO 851 and/or SEQ ID NO 888 and wherein when the cancer index value is about 0.000 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 75.00%, the specificity of the assay is about 85.00%, and the AUC is about 0.96, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 814 and/or SEQ ID NO 851 and/or SEQ ID NO 888;
12. SEQ ID NO 814 and/or SEQ ID NO 851 and/or SEQ ID NO 888 and wherein when the cancer index value is less than about 0.000 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 75.00%, the specificity of the assay is about 85.00%, and the AUC is about 0.96, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 814 and/or SEQ ID NO 851 and/or SEQ ID NO 888;
13. SEQ ID NO 815 and/or SEQ ID NO 852 and/or SEQ ID NO 889 and wherein when the cancer index value is about 0.001 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 90.00%, the specificity of the assay is about 80.00%, and the AUC is about 0.96, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 815 and/or SEQ ID NO 852 and/or SEQ ID NO 889;
14. SEQ ID NO 815 and/or SEQ ID NO 852 and/or SEQ ID NO 889 and wherein when the cancer index value is less than about 0.001 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 90.00%, the specificity of the assay is about 80.00%, and the AUC is about 0.96, preferably wherein the cancer index value is the

percent methylated reference for sequence defined by SEQ ID NO 815 and/or SEQ ID NO 852 and/or SEQ ID NO 889;

15. SEQ ID NO 816 and/or SEQ ID NO 853 and/or SEQ ID NO 890 and wherein when the cancer index value is about 0.025 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 90.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.96, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 816 and/or SEQ ID NO 853 and/or SEQ ID NO 890;
16. SEQ ID NO 816 and/or SEQ ID NO 853 and/or SEQ ID NO 890 and wherein when the cancer index value is less than about 0.025 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 90.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.96, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 816 and/or SEQ ID NO 853 and/or SEQ ID NO 890;
17. SEQ ID NO 817 and/or SEQ ID NO 854 and/or SEQ ID NO 891 and wherein when the cancer index value is about 0.052 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 70.00%, the specificity of the assay is about 85.00%, and the AUC is about 0.95, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 817 and/or SEQ ID NO 854 and/or SEQ ID NO 891;
18. SEQ ID NO 817 and/or SEQ ID NO 854 and/or SEQ ID NO 891 and wherein when the cancer index value is less than about 0.052 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 70.00%, the specificity of the assay is about 85.00%, and the AUC is about 0.95, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 817 and/or SEQ ID NO 854 and/or SEQ ID NO 891;
19. SEQ ID NO 818 and/or SEQ ID NO 855 and/or SEQ ID NO 892 and wherein when the cancer index value is about 0.001 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.94, preferably wherein the cancer index value is the percent methylated

reference for sequence defined by SEQ ID NO 818 and/or SEQ ID NO 855 and/or SEQ ID NO 892;

20. SEQ ID NO 818 and/or SEQ ID NO 855 and/or SEQ ID NO 892 and wherein when the cancer index value is less than about 0.001 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.94, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 818 and/or SEQ ID NO 855 and/or SEQ ID NO 892;
21. SEQ ID NO 819 and/or SEQ ID NO 856 and/or SEQ ID NO 893 and wherein when the cancer index value is about 0.470 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 90.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.93, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 819 and/or SEQ ID NO 856 and/or SEQ ID NO 893;
22. SEQ ID NO 819 and/or SEQ ID NO 856 and/or SEQ ID NO 893 and wherein when the cancer index value is less than about 0.470 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 90.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.93, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 819 and/or SEQ ID NO 856 and/or SEQ ID NO 893;
23. SEQ ID NO 820 and/or SEQ ID NO 857 and/or SEQ ID NO 894 and wherein when the cancer index value is about 0.010 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 70.00%, the specificity of the assay is about 80.00%, and the AUC is about 0.92, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 820 and/or SEQ ID NO 857 and/or SEQ ID NO 894;
24. SEQ ID NO 820 and/or SEQ ID NO 857 and/or SEQ ID NO 894 and wherein when the cancer index value is less than about 0.010 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 70.00%, the specificity of the assay is about 80.00%, and the AUC is about 0.92, preferably wherein the cancer index value is the

percent methylated reference for sequence defined by SEQ ID NO 820 and/or SEQ ID NO 857 and/or SEQ ID NO 894;

25. SEQ ID NO 821 and/or SEQ ID NO 858 and/or SEQ ID NO 895 and wherein when the cancer index value is about 0.321 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 90.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.92, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 821 and/or SEQ ID NO 858 and/or SEQ ID NO 895;
26. SEQ ID NO 821 and/or SEQ ID NO 858 and/or SEQ ID NO 895 and wherein when the cancer index value is less than about 0.321 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 90.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.92, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 821 and/or SEQ ID NO 858 and/or SEQ ID NO 895;
27. SEQ ID NO 822 and/or SEQ ID NO 859 and/or SEQ ID NO 896 and wherein when the cancer index value is about 0.067 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.92, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 822 and/or SEQ ID NO 859 and/or SEQ ID NO 896;
28. SEQ ID NO 822 and/or SEQ ID NO 859 and/or SEQ ID NO 896 and wherein when the cancer index value is less than about 0.067 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.92, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 822 and/or SEQ ID NO 859 and/or SEQ ID NO 896;
29. SEQ ID NO 823 and/or SEQ ID NO 860 and/or SEQ ID NO 897 and wherein when the cancer index value is about 0.062 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.91, preferably wherein the cancer index value is the percent methylated

reference for sequence defined by SEQ ID NO 823 and/or SEQ ID NO 860 and/or SEQ ID NO 897;

30. SEQ ID NO 823 and/or SEQ ID NO 860 and/or SEQ ID NO 897 and wherein when the cancer index value is less than about 0.062 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.91, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 823 and/or SEQ ID NO 860 and/or SEQ ID NO 897;
31. SEQ ID NO 824 and/or SEQ ID NO 861 and/or SEQ ID NO 898 and wherein when the cancer index value is about 0.106 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.90, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 824 and/or SEQ ID NO 861 and/or SEQ ID NO 898;
32. SEQ ID NO 824 and/or SEQ ID NO 861 and/or SEQ ID NO 898 and wherein when the cancer index value is less than about 0.106 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.90, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 824 and/or SEQ ID NO 861 and/or SEQ ID NO 898;
33. SEQ ID NO 825 and/or SEQ ID NO 862 and/or SEQ ID NO 899 and wherein when the cancer index value is about 0.354 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.89, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 825 and/or SEQ ID NO 862 and/or SEQ ID NO 899;
34. SEQ ID NO 825 and/or SEQ ID NO 862 and/or SEQ ID NO 899 and wherein when the cancer index value is less than about 0.354 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.89, preferably wherein the cancer index value is the

percent methylated reference for sequence defined by SEQ ID NO 825 and/or SEQ ID NO 862 and/or SEQ ID NO 899;

35. SEQ ID NO 826 and/or SEQ ID NO 863 and/or SEQ ID NO 900 and wherein when the cancer index value is about 0.075 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 70.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.89, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 826 and/or SEQ ID NO 863 and/or SEQ ID NO 900;
36. SEQ ID NO 826 and/or SEQ ID NO 863 and/or SEQ ID NO 900 and wherein when the cancer index value is less than about 0.075 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 70.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.89, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 826 and/or SEQ ID NO 863 and/or SEQ ID NO 900;
37. SEQ ID NO 827 and/or SEQ ID NO 864 and/or SEQ ID NO 901 and wherein when the cancer index value is about 0.305 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.89, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 827 and/or SEQ ID NO 864 and/or SEQ ID NO 901;
38. SEQ ID NO 827 and/or SEQ ID NO 864 and/or SEQ ID NO 901 and wherein when the cancer index value is less than about 0.305 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.89, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 827 and/or SEQ ID NO 864 and/or SEQ ID NO 901;
39. SEQ ID NO 828 and/or SEQ ID NO 865 and/or SEQ ID NO 902 and wherein when the cancer index value is about 0.110 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.88, preferably wherein the cancer index value is the percent methylated

reference for sequence defined by SEQ ID NO 828 and/or SEQ ID NO 865 and/or SEQ ID NO 902;

40. SEQ ID NO 828 and/or SEQ ID NO 865 and/or SEQ ID NO 902 and wherein when the cancer index value is less than about 0.110 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.88, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 828 and/or SEQ ID NO 865 and/or SEQ ID NO 902;
41. SEQ ID NO 829 and/or SEQ ID NO 866 and/or SEQ ID NO 903 and wherein when the cancer index value is about 0.139 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.88, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 829 and/or SEQ ID NO 866 and/or SEQ ID NO 903;
42. SEQ ID NO 829 and/or SEQ ID NO 866 and/or SEQ ID NO 903 and wherein when the cancer index value is less than about 0.139 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.88, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 829 and/or SEQ ID NO 866 and/or SEQ ID NO 903;
43. SEQ ID NO 830 and/or SEQ ID NO 867 and/or SEQ ID NO 904 and wherein when the cancer index value is about 0.453 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 75.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.87, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 830 and/or SEQ ID NO 867 and/or SEQ ID NO 904;
44. SEQ ID NO 830 and/or SEQ ID NO 867 and/or SEQ ID NO 904 and wherein when the cancer index value is less than about 0.453 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 75.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.87, preferably wherein the cancer index value is the

percent methylated reference for sequence defined by SEQ ID NO 830 and/or SEQ ID NO 867 and/or SEQ ID NO 904;

45. SEQ ID NO 831 and/or SEQ ID NO 868 and/or SEQ ID NO 905 and wherein when the cancer index value is about 0.511 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 90.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.86, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 831 and/or SEQ ID NO 868 and/or SEQ ID NO 905 ;
46. SEQ ID NO 831 and/or SEQ ID NO 868 and/or SEQ ID NO 905 and wherein when the cancer index value is less than about 0.511 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 90.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.86, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 831 and/or SEQ ID NO 868 and/or SEQ ID NO 905;
47. SEQ ID NO 832 and/or SEQ ID NO 869 and/or SEQ ID NO 906 and wherein when the cancer index value is about 0.425 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.86, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 832 and/or SEQ ID NO 869 and/or SEQ ID NO 906;
48. SEQ ID NO 832 and/or SEQ ID NO 869 and/or SEQ ID NO 906 and wherein when the cancer index value is less than about 0.425 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.86, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 832 and/or SEQ ID NO 869 and/or SEQ ID NO 906;
49. SEQ ID NO 833 and/or SEQ ID NO 870 and/or SEQ ID NO 907 and wherein when the cancer index value is about 0.636 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 75.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.86, preferably wherein the cancer index value is the percent methylated

reference for sequence defined by SEQ ID NO 833 and/or SEQ ID NO 870 and/or SEQ ID NO 907;

50. SEQ ID NO 833 and/or SEQ ID NO 870 and/or SEQ ID NO 907 and wherein when the cancer index value is less than about 0.636 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 75.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.86, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 833 and/or SEQ ID NO 870 and/or SEQ ID NO 907;
51. SEQ ID NO 834 and/or SEQ ID NO 871 and/or SEQ ID NO 908 and wherein when the cancer index value is about 0.349 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 75.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.86, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 833 and/or SEQ ID NO 870 and/or SEQ ID NO 907;
52. SEQ ID NO 833 and/or SEQ ID NO 870 and/or SEQ ID NO 907 and wherein when the cancer index value is less than about 0.349 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 75.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.86, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 833 and/or SEQ ID NO 870 and/or SEQ ID NO 907;
53. SEQ ID NO 834 and/or SEQ ID NO 871 and/or SEQ ID NO 908 and wherein when the cancer index value is about 0.109 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 75.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.86, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 834 and/or SEQ ID NO 871 and/or SEQ ID NO 908;
54. SEQ ID NO 835 and/or SEQ ID NO 872 and/or SEQ ID NO 909 and wherein when the cancer index value is less than about 0.109 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 75.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.86, preferably wherein the cancer index value is the

percent methylated reference for sequence defined by SEQ ID NO 835 and/or SEQ ID NO 872 and/or SEQ ID NO 909;

55. SEQ ID NO 836 and/or SEQ ID NO 873 and/or SEQ ID NO 910 and wherein when the cancer index value is about 0.106 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 75.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.86, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 836 and/or SEQ ID NO 873 and/or SEQ ID NO 910;
56. SEQ ID NO 836 and/or SEQ ID NO 873 and/or SEQ ID NO 910 and wherein when the cancer index value is less than about 0.106 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 75.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.86, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 836 and/or SEQ ID NO 873 and/or SEQ ID NO 910;
57. SEQ ID NO 837 and/or SEQ ID NO 874 and/or SEQ ID NO 911 and wherein when the cancer index value is about 0.220 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.85, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 837 and/or SEQ ID NO 874 and/or SEQ ID NO 911;
58. SEQ ID NO 837 and/or SEQ ID NO 874 and/or SEQ ID NO 911 and wherein when the cancer index value is less than about 0.220 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.85, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 837 and/or SEQ ID NO 874 and/or SEQ ID NO 911;
59. SEQ ID NO 838 and/or SEQ ID NO 875 and/or SEQ ID NO 912 and wherein when the cancer index value is about 0.123 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 70.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.85, preferably wherein the cancer index value is the percent methylated

reference for sequence defined by SEQ ID NO 838 and/or SEQ ID NO 875 and/or SEQ ID NO 912;

60. SEQ ID NO 838 and/or SEQ ID NO 875 and/or SEQ ID NO 912 and wherein when the cancer index value is less than about 0.123 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 70.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.85, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 838 and/or SEQ ID NO 875 and/or SEQ ID NO 912;
61. SEQ ID NO 839 and/or SEQ ID NO 876 and/or SEQ ID NO 913 and wherein when the cancer index value is about 0.146 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.85, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 839 and/or SEQ ID NO 876 and/or SEQ ID NO 913;
62. SEQ ID NO 839 and/or SEQ ID NO 876 and/or SEQ ID NO 913 and wherein when the cancer index value is less than about 0.146 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 80.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.85, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 839 and/or SEQ ID NO 876 and/or SEQ ID NO 913;
63. SEQ ID NO 840 and/or SEQ ID NO 877 and/or SEQ ID NO 914 and wherein when the cancer index value is about 0.488 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 65.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.83, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 840 and/or SEQ ID NO 877 and/or SEQ ID NO 914;
64. SEQ ID NO 840 and/or SEQ ID NO 877 and/or SEQ ID NO 914 and wherein when the cancer index value is less than about 0.488 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 65.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.83, preferably wherein the cancer index value is the

percent methylated reference for sequence defined by SEQ ID NO 840 and/or SEQ ID NO 877 and/or SEQ ID NO 914;

65. SEQ ID NO 841 and/or SEQ ID NO 878 and/or SEQ ID NO 915 and wherein when the cancer index value is about 2.096 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 60.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.82, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 841 and/or SEQ ID NO 878 and/or SEQ ID NO 915;
66. SEQ ID NO 841 and/or SEQ ID NO 878 and/or SEQ ID NO 915 and wherein when the cancer index value is less than about 2.096 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 60.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.82, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 841 and/or SEQ ID NO 878 and/or SEQ ID NO 915;
67. SEQ ID NO 842 and/or SEQ ID NO 879 and/or SEQ ID NO 916 and wherein when the cancer index value is about 0.803 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 70.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.82, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 842 and/or SEQ ID NO 879 and/or SEQ ID NO 916;
68. SEQ ID NO 842 and/or SEQ ID NO 879 and/or SEQ ID NO 916 and wherein when the cancer index value is less than about 0.803 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 70.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.82, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 842 and/or SEQ ID NO 879 and/or SEQ ID NO 916;
69. SEQ ID NO 843 and/or SEQ ID NO 880 and/or SEQ ID NO 917 and wherein when the cancer index value is about 1.138 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 65.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.80, preferably wherein the cancer index value is the percent methylated

reference for sequence defined by SEQ ID NO 843 and/or SEQ ID NO 880 and/or SEQ ID NO 917;

70. SEQ ID NO 843 and/or SEQ ID NO 880 and/or SEQ ID NO 917 and wherein when the cancer index value is less than about 1.138 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 65.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.80, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 843 and/or SEQ ID NO 880 and/or SEQ ID NO 917;
71. SEQ ID NO 844 and/or SEQ ID NO 881 and/or SEQ ID NO 918 and wherein when the cancer index value is about 0.500 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 65.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.80, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 844 and/or SEQ ID NO 881 and/or SEQ ID NO 918;
72. SEQ ID NO 844 and/or SEQ ID NO 881 and/or SEQ ID NO 918 and wherein when the cancer index value is less than about 0.500 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 65.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.80, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 844 and/or SEQ ID NO 881 and/or SEQ ID NO 918;
73. SEQ ID NO 845 and/or SEQ ID NO 882 and/or SEQ ID NO 919 and wherein when the cancer index value is about 0.162 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 65.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.78, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 845 and/or SEQ ID NO 882 and/or SEQ ID NO 919; and/or
74. SEQ ID NO 845 and/or SEQ ID NO 882 and/or SEQ ID NO 919 and wherein when the cancer index value is less than about 0.162 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 65.00%, the specificity of the assay is about 75.00%, and the AUC is about 0.78, preferably wherein the cancer index value is the

percent methylated reference for sequence defined by SEQ ID NO 845 and/or SEQ ID NO 882 and/or SEQ ID NO 919.

In any of the described assays, the methylation status of the one or more CpGs in the panel is preferably determined by a percent methylated reference analysis, and the assay is for assessing the presence, absence or development cancer and/or CIN3, preferably the cancer is endometrial cancer or ovarian. Most preferably, the cancer is endometrial cancer.

The ROC data set out in Table 11, corresponding to each of SEQ ID NOs: 809 to 919 are derived by determining a cancer index value from a panel of CpGs, wherein the panel in each instance comprises all of the CpGs in the sequence(s) defined by the SEQ ID NO.

The ROC data in Table 13 corresponds to assays of the invention wherein the sample which has been taken from the individual is a self-collected cervico-vaginal sample and wherein the panel of CpGs comprise the CpGs denoted by CG in the amplicons defined by any one of SEQ ID NOs 920, 922 and 924. In such assays of the invention the step of determining the methylation status of the one or more CpGs in the panel comprises determining each CpG within:

a. SEQ ID NO 920 and wherein when the cancer index value is about 0.280 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is about 100%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 920;

b. SEQ ID NO 920 and wherein when the cancer index value is less than about 0.280 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is about 100%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 920;

c. SEQ ID NO 922 and wherein when the cancer index value is about 0.000 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is about 100%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 922;

d. SEQ ID NO 922 and wherein when the cancer index value is about 0.000 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is about 100%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 922;

e. SEQ ID NO 924 and wherein when the cancer index value is about 0.000 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is about 100%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 924; or

f. SEQ ID NO 924 and wherein when the cancer index value is about 0.000 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is about 100%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 924.

The ROC data in Table 14 corresponds to assays of the invention wherein the sample which has been taken from the individual is a vaginal swab taken from a woman having post-menopausal bleeding and wherein the panel of CpGs comprise the CpGs denoted by CG in the amplicons defined by SEQ ID NOs SEQ ID NOs 920, 922 and 924. In such assays of the invention the step of determining the methylation status of the one or more CpGs in the panel comprises determining each CpG within:

a. SEQ ID NO 920 and wherein when the cancer index value is about 0.280 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 88.00%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 920;

b. SEQ ID NO 920 and wherein when the cancer index value is less than about 0.280 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 88.00%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 920;

c. SEQ ID NO 922 and wherein when the cancer index value is about 0.000 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is about 100%, the specificity of the assay is at least 87.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 922;

d. SEQ ID NO 922 and wherein when the cancer index value is about 0.000 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is about 100%, the specificity of the assay is about 87.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 922;

e. SEQ ID NO 924 and wherein when the cancer index value is about 0.000 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is about 100%, the specificity of the assay is at least 84.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 924; or

f. SEQ ID NO 924 and wherein when the cancer index value is about 0.000 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is about 100%, the specificity of the assay is at least 84.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 924.

Table 11

gene_name	auc	cutoff	Specif-icity	Sensiti-vity	SEQ ID NO of forward primer	SEQ ID NO of reverse primer	SEQ ID NO of probe	ML.design.region	DNA.strand	Chromo-some	Rxn.Start	Rxn.Finish	Amplicon Length
ZSCAN12	1	0.282	1	0.85	809	846	883	chr6:28367271-28367870	negative	6	28368198	28368134	65
HCG4	1	0.212	1	0.55	810	847	884	chr6:29760110-29760709	positive	6	29760385	29760319	67
GYPC	0.98	0.002	0.8	0.9	811	848	885	chr2:127413531-127414130	positive	2	127413902	127413797	106
RASSF1	0.98	0.026	0.9	0.85	812	849	886	chr3:50378131-50378730	positive	3	50378379	50378305	75
GYPC	0.97	0.003	0.85	0.85	813	850	887	chr2:127413636-127414235	negative	2	127414543	127414457	87
TRH	0.96	0	0.85	0.75	814	851	888	chr3:129693491-129694090	negative	3	129694467	129694379	89
PTGER4	0.96	0.001	0.8	0.9	815	852	889	chr5:40680837-40681436	positive	5	40681173	40681071	103
FAIM2	0.96	0.025	0.75	0.9	816	853	890	chr12:50297493-50298092	positive	12	50297790	50297727	64
DMRTA2	0.95	0.052	0.85	0.7	817	854	891	chr1:50886482-50887081	negative	1	50887427	50887344	84
NA	0.94	0.001	0.75	0.85	818	855	892	chr6:29520919-29521918	chrm6_EC neg ii	6	29522458	29522374	85
TRABD	0.93	0.47	0.75	0.9	819	856	893	chr22:50623387-50623986	positive	22	50623686	50623618	69
TCP11	0.92	0.01	0.8	0.7	820	857	894	chr6:35108639-35109238	negative	6	35109589	35109491	99
GATA3	0.92	0.321	0.75	0.9	821	858	895	chr10:8097389-8097988	positive	10	8097681	8097600	82
NA	0.92	0.067	0.75	0.85	822	859	896	chr6:29520919-29521918	chrm6_EC pos ii	6	29521423	29521337	87
SPDYA	0.91	0.062	0.75	0.8	823	860	897	chr2:29033426-29034025	positive	2	29033782	29033710	73
NA	0.9	0.106	0.75	0.8	824	861	898	chr6:29520919-29521918	chrm6_EC neg iii	6	29522384	29522287	98
KIAA1383	0.89	0.354	0.75	0.8	825	862	899	chr1:232941168-232941767	negative	1	232942100	232942032	69
CDH4	0.89	0.075	0.75	0.7	826	863	900	chr20:59828228-59828827	positive	20	59828556	59828486	71
EPHX3	0.89	0.305	0.75	0.8	827	864	901	chr19:15343965-15344564	positive	19	15344316	15344240	77

NEFM	0.88	0.11	0.75	0.8	828	865	902	chr8:24771026-24771625	positive	8	24771260	24771188	73		
SORCS3	0.88	0.139	0.75	0.8	829	866	903	chr10:106401217-106401816	positive	10	106401574	106401479	96		
ZNF718	0.87	0.453	0.75	0.75	830	867	904	chr4:107425-108024	negative	4	108401	108313	89		
TRH	0.86	0.511	0.75	0.9	831	868	905	chr3:129693286-129693885	negative	3	129694220	129694143	78		
DMRT1	0.86	0.425	0.75	0.8	832	869	906	chr9:842333-842932	negative	9	843293	843222	72		
MYO3A	0.86	0.636	0.75	0.75	833	870	907	chr10:26222906-26223505	negative	10	26223879	26223805	75		
NA	0.86	0.349	0.75	0.75	834	871	908	chr19:39260654-39261253	negative	19	39261614	39261550	65		
FAM38B	0.86	0.109	0.75	0.75	835	872	909	chr18:11148614-11149213	negative	18	11149533	11149441	93		
NA	0.86	0.106	0.75	0.75	836	873	910	chr6:29520919-29521918	chrm6_EC pos iv	6	29521637	29521559	79		
DMRTA2	0.85	0.22	0.75	0.8	837	874	911	chr1:50886649-50887248	positive	1	50886963	50886879	85		
LBX2	0.85	0.123	0.75	0.7	838	875	912	chr2:74726434-74727033	negative	2	74727346	74727247	100		
NA	0.85	0.146	0.75	0.8	839	876	913	chr6:29520919-29521918	chrm6_EC pos i	6	29521300	29521219	82		
NA	0.83	0.488	0.75	0.65	840	877	914	chr6:29520919-29521918	chrm6_EC neg iv	6	29522298	29522214	85		
NA	0.82	2.096	0.75	0.6	841	878	915	chr1:208132487-208133086	positive	1	208132848	208132750	99		
GDF6	0.82	0.803	0.75	0.7	842	879	916	chr8:97171601-97172200	negative	8	97172546	97172462	85		
GAD2	0.8	1.138	0.75	0.65	843	880	917	chr10:26506776-26507375	negative	10	26507753	26507674	80		
NA	0.8	0.5	0.75	0.65	844	881	918	chr6:29520919-29521918	chrm6_EC pos iii	6	29521539	29521450	90		
FOXE1	0.78	0.162	0.75	0.65	845	882	919	chr9:100616307-100616906	positive	9	100616638	100616565	74		

Table 13

rxn_name	gene_name	auc	mean_EC_cases	mean_controls	cutoff	specificity	sensitivity	Amplicon SEQ ID NO
ML_cg25060829_ii	ZSCAN12	1	3.82	0	0.28	1	1	920
ML_cg15768103_ii	GYPC	1	4.26	0	0	1	1	922
ML_cg15975865_i	GYPC	1	4.92	0	0	1	1	924

Table 14

rxn_name	gene_name	auc	mean_EC_cases	mean_controls	cutoff	specificity	sensitivity	Amplicon SEQ ID NO
ML_cg25060829_ii	ZSCAN12	0.94	6.46	0	0.28	1	0.88	920
ML_cg15768103_ii	GYPC	1	6.01	0.01	0	0.87	1	922
ML_cg15975865_i	GYPC	1	5.2	0.02	0	0.84	1	924

Relationship between cancer index value and determining methylation status of CpGs

In view of the observations described herein (see Examples), the inventors derived a cancer index based on an analysis of methylation status (DNAme; as described above) for use in assays for assessing the presence or development of cancer in an individual.

As explained herein, the described assays particularly relate to the assessment of assessing the presence, absence or development of endometrial cancer and/or ovarian cancer, particularly endometrial cancer.

Any of the assays described herein involve deriving a cancer index value based on the methylation of status of a panel of one or more CpGs assayed in a sample provided from an individual, as described and defined herein.

The cancer index value may be derived by any suitable means.

The inventors have identified specific CpGs, as described and defined herein, which may be used to form a panel of CpGs whose methylation status is determined in order to establish cancer index values in accordance with the assays described and defined herein. Using these panels the inventors have demonstrated that it is possible to derive a cancer index value which correlates with and is indicative of normal tissue, i.e. tissue which is cancer negative, in particular endometrial and/or ovarian tissue which is cancer negative. Accordingly, cancer can be assessed to be absent in the individual. Using these panels the inventors have demonstrated that it is possible to derive a cancer index value which correlates with and is indicative of cancer tissue, i.e. tissue which is cancer positive, in particular endometrial and/or ovarian tissue which is cancer negative. Accordingly, cancer can be assessed to be present in the individual. As explained herein, the inventors have shown that using panels of the CpGs that have been identified cancer can be assessed to be present in the individual. As explained herein, the inventors have shown that using panels of the CpGs that have been identified it can be shown that the DNA methylation profile of epithelial cells from normal tissue such as from the cervix, vagina, buccal area, or from blood and/or urine, particularly from a liquid-based cytology sample, and more preferably a cervical smear sample, as indicated by the cancer index value, is dynamic and

subject to change on a continuum from indicating cancer negative to cancer positive tissue. In particular, the cancer index value described herein acts as a surrogate for indicating whether the endometrial and/or ovarian tissue of an individual is cancer negative or cancer positive to a high degree of statistical accuracy. As such, using panels of the CpGs that have been identified it is possible to establish a cancer index value scale that can be used to assess the presence, absence or development of cancer in an individual.

As described herein, the inventors have used certain methods for determining the methylation status of specific CpGs in the population of DNA molecules in the sample. For example, in one method a percent methylated reference (PMR) value of a CpG may be determined. In another method the methylation β-values of a CpG may be determined. Different mechanisms may be employed to determine specific values depending on the circumstances, such as PCR-based mechanisms or array-based mechanisms.

As will be apparent to a skilled person, in the assays of the invention the steps of determining the methylation status of specific CpGs in the population of DNA molecules in the sample are not limited to any one specific methodology. As the skilled person will appreciate, because the cancer index value is based on the methylation status of CpGs, and since the methylation status of CpGs can be represented by values which may be specific to a specific methodology, e.g. percent methylated reference (PMR) value or methylation β-value, then the range of cancer index values which define cancer negative and cancer positive samples may be dependent upon the methodology used to determine the methylation status of CpGs. Nevertheless, a user may readily reproduce and implement the assays of the invention using any suitable methodology for determining the methylation status of CpGs, provided that the same methodology is used consistently. Moreover, the user can readily establish, *de novo*, cancer index values which define cancer negative and cancer positive samples by determining the methylation status of CpGs in panels constituting the specific CpGs disclosed herein from known cancer negative and cancer positive patient samples. Once such cancer index values are established using the CpGs identified herein, a user may use these values as a basis for assessing the presence, absence or development of cancer in any test individual whose cancer status is to be determined. Accordingly, cancer index values according to the present invention are not

limited to specific methods of determination of methylation status of CpGs. On the contrary, the skilled person will appreciate that cancer index values can be established which reflect the intrinsic capabilities of the CpGs identified herein to correlate methylation status with cancer disease status.

Accordingly, the cancer index value may be derived by assessing the methylation status of the one or more CpGs in the panel in a sample provided from an individual by any suitable means.

The step of determining the methylation status of each CpG in the panel of one or more CpGs may be achieved by determining a percent methylated reference (PMR) value of each one of the one or more CpGs. The step of determining the methylation status of each CpG in the panel of one or more CpGs may be achieved by determining the methylation β-value of each one of the one or more CpGs.

In any of the assays described herein, the methylation status of the CpGs may be determined by any suitable means. For example, in any of the assays described herein the step of determining the methylation status of each CpG in the panel of one or more CpGs may comprise:

a. performing a sequencing step to determine the sequence of each CpG;
b. hybridising DNA to an array comprising probes capable of discriminating between methylated and non-methylated forms of the CpGs and applying a detection system to the array so as to determine the methylation status of each CpG; and/or
c. performing a PCR step using methylation-specific primers, wherein the methylation status of the CpG is determined by the presence or absence of a PCR product.

The step of determining the methylation status of each CpG in the panel of one or more CpGs may comprise a conversion step in order to distinguish methylated CpG dinucleotides relative to non-methylated CpG dinucleotides. The conversion step may comprise e.g. bisulfite conversion or TAPS (TET-assisted pyridine borane sequencing) conversion of the DNA in a sample that is to be applied to any one or more of a. to c. above. TAPS may particularly involve the steps of oxidising 5-methylcytosine bases

(5mC) to 5-carboxylcytosine bases (5caC), preferably by ten-eleven translocation (TET), and/or oxidising 5-hydroxymethylcytosine bases (5hmC) to 5-carboxylcytosine bases (5caC), preferably by ten-eleven translocation (TET); followed by reducing 5-carboxylcytosine bases (5caC) to dihydrouracil bases (DHU), optionally with pyridine borane.

The step of determining the methylation status of each CpG in the panel of one or more CpGs may additionally, or alternatively, comprise the use of TempO-seq (templated Olig-sequencing). The oligoniclueotides in the context of TempO-seq may or may not be designed such that they hybridise with methylated CpG dinucleotides following a prior conversion as described herein.

The step of determining the methylation status of each CpG in the panel of one or more CpGs may comprise the contacting the DNA in the sample with one or more methylation sensitive restriction endonucleases that cleave methylated and/or unmethylated forms of their restriction sites, and preferably the contacting of the DNA is prior to performing any one of a. to c. above. In assays of the invention wherein methylation sensitive restriction enzymes are used, one or more control reactions are performed. Preferably, the one or more control reactions involve interrogation of known loci that contain (i) no restriction endonuclease sites; (ii) a restriction site that is methylated; (iii) a restriction site that is unmethylated.

Using any of the methods for determining the methylation status of each CpG in the panel of one or more CpGs, the proportion of methylated and unmethylated CpGs at any given locus may be determined, thereby enabling generation of a cancer index value.

Preferably, the step of determining in the population of DNA molecules in the sample the methylation status of a panel of one or more CpGs further comprises determining a β value of each CpG. Deriving the cancer index value may involve providing a methylation β-value data set comprising the methylation β-values for each CpG in the panel of one or more CpGs.

Assessment of methylation status of CpGs

Methylation of DNA is a recognised form of epigenetic modification which has the capability of altering the expression of genes and other elements such as microRNAs. In cancer development and progression, methylation may have the effect of *e.g.* silencing tumor suppressor genes and/or increasing the expression of oncogenes. Other forms of dysregulation may occur as a result of methylation. Methylation of DNA occurs at discrete loci which are predominately dinucleotides consisting of a CpG motif, but may also occur at CHH motifs (where H is A, C, or T). During methylation, a methyl group is added to the fifth carbon of cytosine bases to create methylcytosine.

Methylation can occur throughout the genome and is not limited to regions with respect to an expressed sequence such as a gene. Methylation typically, but not always, occurs in a promoter or other regulatory region of an expressed sequence such as enhancer elements. Most typically, the methylation status of CpGs is clustered in CpG islands, for example CpG islands present in the regulatory regions of genes, especially in their promoter regions.

Typically, an assessment of DNA methylation status involves analysing the presence or absence of methyl groups in DNA, for example methyl groups on the 5 position of one or more cytosine nucleotides. Preferably, the methylation status of one or more cytosine nucleotides present as a CpG dinucleotide (where C stands for Cytosine, G for Guanine and p for the phosphate group linking the two) is assessed.

A variety of techniques are available for the identification and assessment of CpG methylation status, as will be outlined briefly below. The assays described herein encompass any suitable technique for the determination of CpG methylation status.

Methyl groups are lost from a starting DNA molecule during conventional *in vitro* handling steps such as PCR. To avoid this, techniques for the detection of methyl groups commonly involve the preliminary treatment of DNA prior to subsequent processing, in a way that preserves the methylation status information of the original DNA molecule. Such preliminary techniques involve three main categories of processing, *i.e.* bisulphite modification, restriction enzyme digestion and affinity-based analysis. Products of these techniques can then be coupled with sequencing or array-based platforms for subsequent identification or qualitative assessment of CpG methylation status.

Techniques involving bisulphite modification of DNA have become the most common assays for detection and assessment of methylation status of CpG dinucleotides. Treatment of DNA with bisulphite, *e.g.* sodium bisulphite, converts cytosine bases to uracil bases, but has no effect on 5-methylcytosines. Thus, the presence of a cytosine in bisulphite-treated DNA is indicative of the presence of a cytosine base which was previously methylated in the starting DNA molecule. Such cytosine bases can be detected by a variety of techniques. For example, primers specific for unmethylated versus methylated DNA can be generated and used for PCR-based identification of methylated CpG dinucleotides. DNA may be amplified, either before or after bisulphite conversion. A separation/capture step may be performed, *e.g.* using binding molecules such as complementary oligonucleotide sequences. Standard and next-generation DNA sequencing protocols can also be used.

In other approaches, methylation-sensitive enzymes can be employed which digest or cut only in the presence of methylated DNA. Analysis of resulting fragments is commonly carried out using mircroarrays.

Affinity-based techniques exploit binding interactions to capture fragments of methylated DNA for the purposes of enrichment. Binding molecules such as anti-5-methylcytosine antibodies are commonly employed prior to subsequent processing steps such as PCR and sequencing.

Olkhov-Mitsel and Bapat (2012) provide a comprehensive review of techniques available for the identification and assessment of biomarkers involving methylcytosine.

For the purposes of assessing the methylation status of the CpG-based biomarkers characterised and described herein, any suitable assay can be employed.

Assays described herein may comprise determining methylation status of CpGs by bisulphite converting the DNA. Preferred assays involve bisulphite treatment of DNA, including amplification of the identified CpG loci for methylation specific PCR and/or sequencing and/or assessment of the methylation status of target loci using methylation-discriminatory microarrays.

Amplification of CpG loci can be achieved by a variety of approaches. Preferably, CpG loci are amplified using PCR. A variety of PCR-based approaches may be used. For

example, methylation-specific primers may be hybridized to DNA containing the CpG sequence of interest. Such primers may be designed to anneal to a sequence derived from either a methylated or non-methylated CpG locus. Following annealing, a PCR reaction is performed and the presence of a subsequent PCR product indicates the presence of an annealed CpG of identifiable sequence. In such assays, DNA is bisulphite converted prior to amplification. Such techniques are commonly referred to as methylation specific PCR (MSP).

In other techniques, PCR primers may anneal to the CpG sequence of interest independently of the methylation status, and further processing steps may be used to determine the status of the CpG. Assays are designed so that the CpG site(s) are located between primer annealing sites. This assay scheme is used in techniques such as bisulphite genomic sequencing, COBRA, Ms-SNuPE. In such assay, DNA can be bisulphite converted before or after amplification.

Small-scale PCR approaches may be used. Such approaches commonly involve mass partitioning of samples (*e.g.* digital PCR). These techniques offer robust accuracy and sensitivity in the context of a highly miniaturised system (pico-liter sized droplets), ideal for the subsequent handling of small quantities of DNA obtainable from the potentially small volume of cellular material present in biological samples, particularly urine samples. A variety of such small-scale PCR techniques are widely available. For example, microdroplet-based PCR instruments are available from a variety of suppliers, including RainDance Technologies, Inc. (Billerica, MA; http://raindancetech.com/) and Bio-Rad, Inc. (http://www.bio-rad.com/). Microarray platforms may also be used to carry out small-scale PCR. Such platforms may include microfluidic network-based arrays *e.g.* available from Fluidigm Corp. (www.fluidigm.com).

Following amplification of CpG loci, amplified PCR products may be coupled to subsequent analytical platforms in order to determine the methylation status of the CpGs of interest. For example, the PCR products may be directly sequenced to determine the presence or absence of a methylcytosine at the target CpG or analysed by array-based techniques.

Any suitable sequencing techniques may be employed to determine the sequence of target DNA. In the assays of the present invention the use of high-throughput, so-called "second generation", "third generation" and "next generation" techniques to sequence bisulphite-treated DNA can be used.

In second generation techniques, large numbers of DNA molecules are sequenced in parallel. Typically, tens of thousands of molecules are anchored to a given location at high density and sequences are determined in a process dependent upon DNA synthesis. Reactions generally consist of successive reagent delivery and washing steps, *e.g.* to allow the incorporation of reversible labelled terminator bases, and scanning steps to determine the order of base incorporation. Array-based systems of this type are available commercially *e.g.* from Illumina, Inc. (San Diego, CA; http://www.illumina.com/).

Third generation techniques are typically defined by the absence of a requirement to halt the sequencing process between detection steps and can therefore be viewed as real-time systems. For example, the base-specific release of hydrogen ions, which occurs during the incorporation process, can be detected in the context of microwell systems (*e.g.* see the Ion Torrent system available from Life Technologies; http://www.lifetechnologies.com/). Similarly, in pyrosequencing the base-specific release of pyrophosphate (PPi) is detected and analysed. In nanopore technologies, DNA molecules are passed through or positioned next to nanopores, and the identities of individual bases are determined following movement of the DNA molecule relative to the nanopore. Systems of this type are available commercially *e.g.* from Oxford Nanopore (https://www.nanoporetech.com/). In an alternative assay, a DNA polymerase enzyme is confined in a "zero-mode waveguide" and the identity of incorporated bases are determined with florescence detection of gamma-labeled phosphonucleotides (see *e.g.* Pacific Biosciences; http://www.pacificbiosciences.com/).

In other assays sequencing steps may be omitted. For example, amplified PCR products may be applied directly to hybridization arrays based on the principle of the annealing of two complementary nucleic acid strands to form a double-stranded molecule. Hybridization arrays may be designed to include probes which are able to hybridize to amplification products of a CpG and allow discrimination between methylated and non-

methylated loci. For example, probes may be designed which are able to selectively hybridize to an CpG locus containing thymine, indicating the generation of uracil following bisulphite conversion of an unmethylated cytosine in the starting template DNA. Conversely, probes may be designed which are able to selectively hybridize to a CpG locus containing cytosine, indicating the absence of uracil conversion following bisulphite treatment. This corresponds with a methylated CpG locus in the starting template DNA.

Following the application of a suitable detection system to the array, computer-based analytical techniques can be used to determine the methylation status of a CpG. Detection systems may include, *e.g.* the addition of fluorescent molecules following a methylation status-specific probe extension reaction. Such techniques allow CpG status determination without the specific need for the sequencing of CpG amplification products. Such array-based discriminatory probes may be termed methylation-specific probes.

Any suitable methylation-discriminatory microarrays may be employed to assess the methylation status of the CpGs described herein. One particular methylation-discriminatory microarray system is provided by Illumina, Inc. (San Diego, CA; http://www.illumina.com/). In particular, the Infinium MethylationEPIC BeadChip array and the Infinium HumanMethylation450 BeadChip array systems may be used to assess the methylation status of CpGs for predicting cancer development as described herein. Such a system exploits the chemical modifications made to DNA following bisulphite treatment of the starting DNA molecule. Briefly, the array comprises beads to which are coupled oligonucleotide probes specific for DNA sequences corresponding to the unmethylated form of a CpG, as well as separate beads to which are coupled oligonucleotide probes specific for DNA sequences corresponding to the methylated form of an CpG. Candidate DNA molecules are applied to the array and selectively hybridize, under appropriate conditions, to the oligonucleotide probe corresponding to the relevant epigenetic form. Thus, a DNA molecule derived from a CpG which was methylated in the corresponding genomic DNA will selectively attach to the bead comprising the methylation-specific oligonucleotide probe, but will fail to attach to the bead comprising the non-methylation-specific oligonucleotide probe. Single-base extension of only the hybridized probes incorporates a labeled ddNTP, which is subsequently stained with a

fluorescence reagent and imaged. The methylation status of the CpG is determined by calculating the ratio of the fluorescent signal derived from the methylated and unmethylated sites.

Infinium HumanMethylation450 BeadChip array systems can be used to interrogate CpGs in the assays described herein. Alternative or customised arrays could, however, be employed to interrogate the cancer-specific CpG biomarkers defined herein, provided that they comprise means for interrogating all CpG for a given assay, as defined herein.

Techniques involving combinations of the above-described assays may also be used. For example, DNA containing CpG sequences of interest may be hybridized to microarrays and then subjected to DNA sequencing to determine the status of the CpG as described above.

In the assays described above, sequences corresponding to CpG loci may also be subjected to an enrichment process if desired. DNA containing CpG sequences of interest may be captured by binding molecules such as oligonucleotide probes complementary to the CpG target sequence of interest. Sequences corresponding to CpG loci may be captured before or after bisulphite conversion or before or after amplification. Probes may be designed to be complementary to bisulphite converted DNA. Captured DNA may then be subjected to further processing steps to determine the status of the CpG, such as DNA sequencing steps.

Capture/separation steps may be custom designed. Alternatively a variety of such techniques are available commercially, *e.g.* the SureSelect target enrichment system available from Agilent Technologies (http://www.agilent.com/home). In this system biotinylated "bait" or "probe" sequences (*e.g.* RNA) complementary to the DNA containing CpG sequences of interest are hybridized to sample nucleic acids. Streptavidin-coated magnetic beads are then used to capture sequences of interest hybridized to bait sequences. Unbound fractions are discarded. Bait sequences are then removed (*e.g.* by digestion of RNA) thus providing an enriched pool of CpG target sequences separated from non-CpG sequences. Template DNA may be subjected to bisulphite conversion and target loci amplified by small-scale PCR such as microdroplet PCR using primers which

are independent of the methylation status of the CpG. Following amplification, samples may be subjected to a capture step to enrich for PCR products containing the target CpG, *e.g.* captured and purified using magnetic beads, as described above. Following capture, a standard PCR reaction is carried out to incorporate DNA sequencing barcodes into CpG-containing amplicons. PCR products are again purified and then subjected to DNA sequencing and analysis to determine the presence or absence of a methylcytosine at the target genomic CpG.

CpG biomarker loci defined herein by SEQ ID NOs 1 to 500 correspond to Illumina® identifiers (IlmnID) known in the art. These CpG loci identifiers refer to individual CpG sites used in the commercially available Illumina® Infinium Methylation EPIC BeadChip kit and Illumina® Infinium Human Methylation450 BeadChip kit. The identity of each CpG site represented by each CpG loci identifier is publicly available from the Illumina, Inc. website under reference to the CpG sites used in the Infinium Methylation EPIC BeadChip kit and the Infinium Human Methylation450 BeadChip kit.

To complement evolving public databases to provide accurate CpG loci identifiers and strand orientation, Illumina® has developed a method to consistently designate CpG loci based on the actual or contextual sequence of each individual CpG locus. To unambiguously refer to CpG loci in any species, Illumina® has developed a consistent and deterministic CpG loci database to ensure uniformity in the reporting of methylation data. The Illumina® method takes advantage of sequences flanking a CpG locus to generate a unique CpG locus cluster ID. This number is based on sequence information only and is unaffected by genome version. Illumina's standardized nomenclature also parallels the TOP/BOT strand nomenclature (which indicates the strand orientation) commonly used for single nucleotide polymorphism (SNP) designation.

Illumina® Identifiers for the Infinium MethylationEPIC BeadChip and Infinium Human Methylation450 BeadChip system are also available from public repositories such as Gene Expression Omnibus (GEO) (http://www.ncbi.nlm.nih.gov/geo/).

By assessing the methylation status of a CpG it is meant that a determination is made as to whether a given CpG is methylated or unmethylated. In addition, it is meant

that a determination is made as to the degree to which a given CpG site is methylated across a population of CpG loci in a sample.

CpG methylation status may be measured indirectly using a detection system such as fluorescence. A methylation-discriminatory microarray may be used. When calculating the degree of methylation of a given CpG, the Illumina® definition of beta-values may be used. The Illumina® methylation beta-value of a specific CpG site is calculated from the intensity of the methylated (M) and unmethylated (U) alleles, as the ratio of fluorescent signals $\beta=Max(M,0)/[Max(M,0)+Max(U,0)+100]$. On this scale, $0<\beta<1$, β values of 1 or close to 1 indicate 100% methylation whereas values of 0 or close to 0 indicate 0% methylation.

The methylation status of any one or more CpGs of the CpGs defined defined by SEQ ID NOs: 1 to 500 or identified in SEQ ID NOs: 501 to 808 may be assessed by any suitable technique. As explained in more detail in the Examples below, one particular exemplary technique which the inventors have used is a methylation discriminatory array, such as an Illumina InfiniumMethylation EPIC BeadChip. These assays utilise probes directed to methylated and unmethylated CpGs at a given locus.

Another exemplary technique which the inventors have used to determine the methylation status of any one or more CpGs is a fluorescence-based PCR technique referred to as MethyLight. These assays utilise forward and reverse PCR primers specific for sequences encompassing any one or more of the 500 CpGs defined according to SEQ ID NOS: 1 to 500 or identified in SEQ ID NOs: 501 to 808. The methylation status of one or more of the CpGs defined by SEQ ID NOs: 1 to 500 or identified in SEQ ID NOs: 501 to 808 may therefore be determined by MethyLight analysis. The detectable probes are typically designed such that they hybridise only to methylated forms of the one or more CpGs to be assayed in view of the bisulfite conversion step within a typical MethyLight protocol.

Bioinformatic tools and statistical metrics for CpG-based assays

Software programs which aid in the *in silico* analysis of bisulphite converted DNA sequences and in primer design for the purposes of methylation-specific analyses are generally available and have been described previously.

In risk models for predicting cancer, a receiver-operating-characteristic (ROC) curve analysis is often used, in which the area under the curve (AUC) is assessed. Each point on the ROC curve shows the effect of a rule for turning a risk/likelihood estimate into a prediction of the presence, absence or development of cancer in an individual. The AUC measures how well the model discriminates between case subjects and control subjects. An ROC curve that corresponds to a random classification of case subjects and control subjects is a straight line with an AUC of 50%. An ROC curve that corresponds to perfect classification has an AUC of 100%.

In any of the methods described herein, the 95% confidence interval for the ROC AUC may be between 0.60 and 1.

In any of the methods described herein, the interval may be defined as a range having as an upper limit any number between 0.60 and 1. The upper limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90, 0.91, 0.92, 0.93, 0.94, 0.95, 0.96, 0.97, 0.98, 0.99 or 1.00.

In any of the methods described herein, the interval may be defined as a range having as a lower limit any number between 0.60 and 1. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90, 0.91, 0.92, 0.93, 0.94, 0.95, 0.96, 0.97, 0.98, 0.99 or 1.00.

In any of the methods described herein, the interval range may comprise any of the above lower limit numbers combined with any of the above upper limit numbers as appropriate.

Preferably, the upper limit number is 1. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 1 and as a lower limit any number between 0.60 and 1. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80,

0.81, 0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90, 0.91, 0.92, 0.93, 0.94, 0.95, 0.96, 0.97, 0.98, 0.99 or 1.00.

The upper limit number may be 0.99. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.99 and as a lower limit any number between 0.60 and 0.99. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90, 0.91, 0.92, 0.93, 0.94, 0.95, 0.96, 0.97, 0.98 or 0.99.

The upper limit number may be 0.98. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.98 and as a lower limit any number between 0.60 and 0.98. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90, 0.91, 0.92, 0.93, 0.94, 0.95, 0.96, 0.97 or 0.98.

The upper limit number may be 0.97. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.97 and as a lower limit any number between 0.60 and 0.97. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90, 0.91, 0.92, 0.93, 0.94, 0.95, 0.96 or 0.97.

The upper limit number may be 0.96. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.96 and as a lower limit any number between 0.60 and 0.96. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90, 0.91, 0.92, 0.93, 0.94, 0.95 or 0.96.

The upper limit number may be 0.95. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.95 and as a lower limit any number between 0.60 and 0.95. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79,

0.80, 0.81, 0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90, 0.91, 0.92, 0.93, 0.94 or 0.95.

The upper limit number may be 0.94. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.94 and as a lower limit any number between 0.60 and 0.94. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90, 0.91, 0.92, 0.93 or 0.94.

The upper limit number may be 0.93. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.93 and as a lower limit any number between 0.60 and 0.93. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90, 0.91, 0.92 or 0.93.

The upper limit number may be 0.92. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.92 and as a lower limit any number between 0.60 and 0.92. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90, 0.91 or 0.92.

The upper limit number may be 0.91. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.91 and as a lower limit any number between 0.60 and 0.91. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90 or 0.91.

The upper limit number may be 0.90. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.90 and as a lower limit any number between 0.60 and 0.90. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89 or 0.90.

The upper limit number may be 0.89. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.89 and as a lower limit any number between 0.60 and 0.89. The lower limit number may be 0.60, 0.61, 0.62, 0.63,

0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88 or 0.89.

The upper limit number may be 0.88. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.88 and as a lower limit any number between 0.60 and 0.88. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83, 0.84, 0.85, 0.86, 0.87 or 0.88.

The upper limit number may be 0.87. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.87 and as a lower limit any number between 0.60 and 0.87. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83, 0.84, 0.85, 0.86 or 0.87.

The upper limit number may be 0.86. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.86 and as a lower limit any number between 0.60 and 0.86. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83, 0.84, 0.85 or 0.86.

The upper limit number may be 0.85. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.85 and as a lower limit any number between 0.60 and 0.85. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83, 0.84 or 0.85.

The upper limit number may be 0.84. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.84 and as a lower limit any number between 0.60 and 0.84. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82, 0.83 or 0.84.

The upper limit number may be 0.83. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.83 and as a lower limit any number between 0.60 and 0.83. The lower limit number may be 0.60, 0.61, 0.62, 0.63,

0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81, 0.82 or 0.83.

The upper limit number may be 0.82. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.82 and as a lower limit any number between 0.60 and 0.82. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80, 0.81 or 0.82.

The upper limit number may be 0.81. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.81 and as a lower limit any number between 0.60 and 0.81. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.80 or 0.81.

The upper limit number may be 0.80. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.80 and as a lower limit any number between 0.60 and 0.80. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79 or 0.80.

The upper limit number may be 0.79. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.79 and as a lower limit any number between 0.60 and 0.79. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78 or 0.79.

The upper limit number may be 0.78. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.78 and as a lower limit any number between 0.60 and 0.78. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77 or 0.78.

The upper limit number may be 0.77. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.77 and as a lower limit any number between 0.60 and 0.77. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75, 0.76 or 0.77.

The upper limit number may be 0.76. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.76 and as a lower limit any number between 0.60 and 0.76. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74, 0.75 or 0.76.

The upper limit number may be 0.75. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.75 and as a lower limit any number between 0.60 and 0.75. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73, 0.74 or 0.75.

The upper limit number may be 0.74. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.74 and as a lower limit any number between 0.60 and 0.74. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72, 0.73 or 0.74.

The upper limit number may be 0.73. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.73 and as a lower limit any number between 0.60 and 0.73. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71, 0.72 or 0.73.

The upper limit number may be 0.72. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.72 and as a lower limit any number between 0.60 and 0.72. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71 or 0.72.

The upper limit number may be 0.71. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.71 and as a lower limit any number between 0.60 and 0.71. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70 or 0.71.

The upper limit number may be 0.70. Thus, the 95% confidence ROC AUC interval may be defined as a range having an upper limit of 0.70 and as a lower limit any number between 0.60 and 0.70. The lower limit number may be 0.60, 0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69 or 0.70.

Methods of treatment and diagnosis

The term "treatment" as used herein is intended to refer to any intervention or procedure performed on an individual, including a surgical intervention or a pharmacological intervention such as the administration of a compound or drug. Any such treatment may be performed for therapeutic purposes or for preventative or prophylactic purposes.

The invention also encompasses the performance of one or more treatment steps following a positive classification of cancer, particularly endometrial and/or ovarian cancer, based on any of the methods described herein. Said treatments may be considered "therapeutic" treatments.

The invention also encompasses the performance of one or more treatment steps following a negative classification of cancer or prediction of an individual being at risk of cancer development, particularly endometrial and/or ovarian cancer, based on any of the methods described herein. Said treatments may be considered "risk prevention", "preventative" or "prophylactic" treatments.

The invention also encompasses the performance of one or more treatment steps following a negative classification of cancer or prediction of an individual being at risk of cancer development based on any of the methods described herein, in an individual that harbours one or more mutations that predispose the individual to an increased risk of developing cancer.

The invention thus encompasses a method of treating a cancer patient comprising administering chemotherapy, radiation, immunotherapy or any cancer therapy described herein to the patient determined to have a cancer index value which indicates that the patient has is positive for cancer based on any of the assays described herein, preferably wherein the cancer is endometrial cancer.

The invention thus encompasses a method of treating and/or preventing cancer in an individual, the method comprising:

a. assessing the cancer status of the individual by assessing the presence, absence or development of cancer in the individual by performing any one of the assays described herein;

b. administering one or more therapeutic or preventative treatments to the individual based on the assessment,

preferably wherein the cancer is endometrial and/or ovarian cancer, most preferably endometrial cancer.

The invention thus encompasses a method of treating and/or preventing cancer in an individual, the method comprising:

a. assessing the cancer status of the individual by assessing the presence, absence or development of cancer in the individual comprising:
   i. providing a sample which has been taken from the individual, the sample comprising a population of DNA molecules;
   ii. determining in the population of DNA molecules in the sample the methylation status of a panel of:
      1. one or more CpGs selected from a panel of CpGs identified in SEQ ID NOs 1 to 500 wherein the CpGs are identified at nucleotide positions 61 to 62; and/or
      2. one or more CpGs selected from within a panel of one or more Differentially Methylated Regions (DMRs) defined by SEQ ID NOs 501 to 808, wherein the CpGs are denoted by CG;

   iii. deriving a cancer index value based on the methylation status of the one or more CpGs in the panel; and
   iv. assessing the presence, absence or development of cancer in the individual based on the cancer index value, wherein the assay is characterised as having an area under the curve (AUC) of 0.90 or more as determined by receiver operating characteristics (ROC);
b. administering one or more therapeutic treatments to the individual based on the assessment,

preferably wherein the cancer in endometrial and/or ovarian cancer, most preferably endometrial cancer.

In any of the methods of treatment encompassed by the invention, the step of predicting the presence or development of cancer, preferably wherein the cancer in endometrial and/or ovarian cancer, in an individual may involve deriving a cancer index value.

In any of the methods of treatment encompassed by the invention, the step of predicting the presence or development of cancer in an individual may involve the use of any one of the arrays described herein.

In any of the methods of treatment encompassed by the invention, the step of stratifying the individual may involve applying any one of the thresholds according to any one of the assays of the invention described herein.

The step of administering one or more treatments may comprise different treatment steps depending on the stratification of an individual on the basis of their cancer status or their risk of having cancer or on the basis of risk of cancer development, particularly endometrial and/or ovarian cancer, most preferably endometrial cancer. Particularly the amount of an invasiveness of the treatments administered may vary dependent on the stratification of an individual on the basis of their cancer status or their risk of having cancer or on the basis of their risk of cancer development. The treatments administered to the individual may comprise any treatments considered suitable by a person skilled in the art.

For example, when the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the cancer index value is about -0.660 or more and less than about -0.430, and preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, the individual is subjected to one or more treatments according to their cancer index value, the one or more treatments may comprise any of:

a. a transvaginal ultrasound to assess endometrium and ovaries;
b. a repeat assay according to any one of the assays of the invention, preferably wherein the repeat assay is performed about two years after the previous assay, preferably wherein the cancer is endometrial and/or ovarian cancer, most preferably wherein the cancer is endometrial cancer.

When the individual is assessed as having cancer and/or CIN3 or as having a moderate risk of CIN3 and/or cancer development, and wherein the cancer index value is about -0.430 or more and less than about -0.230, and preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, the individual is subjected to one or more treatments according to their cancer index value, the one or more treatments may comprise any of:

a. a transvaginal ultrasound to assess endometrium and ovaries;
b. intensified screening, preferably wherein the intensified screening comprises one or more of:
    ix. a colposcopy;
    x. a HPV test;
    xi. a cervical cytology test;
    xii. a test for CA125, preferably wherein the test is repeated six-monthly;
    xiii. a test for cell-free tumour DNA methylation in plasma/serum, preferably wherein the test is repeated annually;
    xiv. a test for cell-free tumour DNA methylation in vaginal fluid, preferably wherein the test is repeated annually
    xv. a pelvic MRI scan, preferably wherein the individual being subjected to the pelvic MRI scan is post-menopausal, and preferably wherein the scan is repeated annually;
    xvi. a repeat assay according to any one of the assays described herein, preferably wherein the repeat assay is performed about one year after the previous assay
c. administration of one or more of progestogens, particularly wherein the progestogens are delivered locally or systemically, Aspirin, Metformin, aromatase-inhibitors, weight-loss regimen,

preferably wherein the cancer is endometrial and/or ovarian cancer, most preferably wherein the cancer is endometrial cancer.

In any of the methods of treatment described herein, when the colposcopy, HPV and cytology tests are negative, the intensified screening may further comprise a

hysteroscopy and endocervical and endometrial biopsy. More preferably, when the transvaginal ultrasound and intensified screening are both negative:

a. the transvaginal ultrasound, the test for CA125, the test for cell-free tumour DNA methylation in plasma/serum, and the test for cell-free tumour DNA methylation in vaginal fluid may be repeated about six months after the previous assay; and
b. the colposcopy, the HPV test, and the cervical cytology test, may be repeated about one year after the previous assay.

When the individual is assessed as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the cancer index value is about -0.230 or more, and preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, and the individual is subjected to one or more treatments according to their cancer index value, the one or more treatments may comprise any of:

a. a transvaginal ultrasound to assess endometrium and ovaries;
b. intensified screening, preferably wherein the intensified screening comprises one or more of:
    i. a colposcopy;
    ii. a HPV test;
    iii. a cervical cytology test;
    iv. a test for CA125, preferably wherein the test is repeated six-monthly;
    v. a test for cell-free tumour DNA methylation in plasma/serum, preferably wherein the test is repeated annually;
    vi. a test for cell-free tumour DNA methylation in vaginal fluid, preferably wherein the test is repeated annually
    vii. a pelvic MRI scan, preferably wherein the individual being subjected to the pelvic MRI scan is post-menopausal, and preferably wherein the scan is repeated annually;

viii. a repeat assay according to any of the assays described herein, preferably wherein the repeat assay is performed about one year after the previous assay;

c. administration of one or more of progestogens, particularly wherein the progestogens are delivered locally or systemically, Aspirin, Metformin, aromatase-inhibitors, weight-loss regimen;

d. a total hysterectomy and bilateral salpingo-oophorectomy,

preferably wherein the cancer is endometrial and/or ovarian cancer, most preferably wherein the cancer is endometrial cancer..

In any of the methods of treatment described herein, when the colposcopy, HPV and cytology tests are negative, the intensified screening may further comprise a hysteroscopy and endocervical and endometrial biopsy. More preferably, when the transvaginal ultrasound and intensified screening are both negative:

a. the transvaginal ultrasound, the test for CA125, the test for cell-free tumour DNA methylation in plasma/serum, the test for cell-free tumour DNA methylation in vaginal fluid, the colposcopy, the HPV test, and the cervical cytology test may be repeated about six months after the previous assay; and

b. the pelvic MRI scan may be repeated about one year after the previous assay.

In any of the assays described herein, wherein tests are performed as part of intensified screening the tests may be repeated at any suitable interval. A test for CA125 may be performed three-monthly, six-monthly, annually or about once every two, three or four years. A test for cell-free tumour DNA methylation in plasma/serum may be performed three-monthly, six-monthly, annually or about once every two, three or four years. A test for cell-free tumour DNS methylation in vaginal fluid may be performed three-monthly, six-monthly, annually or about once every two, three or four years. A pelvic MRI scan may be performed three-monthly, six-monthly, annually or about once every two, three or four years.

Wherein the individual is assessed as having a moderate to high risk of having cancer and/or CIN3 or a moderate to high risk of cancer and/or CIN3 development, the one or more treatments may comprise administration of one or more of progestogens,

particularly wherein the progestogens are delivered locally or systemically, Aspirin, Metformin, aromatase-inhibitors, and a weight-loss regimen.

Other exemplary treatments comprise one or more surgical procedures, one or more chemotherapeutic agents, one or more cytotoxic chemotherapeutic agents one or more radiotherapeutic agents, one or more immunotherapeutic agents, one or more biological therapeutics, one or more anti-hormonal treatments or any combination of the above following a positive diagnosis of cancer.

In any of the methods of treatment described herein, the individual may particularly be administered treatments recited in Table 9. Four sub-groups defined by ranges of cancer index values are specified in Table 9 as corresponding to preferred clinical actions, comprising intensified screening, administration of therapeutics and surgery.

Cancer treatments may be administered to an individual harbouring cancer or at risk of cancer development, in an amount sufficient to prevent, treat, cure, alleviate or partially arrest cancer or one or more of its symptoms. Such treatments may result in a decrease in severity, and/or decreased cancer index value, of cancer symptoms, or an increase in frequency or duration of symptom-free periods. A treatment amount adequate to accomplish this is defined as "therapeutically effective amount". Effective amounts for a given purpose will depend on the severity of cancer and/or the individual's cancer index value as well as the weight and general state of the individual. As used herein, the term "*individual*" includes any human, preferably wherein the human is a woman. As used herein, "*treatment*" is to be considered synonymous with "*therapeutic agent*".

The following therapeutic agents may be administered to an individual based on their cancer risk alone or in combination with any other treatment described herein. The therapeutic agent may be directly attached, for example by chemical conjugation, to an antibody. Methods of conjugating agents or labels to an antibody are known in the art. For example, carbodiimide conjugation (Bauminger & Wilchek (1980) Methods Enzymol. 70, 151-159) may be used to conjugate a variety of agents, including doxorubicin, to antibodies or peptides. The water-soluble carbodiimide, 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide (EDC) is particularly useful for conjugating a functional moiety to a binding moiety. Other methods for conjugating a moiety to

antibodies can also be used. For example, sodium periodate oxidation followed by reductive alkylation of appropriate reactants can be used, as can glutaraldehyde cross-linking. However, it is recognised that, regardless of which method of producing a conjugate of the invention is selected, a determination must be made that the antibody maintains its targeting ability and that the functional moiety maintains its relevant function.

A cytotoxic moiety may be directly and/or indirectly cytotoxic. By "directly cytotoxic" it is meant that the moiety is one which on its own is cytotoxic. By "indirectly cytotoxic" it is meant that the moiety is one which, although is not itself cytotoxic, can induce cytotoxicity, for example by its action on a further molecule or by further action on it. The cytotoxic moiety may be cytotoxic only when intracellular and is preferably not cytotoxic when extracellular.

Cytotoxic chemotherapeutic agents are well known in the art. Cytotoxic chemotherapeutic agents, such as anticancer agents, include: alkylating agents including nitrogen mustards such as mechlorethamine (HN2), cyclophosphamide, ifosfamide, melphalan (L-sarcolysin) and chlorambucil; ethylenimines and methylmelamines such as hexamethylmelamine, thiotepa; alkyl sulphonates such as busulfan; nitrosoureas such as carmustine (BCNU), lomustine (CCNU), semustine (methyl-CCNU) and streptozocin (streptozotocin); and triazenes such as decarbazine (DTIC; dimethyltriazenoimidazole-carboxamide); Antimetabolites including folic acid analogues such as methotrexate (amethopterin); pyrimidine analogues such as fluorouracil (5-fluorouracil; 5-FU), floxuridine (fluorodeoxyuridine; FUdR) and cytarabine (cytosine arabinoside); and purine analogues and related inhibitors such as mercaptopurine (6-mercaptopurine; 6-MP), thioguanine (6-thioguanine; TG) and pentostatin (2'-deoxycoformycin). Natural Products including vinca alkaloids such as vinblastine (VLB) and vincristine; epipodophyllotoxins such as etoposide and teniposide; antibiotics such as dactinomycin (actinomycin D), daunorubicin (daunomycin; rubidomycin), doxorubicin, bleomycin, plicamycin (mithramycin) and mitomycin (mitomycin C); enzymes such as L-asparaginase; and biological response modifiers such as interferon alphenomes. Miscellaneous agents including platinum coordination complexes such as cisplatin (cis-DDP) and carboplatin;

anthracenedione such as mitoxantrone and anthracycline; substituted urea such as hydroxyurea; methyl hydrazine derivative such as procarbazine (N-methylhydrazine, MIH); and adrenocortical suppressant such as mitotane (o,p'-DDD) and aminoglutethimide; taxol and analogues/derivatives; and hormone agonists/antagonists such as flutamide and tamoxifen.

A cytotoxic chemotherapeutic agent may be a cytotoxic peptide or polypeptide moiety which leads to cell death. Cytotoxic peptide and polypeptide moieties are well known in the art and include, for example, ricin, abrin, Pseudomonas exotoxin, tissue factor and the like. Methods for linking them to targeting moieties such as antibodies are also known in the art. Other ribosome inactivating proteins are described as cytotoxic agents in WO 96/06641. Pseudomonas exotoxin may also be used as the cytotoxic polypeptide. Certain cytokines, such as TNFα and IL-2, may also be useful as cytotoxic agents.

Certain radioactive atoms may also be cytotoxic if delivered in sufficient doses. Radiotherapeutic agents may comprise a radioactive atom which, in use, delivers a sufficient quantity of radioactivity to the target site so as to be cytotoxic. Suitable radioactive atoms include phosphorus-32, iodine-125, iodine-131, indium-111, rhenium-186, rhenium-188 or yttrium-90, or any other isotope which emits enough energy to destroy neighbouring cells, organelles or nucleic acid. Preferably, the isotopes and density of radioactive atoms in the agents of the invention are such that a dose of more than 4000 cGy (preferably at least 6000, 8000 or 10000 cGy) is delivered to the target site and, preferably, to the cells at the target site and their organelles, particularly the nucleus.

The radioactive atom may be attached to an antibody, antigen-binding fragment, variant, fusion or derivative thereof in known ways. For example, EDTA or another chelating agent may be attached to the binding moiety and used to attach 111In or 90Y. Tyrosine residues may be directly labelled with 125I or 131I.

A cytotoxic chemotherapeutic agent may be a suitable indirectly-cytotoxic polypeptide. In a particularly preferred embodiment, the indirectly cytotoxic polypeptide is a polypeptide which has enzymatic activity and can convert a non-toxic and/or relatively non-toxic prodrug into a cytotoxic drug. With antibodies, this type of system is often

referred to as ADEPT (Antibody-Directed Enzyme Prodrug Therapy). The system requires that the antibody locates the enzymatic portion to the desired site in the body of the patient and after allowing time for the enzyme to localise at the site, administering a prodrug which is a substrate for the enzyme, the end product of the catalysis being a cytotoxic compound. The object of the approach is to maximise the concentration of drug at the desired site and to minimise the concentration of drug in normal tissues. In a preferred embodiment, the cytotoxic moiety is capable of converting a non-cytotoxic prodrug into a cytotoxic drug.

In any of the methods of treatment described herein, the one or more treatments that the individual is subjected to may be repeated on one or more occasions. The one or more treatments may be repeated at regular intervals. The repetitive nature of the treatment administration may depend on the particular treatment being administered. Some treatments may require repetitive administration at greater frequency than others. The skilled person would be aware of the frequency of administration required for therapies known in the art. The one or more treatments may be repeated weekly, two weekly, three weekly, four weekly, monthly, three monthly, six monthly, yearly, two yearly, three yearly, four yearly, or five yearly.

In any of the methods described herein, when the individual is assessed as having a cancer index value of less than about -0.660, and preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, no treatment is administered to the individual.

Methods of monitoring

The invention also provides methods of monitoring the presence, or risk of the presence or development of cancer in an individual.

"*Monitoring*" in the context of the present invention may refer to longitudinal assessment of an individual's cancer status, risk of harbouring cancer or risk of cancer development. This longitudinal assessment may be carried out according to any of the assays of the invention described herein. This longitudinal assessment may involve

performance of any of the assays of the invention described herein to predict the presence or development of cancer in an individual at more than one time point over the course of an undetermined time window. The time window may be any period of time whilst the individual is still living. The time window may persist for the lifetime of the individual. The time window may persist until the individual's cancer status, risk of harbouring cancer or risk of cancer development falls below a certain level. The level may be a particular cancer index value.

The invention thus encompasses a method of monitoring for the presence, absence or development of cancer, particularly endometrial and/or ovarian cancer, most preferably endometrial cancer, in an individual, the method comprising:

a. assessing the presence or absence of cancer and/or CIN3 in an individual or assessing cancer development in an individual to establish a cancer status for the individual by performing any one of the assays of the invention described herein at a first time point;
b. assessing the presence or absence of cancer in the individual or assessing cancer development in the individual to establish a cancer status for the individual by performing any one of the assays of the invention described herein at one or more further time points, preferably wherein the cancer status of the individual in steps a and b are assessed using the same assay; and
c. monitoring any change in the cancer status of the individual between time points.

The invention also encompasses a method of monitoring for the presence, absence or development of cancer, particularly endometrial and/or ovarian cancer, in an individual, the method comprising:

a. assessing the presence or absence of cancer and/or CIN3 in an individual or assessing cancer development in an individual to establish a cancer status for the individual by performing an assay at a first time point, comprising:
    1. providing a sample which has been taken from the individual, the sample comprising a population of DNA molecules;

2. determining in the population of DNA molecules in the sample the methylation status of a panel of:
    a. one or more CpGs selected from a panel of CpGs identified in SEQ ID NOs 1 to 500 wherein the CpGs are identified at nucleotide positions 61 to 62; and/or
    b. one or more CpGs selected from within a panel of one or more Differentially Methylated Regions (DMRs) defined by SEQ ID NOs 501 to 808, wherein the CpGs are denoted by CG;

3. deriving a cancer index value based on the methylation status of the one or more CpGs in the panel; and
4. assessing the presence, absence or development of cancer in the individual based on the cancer index value, wherein the assay is characterised as having an area under the curve (AUC) of 0.90 or more as determined by receiver operating characteristics (ROC);

b. assessing the presence or absence of cancer in the individual or assessing cancer development in the individual to establish a cancer status for the individual by performing the assay of steps a(1) to a(4) or by performing any one of the assays of the invention described herein at one or more further time points; and

c. monitoring any change in the cancer status of the individual between time points.

In any of the methods of monitoring described herein, the steps of assessing the presence, absence or development of cancer in an individual based on a cancer index value may involve the application of threshold values. Threshold values can provide an indication of an individual's cancer status, risk of having cancer or an individual's risk of cancer development. For example, cancer index values may indicate the presence or absence of cancer, or a high or low risk of harbouring or developing cancer. In any of the methods of monitoring encompassed by the invention, the step of predicting the presence, absence or development of cancer in an individual involves deriving a cancer index value.

The invention further encompasses a method of measuring methylation in a patient at multiple time points comprising (a) assessing the presence, absence or development of cancer in an individual by performing any one of the assays of the invention described herein at a first time point; (b) assessing the presence, absence or development of cancer in the individual by performing any one of the assays of the invention described herein at one or more further time points, and (c) detecting differential methylation status between (a) and (b).

In any of the methods of monitoring described herein, the individual may already harbour cancer, particularly endometrial and/or ovarian cancer, most preferably endometrial cancer. The individual may not have cancer. The individual may not harbour cancer. The individual may not harbour cancer but may harbour one or more genetic mutations that predispose the individual to an increased risk of cancer development *e.g.* the individual may have Lynch syndrome, and therefore harbour mutations in one or more mutations of the *MLH1*, *MSH2*, *MSH6*, *PMS2*, or *EPCAM* genes. Other mutations may include any mutations in the art that are considered to pre-dispose individuals to cancer. In any of the methods of monitoring described herein, the individual may not harbour cancer but may harbour one or more genetic mutations that pre-dispose the individual to cancer, and this individual may be subjected to any of the methods of monitoring described herein in order to determine their risk of having cancer or of developing cancer. For example, in any of the methods described herein, the individual does not harbour cancer and harbours one or more mutations that predispose the individual to an increased risk of developing cancer, particularly endometrial and/or ovarian cancer, and wherein one or more treatments are administered to the individual in accordance with any of the methods of treatment described herein as a method of prophylaxis. In any of the methods described herein, the individual does not harbour cancer and harbours one or more mutations that predispose the individual to an increased risk of developing cancer, and wherein one or more treatments are administered to the individual in accordance with any of the methods of treatment described herein as a method of prophylaxis, and wherein the one or more treatments administered to the individual comprises one or more doses of progestogens,

particularly wherein the progestogens are delivered locally or systemically, Aspirin, Metformin, aromatase-inhibitors, and/or a weight-loss regimen.

In any of the methods of monitoring described herein, depending on the risk of the presence or development of cancer in the individual, one or more treatments are administered to the individual according to any one of the methods of treatment encompassed by the invention and described herein, or wherein the cancer index value of the individual is less than about -0.660 no treatment is administered to the individual. Different treatments may be administered depending on the stratification of an individual on the basis of their cancer status, risk of harbouring cancer or on the basis of their risk of cancer development. The method may further comprise administration of one or more treatments according to the methods of treatment described herein.

The cancer index value may change between any two or more time points. For this reason, longitudinal monitoring of an individual's cancer index value could be of particular benefit to the assessment of, for example, cancer progression, prevention of recurrence of cancer, cancer treatment efficacy, or cancer efficacy.

In any of the methods of monitoring described herein, the one or more further time points may be any suitable time point. Preferably the one or more further time points may of suitable distance apart for sufficiently frequent screening in order to predict any particularly early onset cases of presence or development of cancer in an individual. Preferably the one or more further time points may be of suitable distance apart for assessing the efficacy of one or more treatments. Preferably the one or more further time points may be of suitable distance apart for predicting whether an individual remains free of cancer after a successful course of treatment. The one or more further time points may be about monthly, about two monthly, about three monthly, about four monthly, about five monthly, about six monthly, about seven monthly, about eight monthly, about nine monthly, about ten monthly, about eleven monthly, about yearly, about two yearly, or more than two yearly.

In any of the methods of monitoring described herein, changes may be made to the one or more treatments wherein a positive or negative responses to the one or more treatments are observed. Treatments may be changed in accordance with the methods of

treatments described herein. Treatments may particularly be changed if the individual's cancer status or risk stratification, based on their cancer index value, changes.

In any of the methods of monitoring encompassed by the invention, the step of predicting the presence or development of cancer in an individual may involve the use of any one of the arrays described herein.

Biological samples

The assays described herein are preferably performed on samples comprising epithelial cells, particularly tissue obtained from an anatomical site other than the endometrium or ovary. The sample may particularly be derived from the cervix, the vagina, the buccal area, blood and/or urine. The sample is preferably a cervical liquid-based cytology sample, and more preferably a cervical smear sample.

Preferably, any one of the assays described herein for assessing the presence, absence or development of cancer in an individual comprises providing a sample which has been taken from the individual. Preferably the individual is a woman.

In any of the assays described herein, the assay may or may not encompass the step of obtaining the sample from the individual. In assays which do not encompass the step of obtaining the sample from the individual, a sample which has previously been obtained from the individual is provided.

The sample may be provided directly from the individual for analysis or may be derived from stored material, e.g. frozen, preserved, fixed or cryopreserved material.

In any of the assays described herein, the sample may be self-collected or collected by any suitable medical professional.

Any of the assays described herein, the sample may comprise cells. The sample may comprise genetic material such as DNA and/or RNA.

Any of the assays described herein may involve providing a biological sample from the patient as the source of patient DNA for methylation analysis.

Any of the assays described herein may involve obtaining patient DNA from a biological sample which has previously been obtained from the patient.

Any of the assays described herein may involve obtaining a biological sample from the patient as the source of patient DNA for methylation analysis. The sample may be self-collected or collected by any suitable medical professional. Procedures for obtaining a biological sample include biopsy.

In any of the assays described herein, the sample may be obtained from a woman having abnormal vaginal bleeding, such as postmenopausal bleeding. Women with post-menopausal bleeding in particular should be assessed by any one of the assays described herein.

Methods for sample isolation and for the subsequent extraction and isolation of DNA from such cell or tissue samples in preparation for assessing DNA methylation, are well known to those skilled in the art. In the context of the assays or methods described herein, the entirety of a sample may be used, or alternatively cells may be concentrated or cell types may be fractionated in order to only apply subsets of one or more cell types to the present assays or methods. Any suitable methods of concentration or fractionation may be used.

In any one of the assays described and defined herein the sample from the individual, or the sample which has been taken from the individual, may derive from a tissue which is different from the tissue which harbours the tumour, if a tumour is present in the individual. Accordingly, in any one of the assays described and defined herein the sample from the individual, or the sample which has been taken from the individual, may not comprise nucleic acid, including DNA, which derives from the tumour, i.e. tumour-specific nucleic acid, including tumour-specific DNA. Thus, consistent with the data set out in the examples and the disclosures herein, methylation profiles derived from DNA molecules in the sample are used as surrogate markers for tumour-specific nucleic acid, including tumour-specific DNA, which exists at an anatomical site in the body of the individual which is remote from the anatomical site from which the sample is derived. A skilled person would able to identify the absence of tumour-specific DNA in any given population of sample-specific DNA molecules by routine means, such as determining the absence of known genetic mutations which are characteristic of the particular cancer, by e.g. sequence based screening. However, the performance of any one of the assays

described and defined herein does not require any assessment to verify the absence of tumour-specific DNA in any given population of DNA molecules.

Types of cancers

The methods described herein may be applied to any cancer and/or CIN3. Preferably, the methods described herein may be applied to endometrial cancer and/or ovarian cancer and/or CIN3, particularly endometrial cancer. The methods described herein are most preferably applied to endometrial cancer.

The cancer may be a primary cancer lesion. The cancer may be a secondary cancer lesion. The cancer may be a metastatic lesion.

In assays described herein, wherein the assays is for assessing the presence, absence or development of endometrial cancer, the endometrial cancer may preferably be endometriod cancer, uterine carcinosarcoma, squamous cell carcinoma, small cell carcinoma, transitional carcinoma, serous carcinoma, clear-cell carcinoma, mucinous adenocarcinoma, undifferentiated carcinoma, dedifferentiated carcinoma or serous adenocarcinoma. Any of the assays described herein may additionally, or alternatively, be for assessing the presence, absence or development of ovarian cancer.

In assays described herein, wherein the assays is for assessing the presence, absence or development of ovarian cancer cancer, the ovarian cancer cancer may preferably be serous carcinoma, mucinous carcinoma, endometrioid carcinoma, clear cell carcinoma, low malignant potential (LMP) tumor, borderline epithelial ovarian cancer, teratoma, dysgerminoma, endodermal sinus tumor, Choriocarcinoma, granulosa-theca tumor, Sertoli-Leydig tumor, granulosa cell tumor, small cell carcinoma of the ovary or primary peritoneal carcinoma.

Arrays and kits

The invention also encompasses arrays capable of discriminating between methylated and non-methylated forms of CpGs as defined herein; the arrays may comprise

oligonucleotide probes specific for methylated forms of CpGs as defined herein and oligonucleotide probes specific for non-methylated forms of CpGs as defined herein.

In any of the arrays described herein, the array may comprise oligonucleotide probes specific for a methylated form of each CpG in a CpG panel and oligonucleotide probes specific for a non-methylated form of each CpG in the panel; wherein the panel consists of at least 50 CpGs selected from the CpGs identified in SEQ ID NOs 1 to 808.

The panel may consist of at least 50 CpGs selected from the CpGs identified in SEQ ID NOs 1 to 808, preferably wherein the CpGs comprise the CpGs identified in SEQ ID NOs 1 to 50.

The panel may consist of at least 100 CpGs selected from the CpGs identified in SEQ ID NOs 1 to 808, preferably wherein the CpGs comprise the CpGs identified in SEQ ID NOs 1 to 100.

The panel may consist of at least 150 CpGs selected from the CpGs identified in SEQ ID NOs 1 to 808, preferably wherein the CpGs comprise the CpGs identified in SEQ ID NOs 1 to 150.

The panel may consist of at least 200 CpGs selected from the CpGs identified in SEQ ID NOs 1 to 808, preferably wherein the CpGs comprise the CpGs identified in SEQ ID NOs 1 to 200.

The panel may consist of at least 250 CpGs selected from the CpGs identified in SEQ ID NOs 1 to 808, preferably wherein the CpGs comprise the CpGs identified in SEQ ID NOs 1 to 250.

The panel may consist of at least 300 CpGs selected from the CpGs identified in SEQ ID NOs 1 to 808, preferably wherein the CpGs comprise the CpGs identified in SEQ ID NOs 1 to 300.

The panel may consist of at least 350 CpGs selected from the CpGs identified in SEQ ID NOs 1 to 808, preferably wherein the CpGs comprise the CpGs identified in SEQ ID NOs 1 to 350.

The panel may consist of at least 400 CpGs selected from the CpGs identified in SEQ ID NOs 1 to 808, preferably wherein the CpGs comprise the CpGs identified in SEQ ID NOs 1 to 400.

The panel may consist of at least 450 CpGs selected from the CpGs identified in SEQ ID NOs 1 to 808, preferably wherein the CpGs comprise the CpGs identified in SEQ ID NOs 1 to 450.

The panel may consist of at least 500 CpGs selected from the CpGs identified in SEQ ID NOs 1 to 808, preferably wherein the CpGs are the CpGs identified in SEQ ID NOs 1 to 500.

The panel may consist of all CpGs identified in SEQ ID NOs 1 to 808.

In some embodiments the array is not an Infinium MethylationEPIC BeadChip array or an Illumina Infinium HumanMethylation450 BeadChip array.

Separately or additionally, in some embodiments the number of CpG-specific oligonucleotide probes of the array is 482,000 or less, 480,000 or less, 450,000 or less, 440,000 or less, 430,000 or less, 420,000 or less, 410,000 or less, or 400,000 or less, 375,000 or less, 350,000 or less, 325,000 or less, 300,000 or less, 275,000 or less, 250,000 or less, 225,000 or less, 200,000 or less, 175,000 or less, 150,000 or less, 125,000 or less, 100,000 or less, 75,000 or less, 50,000 or less, 45,000 or less, 40,000 or less, 35,000 or less, 30,000 or less, 25,000 or less, 20,000 or less, 15,000 or less, 10,000 or less, 5,000 or less, 4,000 or less, 3,000 or less or 2,000 or less.

The CpG panel may comprise any set of CpGs defined in the assays of the invention described herein.

The arrays of the invention may comprise one or more oligonucleotides comprising any set of CpGs defined in the assays of the invention, wherein the one or more oligonucleotides are hybridized to corresponding oligonucleotide probes of the array.

The invention also encompasses a process for making a hybridized array described herein, comprising contacting an array according to the present invention with a group of oligonucleotides comprising any set of CpGs defined in the assays of the invention.

Any of the arrays as defined herein may be comprised in a kit. The kit may comprise any array as defined herein together with instructions for use.

The invention further encompasses the use of any of the arrays as defined herein in any of the assays for determining the methylation status of CpGs for the purposes of predicting the presence or development of cancer in an individual.

The following Examples serve to illustrate but not to limit the invention.

Examples

In the Examples described herein, WID-EC-Index is a cancer index value wherein the index value has been determined by assaying in a population of DNA molecules derived from a given sample from an individual the methylation status of a panel of CpGs selected from the CpGs defined by SEQ ID NOs: 1 to 500.

In some instances within the Examples, all CpGs defined by SEQ ID NOs: 1 to 500 have been included in the panel which has been assayed to obtain a cancer index value. In addition, specific sub-selections of CpGs from among the 500 CpGs defined by SEQ ID NOs: 1 to 500 have been included in the panel which has been assayed to obtain a cancer index value. In these instances, the cancer index value's ability to discriminate between cancer positive and cancer negative women is described, wherein discriminatory ability of the index is characterised by AUC and received operating characteristics.

The inventors, along with other scientists, have shown in the past that DNA methylation in vaginal fluid or cervical smears may be able to identify women with endometrial cancer. All of these studies were relatively small and did not validate the findings in a large data set. In addition, none of these studies focused specifically on high risk endometrial cancers and, most importantly, none assessed cohort-based samples from women prior to the diagnosis of the disease.

DNA methylation changes can be used as both, (i) a surrogate readout for factors which drive cancer formation and thereby predict cancer risk and (ii) a diagnostic tool which indicates the presence of a cancer. The bulk of the DNA extracted from a cervical smear sample contains: (i) DNA from normal cells (e.g. hormone-sensitive cervical epithelial cells whose DNA methylation is likely to capture long-term effects triggered by unopposed estrogen – the core risk factor for endometrial cancer) that provides the *cancer risk component* of the signature and (ii) DNA from cell-detritus draining from the endometrial cavity, the quantity of which is likely increased with respect to endometrial cancers, which provides the *diagnostic component* of the signature.

Here, the inventors have developed and validated a DNA methylation signature in cervical smear samples which is capable of both diagnosing and predicting the risk of developing endometrial cancer.

Materials and Methods

Study design and epidemiological data acquisition

The study was conducted as part of a multi-centre study involving several recruitment sites in 5 European countries (i.e. the UK, Czech Republic, Italy, Norway and Germany). Participants were aged >18 years. Prior to taking part, each prospective study volunteer was given a Participant Information Sheet as well as a Consent Form and the rationale for the study was explained. Additional resources, including an explanatory video and further online resources, were also made available. Women diagnosed with breast or ovarian cancer (case) or a non-malignant benign gynaecological condition (control) were approached during outpatient hospital clinics, while women recruited as *BRCA* mutation carriers or healthy volunteers from the general population (control) were approached via outreach campaigns, public engagement, and as part of cervical screening programmes. After signing an informed consent, participants completed an epidemiological questionnaire as well as a feedback form after their participation. The study itself is a sub-study of the FORECEE (4C) Programme, which has ethical approval from the UK Health Research Authority (REC 14/LO/1633) and other contributing centres.

The epidemiological survey was administered via the Qualtrics application on dedicated iPads. The survey contained questions relating to health habits, relevant risk factors, and also made enquiries as to historical health habits, as well as obtaining a thorough medical and obstetric history. Cervical samples were collected at appropriate clinical venues by trained staff and the cervical smears were carried out by a small group of research midwives or physicians with a view to establishing standard practice. Buccal samples were collected using Copan 4N6FLOQ Swabs, Thermofisher Scientific.

Biological samples were given an anonymous Participant ID Number which was assigned to the person's name in a securely stored link file. Following sample taking, an

email survey was sent to each participant, enabling them to feedback with respect to the recruitment process. Women with a current diagnosis of grade 3 and/or stage IB or above malignant endometrial cancer and recruited prior to receiving any systemic treatment (chemo- or antihormonal or Herceptin, etc.) or surgery or radiotherapy were eligible as endometrial cancer cases. For the FORECEE Discovery set controls were initially matched one-to-one with cases based on menopausal status, age (5 year age ranges where possible), and recruitment centre/country. However, due to an imbalance in recruitment of cases and controls at some centres, a number of cases were matched on age and menopausal status alone. Cancer histological data was collected post-recruitment either by clinicians directly involved in the diagnosis/treatment of the cancer cases or by a nominated data manager with access to the in-house hospital systems.

Cervical Smear Sample Collection

Cervical smears were taken at collaborating hospitals and recruitment centres using the ThinPrep system (Hologic Inc., cat #70098-002). Cervical cells were sampled from the cervix using a cervix brush (Rovers Medical Devices, cat #70671-001) which was rotated 5 times through 360 degrees whilst in contact with the cervix to maximise cell sampling. The brush was removed from the vagina and immersed in a ThinPrep vial containing Preserve-cyt fluid and then pushed against the bottom of the vial 10 times to facilitate release of the cells from the brush into the solution. The sample vial was sealed and stored locally at room temperature. Buccal cells were collected using two Copan 4N6FLOQ Buccal Swabs (Copan Medical Diagnostics, cat #4504C) by firmly brushing the swab head 5-6 times against the buccal mucosa of each cheek. The swabs were re-capped and left to dry out at room temperature within the sampling tube which contains a drying desiccant. 2.5 ml of venous whole blood was collected in PAX gene blood DNA tubes (BD Biosciences #761165) and stored locally at 4˚C. All samples were shipped to UCL at ambient temperature.

The vaginal-swab endometrial cancer set (55 controls and 8 endometrial cancers) consists of swabs from women presenting at UCLH for postmenopausal bleeding.

Self-collected samples

Two endometrial cancer cases and three controls matched by age provided a cervico-vaginal sample using the self-collection device Evalyn Brush at the outpatient clinic after a brief explanation by medical staff. The Evalyn Brush was rotated 5 times through 360 degrees once introduced in the vagina as indicated per fabricant protocol to maximize cell sampling. Samples were stored using ThinPrep.

Sample processing and DNA extraction

When preparing for sample storage in the laboratory, cervical smear samples were poured into 50 ml Falcon tubes and left to sediment at room temperature for 2 hours. 1 mL wide bore tips were then used to transfer the enriched cellular sediment into a 2 mL vial. The cervical sediments were washed twice with PBS, lysed, and stored temporarily at -20°C ahead of extraction.

DNA methylation array analysis

Cervical DNA was normalised to 25 ng/ul and 500 ng total DNA was bisulfite modified using the EZ-96 DNA Methylation-Lightning kit (Zymo Research Corp, cat #D5047) on the Hamilton Star Liquid handling platform. 8 ul of modified DNA was subjected to methylation analysis on the Illumina InfiniumMethylation EPIC BeadChip (Illumina, CA, USA) at UCL Genomics according to the manufacturer's standard protocol.

Methylation analysis

All methylation microarray data were processed through the same standardised pipeline. Raw data was loaded using the R package minfi. Any samples with median methylated and unmethylated intensities < 9.5 were removed. Any probes with a detection p-value >0.01 were regarded as failed. Any samples with >10% failed probes, and any probes with >10% failure rate were removed from the dataset. Beta values from failed probes (approximately 0.001% of the dataset) were imputed using the impute.knn function as part of the impute R package.

Non-CpG probes (2,932), SNP-related probes as identified by Zhou et.al. (82,108), and chrY probes were removed from the dataset. An additional 6,102 previously identified probes that followed a trimodal methylation pattern characteristic of an underlying SNP were removed.

Background intensity correction and dye bias correction was performed using the minfi single sample preprocessNoob function. Probe bias correction was performed using the beta mixture quantile normalisation (BMIQ) algorithm.

The fraction of immune cell contamination, and the relative proportions of different immune cell subtypes in each sample, were estimated using the EpiDISH algorithm using the epithelial, fibroblast and immune cell reference dataset. The top 1,000 most variable probes (ranked by standard deviation) were used in a principal component analysis. Statistical tests were performed in order to identify any anomalous associations between plate, sentrix position, date of array processing, date of DNA creation, study centre, immune contamination fraction, age, type (case versus control) and the top ten principal components. Finally, two-thirds of the discovery dataset was randomly selected for use as the training dataset and the remaining third was allocated to the internal validation dataset. This split was carried out once, and the same training and validation sets were used in all subsequent analyses.

Methylight reaction design

Two ranked lists of CpGs were generated. The first was ranked according to the epithelial delta-beta estimates (the estimated difference in methylation between cases and controls in cervical epithelial cells). The second was ranked according to p-values (derived from a linear model comparing cases to controls after adjustment for immune cell proportion and age). For each CpG we identified any contiguous CpGs within +/-500bp. The inventors computed and plotted the mean methylation in cases and controls across all CpGs within this 1000bp region. Upon visual inspection of the top 50 CpGs (in both ranked lists) we identified a number of candidate regions according to the following criteria:

1. Regions where the methylation level was close to zero in healthy controls.
2. Regions where the variability within controls was relatively low.
3. Regions where the methylation level was elevated in cases.
4. Regions that included two or more CpG sites

Cervical smear samples from 20 healthy controls (age range 34 to 75, 11 post-menopause and 9 pre-menopause) and 20 women with endometrial cancer (age range from 34 to 75, 11 post-menopause and 9 pre-menopause) were analysed

Statistical analyses for classifier development

Contamination by immune cells presented a challenge with respect to the identification of differentially methylated positions (DMPs) as differential methylation that occurred solely in epithelial cells was diminished in samples with high IC and vice versa. In order to overcome this, the inventors linearly regressed the beta values on IC for each CpG site, the linear models being fitted to cases and controls separately. The intercept points at IC = 0 were used as estimates of mean beta values in cases and controls in a pure epithelial cell population. The difference between these intercept points provided a delta-beta estimate in epithelial cells. The difference between intercept points at IC = 1 provided immune cell delta-beta estimates. A list of ranked CpGs was produced according to delta-beta estimates in epithelial cells.

The R package glmnet was used to train classifiers with a mixing parameter value of alpha = 0 (ridge penalty) and alpha = 1 (lasso penalty) with binomial response type. Data from the training dataset were used to fit the classifiers. A ranked list of CpGs was generated by taking the CpG with the largest epithelial delta-beta, followed by the CpG with the largest immune delta-beta, followed by the next largest epithelial delta-beta and so forth (any duplicates were removed). The top n CpGs from the list of ranked CpGs were used as inputs to the classifier. Ten-fold cross-validation was used inside the training set by the cv.glmnet function in order to determine the optimal value of the regularisation parameter lambda. The AUC was used as a metric of classifier performance which was

evaluated on the internal validation dataset as a function of n, the number of CpGs used as inputs during training. The maximum value of n was 30,000.

The optimal classifier was selected based on the highest AUC obtained in the internal validation dataset. Once the optimal number of inputs was determined, the training and internal validation datasets were combined and the classifier was refitted using the entire discovery dataset with alpha and lambda fixed to their optimal values. This finalised classifier was then applied to the external validation dataset and the corresponding AUC was computed.

Denoting the top n CpGs as $x_1, \ldots, x_n$ and the regression coefficients from the trained classifier as $w_1, \ldots, w_n$ then WID-EC-index = $\sum_{i=1}^{n}(w_i x_i - \mu)/\sigma$ where μ and σ are defined as the mean and standard deviation of the quantity $\sum_{i=1}^{n} w_i x_i$ in the training dataset (that is, the index is scaled to have zero mean and unit standard deviation in the training dataset).

Data availability

DNAme data has been deposited in the European Genome-phenome Archive (EGA), which is hosted by the EBI and the CRG, under accession number EGASXXXXXXXXXXX.

Example:

The inventors performed an epigenome-wide DNAme analysis in cervical smear samples from women who were subsequently diagnosed with endometrial cancer, and in matched controls, and established the WID-EC-index (Women's risk IDentification for Endometrial Cancer index) which the inventors further validated in an independent set of cervical samples.

For the Discovery Set (Figure 1), the inventors collected samples from 217 women at the time of endometrial cancer diagnosis with at least one poor prognostic feature (i.e. grade 3 or clear cell or serous histology or >50% myometrial invasion) from 15 European

centres (either at the time before an endometrial biopsy was taken for diagnostic purpose or before commencing a hysterectomy), and 869 women without a cancer (593 from the general population and 276 from women attending hospital for benign women-specific conditions) (Table 8; samples from a greater proportion of younger women were deliberately used in the Discovery set in order to develop a risk predictor applicable also to younger women; the external validation set was composed of age-matched cases and controls). Epigenome-wide DNAme was analysed using an Illumina Infinium EPIC bead chip array which encompasses over 850,000 CpG sites.

Sample heterogeneity and differential methylation

The inventors assessed the number of CpGs which were significantly differentially methylated between cancer cases and controls (Figure 6A); after Bonferonni multiple test adjustment, 116,658 CpGs showed significant differential methylation. Previously the inventors found that methylation differences may vary due to immune cell type composition in cases compared to controls. Hence the inventors assessed the level of cell type heterogeneity in each cervical smear sample using HEpiDISH, an algorithm that infers the relative proportion of epithelial cells, fibroblasts, and seven subtypes of immune cells in each sample. The cell-type distributions were broadly similar between cancer cases and controls (although there were small but significant differences in some immune cell subtypes; Figure 6B).

Development of discriminatory index

In order to derive a diagnostic methylation signature, termed the WID-EC-index, the inventors used ridge and lasso regression to classify individuals as cases or controls. Classifiers were trained on two thirds of the discovery dataset (572 cancer-free controls, 144 endometrial cancer cases) and the remaining one third was used as an internal validation set (297 controls, 73 cases) with the intention of evaluating their performance as a function of the number of CpGs used to construct the index. The area under the receiver operator characteristic curve (AUC) was used as a measure of predictive performance. CpGs were ranked according to their epithelial delta-beta.

Predictive performance was evaluated as a function of the number of CpGs used to train the classifier using the internal validation dataset and optimal performance of 0.97 (Figure 2; 95% CI: 0.94-0.99) was achieved using 500 CpGs with ridge regression (Figure 6C). Discriminatory performance was broadly independent of immune cell proportion (Figure 6D). In samples with an immune cell proportion ≤0.5 the AUC was 0.98 (95% CI: 0.97-1.00), and in those with a proportion >0.5 the AUC was 0.95 (95% CI: 0.91-0.99). The WID-EC-index was slightly associated with IC fraction in controls (linear regression coefficients of 0.29, $p<0.001$), with a negative trend in cancer cases (linear regression coefficient of -0.28, $p=0.6$).

External validation

A separate independent external validation dataset consisting of 63 endometrial cancer cases and 225 controls was used to validate the index performance (Figure 1). The WID-EC-index was computed for each woman (Figure 3A) resulting in an AUC of 0.92 (95% CI: 0.87-0.97) and 0.93 (95% CI: 0.88-0.99) and 0.89 (95% CI: 0.80-0.98) for IC ≤0.5 and >0.5, respectively. Odds ratios corresponding to quartiles defined on the internal validation set are displayed for the external validation set in Table 7.

In order to assess whether the WID-EC-index is able to predict endometrial cancer risk, the inventors analysed samples which have been collected as part of the routine cervical screening program in Stockholm from healthy women who subsequently developed endometrial cancer (cases; n=55; average time between sample collection and cancer diagnosis was 304 days) and from women who did not (controls, n=99). The inventors observed an AUC of 0.83 (95% CI: 0.76-0.90) overall with 0.82 (95% CI: 0.72-0.93) and 0.85 (95% CI: 0.75-0.95) for IC ≤0.5 and >0.5, respectively.

Sample degradation in the prospective set

The cell-type composition of these three datasets was broadly similar to the discovery dataset used to develop the index and did not show any significant differences between cases and controls (Figure 7A,B). However, the inventors observed a systematic loss of methylation in cancer free controls from the prospective set in comparison to the

discovery set, a loss that predominantly occurred at CpG-sparse "Open Sea" and "Shore" regions of the genome (Figure 7C). The inventors hypothesise that these changes may be due to storage related degradation due to long term biobank storage (the median storage time was 95 days and ranged from 15 to 1,001 days).

The WID-EC-index is highly enriched for CpG-dense CpG Islands and depleted for Open Sea CpG regions relative to the overall illumina EPIC array (Figure 7D). The inventors decomposed the index into two subcomponents consisting of only CpGs from Islands (237 CpGs) and Open Sea regions (228 CpGs). The CpG island subcomponent offered superior performance in the prospective samples (AUC: 0.87, 95% CI: 0.81-0.94; Figure 7E) whereas the Open Sea subcomponent suffered from a substantial corruption of the discriminatory signal (Figure 7F), suggesting that the overall performance of WID-EC-index was diminished by the degradation of Open Sea CpG regions. In the external validation set the Island and Open Sea components generated AUC values of 0.92 and 0.53 respectively, indicating that the discriminatory signal is largely driven by the CpG island component (Figure 7G,H).

Association with epidemiological, clinical and technical factors

The inventors investigated the relationship between the WID-EC-index and various epidemiological and clinical variables in the internal and external validation sets. A statistically significant association was found between the WID-EC-index and age in controls (correlation coefficient=0.37, $p<10^{-16}$; Figure 4A). A similar trend was observed in cancer cases (correlation coefficient=0.16, p=0.06). A significant correlation of 0.14 ($p<0.01$) was observed between the index and BMI in controls. The WID-EC-index was significantly elevated in post-menopausal controls (Figure 4C), reflecting the association with age. No significant association was observed with parity in post-menopausal controls (Figure 4D). The index was significantly elevated in stage III/IV cancers (Figure 4E) and in grade II cancers compared to grade I cancers (Figure 4F). No association was observed with histological subtypes (Figure 4G).

The inventors investigated whether there was any association between the WID-EC-index and various technical parameters including date of sample processing, plate

number (samples were processed on 96 sample plates) and sentrix position but no significant associations were found. The inventors compared the 593 control samples from healthy volunteers to 276 control samples taken from women presenting with benign women-specific conditions but did not find any significant differences (Figure 8A). The inventors also observed no significant dependence on the time from sample collection to DNA extraction (Figure 8B).

Inferred proportion of tumour DNA

Due to the anatomical proximity between the cancer (i.e. endometrium) and the area from which the inventors have taken the sample (i.e. cervix) the inventors investigated whether the discriminatory signal is driven by tumour DNA draining from the uterus to the cervix or whether the signal is a generic risk signal retained in cervical epithelial cells. The inventors used 11 epithelial, 7 fibroblast, 42 immune cell, and 9 endometrial cancer tissue samples to develop a new reference panel for use with the EpiDISH algorithm (see Methods). For each sample the inventors obtained estimates of the proportion of DNA from each of the four cell types. The inventors observed that the proportion of tumour DNA in cases is substantially higher compared to controls (Figure 5A) for which the proportion of tumour DNA is close to zero. The inventors found that 43% of cancer cases provided cervical smear samples that consisted of >10% tumour DNA. Although the WID-EC index strongly increases with the proportion of tumour DNA (correlation coefficient 0.70, $p<10^{-16}$) it is also dramatically higher in those cases which have no tumour DNA present (Figure 5B) indicating that the discriminatory signal does not depend on the presence of tumour DNA.

Cancer index values and clinical actions

Four sub-groups defined by ranges of cancer index values are specified in Table 9 as corresponding to preferred clinical actions, comprising intensified screening, administration of therapeutics and surgery. The subgroups are quartiles based on control samples from the internal validation set. That is, these values of the index split the control samples into four equally sized groups. Odds ratio values are calculated by comparing the number of cases

and controls in a given quartile to the first quartile (which is taken as a reference). Odds ratio values are determined for endometrial cancer risk, ovarian cancer risk and CIN3 risk. For example, a woman in the fourth quartile is roughly 25 times more likely to have endometrial cancer than a woman in the first quartile.

Discussion

Endometrial cancer is the most common gynaecological cancer and amongst those cancers with the most rapidly increasing incidence rates.

Here the inventors have established for the first time a test – the WID-EC-index – which based on a DNA methylation signature in cervical smear samples is able to identify women both with endometrial cancer and at risk for endometrial cancer with a very high sensitivity and specificity.

The WID-EC-index is able to identify 70% of women with an endometrial cancer with a specificity of 99% and 90% of women with an endometrial cancer with a specificity of 78%. Even more importantly the inventors demonstrated that based on a general population cervical screening cohort the inventors identified 50% of women who developed endometrial cancer subsequent to cancer diagnosis with a specificity of 100%. The inventors expect that the sensitivity (at similar specificity) could be even higher in this cohort setting because long-term storage (i.e. several years) of smear samples within the fluid which is used for liquid based cytology (e.g. Preservcyt) at -25C had a strong impact on DNA methylation (unpublished) with the least impact on CpG islands (which largely contribute to the diagnostic component of the WID-EC-index) and the strongest impact on open sea CpGs (i.e. CpGs which contribute to the risk predictive component of the index).

The inventors propose that – once validated in a prospective setting – that women amongst the top 10^{th} percentile should undergo an endometrial biopsy which for the far majority of cases can easily be done in an outpatient setting and – using for instance a pipelle – is easy tolerated by the patient.

Before validating the WID-EC-index in the general population it needs to be prospectively validated in particular in women at high risk for endometrial cancer including women with high BMI (currently 38% of all endometrial cancers are attributable

to high BMI with increasing tendency) or Lynch syndrome. Lynch syndrome is an autosomal dominant inherited predisposition to cancer, caused by the mutation of DNA mismatch repair and associated with a 33-60% lifetime risk of developing endometrial cancer. Endometrial cancers in these women appear to be characterised by a higher proportion of advanced stage than in the general population and more aggressive histologic types (clear cell carcinomas, papillary serous carcinoma and carcino-sarcoma) and endometrial cancer occurs at a younger age in these women. It needs to be demonstrated whether the WID-EC-index test will allow these women – ideally based on self-collected samples – to personalise risk-reducing measures.

Table 7A

Quantile	Control	Cancer	OR (unadjusted)	OR (adjusted)
(-1.36, -0.66)	35	1	1.00 (reference)	1.00 (reference)
(-0.66, -0.43)	45	1	0.78 (0.02,31.16)	0.61 (0.01, 20.2)
(-0.43, -0.23)	77	4	1.65 (0.22,46.2)	0.66 (0.05, 16.74)
(-0.23, 1.03)	68	57	25.5 (5.27,612.01)	13.66 (2.54, 254.56)

Table 7B

Quantile	Control	Cancer	OR (unadjusted)	OR (adjusted)
(-1.36, -0.66)	20	3	1.00 (reference)	1.00 (reference)
(-0.66, -0.43)	32	3	0.63 (0.1,3.99)	0.63 (0.11, 3.74)
(-0.43, -0.23)	22	8	2.33 (0.57,12.47)	3.64 (0.83, 20.4)
(-0.23, 1.03)	25	41	10.26 (3.09,49.01)	13.47 (3.4, 71.78)

Table 7C. Prospective samples odds ratio table

Quantile	Control	Cancer	OR (unadjusted)	OR (adjusted)
(-1.36, -0.66)	20	3	1.00 (reference)	1.00 (reference)
(-0.66, -0.43)	32	3	0.63 (0.1,3.99)	0.63 (0.11, 3.74)
(-0.43, -0.23)	22	8	2.33 (0.57,12.47)	3.64 (0.83, 20.4)
(-0.23, 1.03)	25	41	10.26 (3.09,49.01)	13.47 (3.4, 71.78)

Table 7D. Ovarian cancer odds ratio table

Quantile	Control	Cancer	OR (unadjusted)	OR (adjusted)
(-1.36, -0.66)	75	17	1.00 (reference)	1.00 (reference)
(-0.66, -0.43)	74	35	2.07 (1.08,4.11)	1.61 (0.8, 3.3)
(-0.43, -0.23)	74	61	3.6 (1.95,6.91)	1.97 (0.97, 4.07)
(-0.23, 1.03)	74	129	7.59 (4.25,14.23)	3.42 (1.71, 7.04)

Table 8A. Internal validation

Factor	Group	Control	Cancer	OR	p-value
Age (years)	<52	443 (56%)	16 (8%)	1.00 (reference)	-
	52-64	222 (28%)	66 (32%)	8.15 (4.72,14.91)	<10^-15
	>64	132 (17%)	125 (60%)	25.86 (15.24,46.76)	<10^-Inf
Age at menarche (years)	<12	124 (16%)	37 (18%)	1.27 (0.79,2.02)	0.32
	Dec-13	418 (53%)	108 (53%)	1.1 (0.77,1.57)	0.6
	>13	251 (32%)	59 (29%)	1.00 (reference)	-
Parous	Yes	598 (75%)	165 (80%)	1.00 (reference)	-
	No	199 (25%)	41 (20%)	0.75 (0.51,1.08)	0.13
Age at birth of first live child (years)	<21	34 (6%)	17 (10%)	1.00 (reference)	-
	21-27	202 (34%)	92 (56%)	0.91 (0.49,1.75)	0.77
	>27	352 (60%)	55 (34%)	0.31 (0.16,0.61)	<10^-3
Menopausal status	Pre	411 (52%)	19 (9%)	1.00 (reference)	-
	Post	386 (48%)	188 (91%)	10.44 (6.54,17.63)	<10^-Inf
Age at menopause (years)	<46	359 (49%)	25 (14%)	0.09 (0.06,0.15)	<10^-Inf
	46-52	267 (36%)	69 (39%)	0.35 (0.23,0.51)	<10^-7
	>52	110 (15%)	82 (47%)	1.00 (reference)	-
BMI (kg/m2)	<25	409 (51%)	57 (28%)	1.00 (reference)	-
	25-30	238 (30%)	50 (24%)	1.51 (1,2.28)	0.05
	>30	150 (19%)	100 (48%)	4.77 (3.29,6.97)	<10^-Inf
Oral contraceptive use (pre menopausal only)	No	194 (68%)	109 (76%)	1.00 (reference)	-
	Yes	89 (31%)	29 (20%)	0.58 (0.36,0.93)	0.02
Hormone replacement therapy (post menopausal only)	No	279 (98%)	143 (99%)	1.00 (reference)	-
	Yes	7 (2%)	1 (1%)	0.31 (0.01,1.83)	0.23
Smoking	No	685 (86%)	193 (94%)	1.00 (reference)	-
	Yes	98 (12%)	12 (6%)	0.44 (0.22,0.79)	0.005
First degree relatives with endometrial cancer	0	778 (98%)	200 (97%)	1.00 (reference)	-
	1+	19 (2%)	7 (3%)	1.45 (0.55,3.38)	0.42

Table 8A. External validation

Factor	Group	Control	Cancer	OR	p-value
Age (years)	<52	91 (40%)	3 (5%)	1.00 (reference)	-
	52-64	85 (38%)	25 (40%)	8.48 (2.82,38.04)	<10^-4
	>64	49 (22%)	35 (56%)	20.41 (6.86,91.26)	<10^-10
Age at menarche (years)	<12	34 (15%)	11 (18%)	1.3 (0.53,3.04)	0.56
	Dec-13	119 (53%)	33 (53%)	1.11 (0.58,2.15)	0.76
	>13	72 (32%)	18 (29%)	1.00 (reference)	-
Parous	Yes	166 (74%)	48 (76%)	1.00 (reference)	-
	No	59 (26%)	15 (24%)	0.88 (0.45,1.67)	0.71
Age at birth of first live child (years)	<21	16 (10%)	8 (17%)	1.00 (reference)	-
	21-27	61 (38%)	24 (51%)	0.78 (0.3,2.18)	0.63
	>27	84 (52%)	15 (32%)	0.36 (0.13,1.03)	0.06
Menopausal status	Pre	79 (35%)	6 (10%)	1.00 (reference)	-
	Post	146 (65%)	57 (90%)	5.01 (2.22,13.61)	<10^-4
Age at menopause (years)	<46	82 (37%)	5 (8%)	0.11 (0.03,0.27)	<10^-6
	46-52	91 (41%)	26 (44%)	0.48 (0.25,0.92)	0.03
	>52	47 (21%)	28 (47%)	1.00 (reference)	-
BMI (kg/m2)	<25	117 (52%)	17 (27%)	1.00 (reference)	-
	25-30	57 (25%)	11 (17%)	1.33 (0.57,3.02)	0.5
	>30	51 (23%)	35 (56%)	4.67 (2.42,9.3)	<10^-5
Oral contraceptive use (pre menopausal only)	No	26 (38%)	5 (31%)	1.00 (reference)	-
	Yes	42 (62%)	11 (69%)	1.34 (0.43,4.78)	0.63
Hormone replacement therapy (post menopausal only)	No	64 (93%)	16 (100%)	1.00 (reference)	-
	Yes	5 (7%)	0 (0%)		
Smoking	No	190 (85%)	59 (95%)	1.00 (reference)	-
	Yes	34 (15%)	3 (5%)	0.3 (0.07,0.87)	0.02

First degree relatives with endometrial cancer	0	219 (97%)	60 (95%)	1.00 (reference)	-
	1+	6 (3%)	3 (5%)	1.86 (0.36,7.53)	0.42

Table 8B. Internal validation

Factor	Group	Set
Age (years)	<52	16 (8%)
	52-64	66 (32%)
	>64	125 (60%)
Menopausal status	Pre	19 (9%)
	Post	188 (91%)
Stage	T1	125 (60%)
	T2	14 (7%)
	T3	44 (21%)
	T4	15 (7%)
Grade	I	45 (22%)
	II	49 (24%)
	III	94 (45%)
Histology	Endometrioid	132 (64%)
	Serous	37 (18%)
	Other	38 (18%)

Table 8B. External validation

Factor	Group	Set
Age (years)	<52	3 (5%)
	52-64	25 (40%)
	>64	35 (56%)
Menopausal status	Pre	6 (10%)
	Post	57 (90%)
Stage	T1	45 (71%)
	T2	3 (5%)
	T3	9 (14%)
	T4	4 (6%)
Grade	I	10 (16%)
	II	14 (22%)
	III	31 (49%)
Histology	Endometrioid	40 (63%)
	Serous	10 (16%)
	Other	13 (21%)

Table 8B. Prospective validation

Factor	Group	
Age (years)	<52	17 (31%)
	52-64	18 (33%)
	>64	20 (36%)
Stage	I	34 (62%)
	II	5 (9%)
	III	6 (11%)
	IV	5 (9%)

Table 9.

WID-EC ranges	Endometrial cancer risk	Ovarian cancer risk	CIN3 risk	Clinical Action
(-1.36, -0.66)	1	1	1	no action required
(-0.66, -0.43)	0.78 (0.02,31.16)	2.07 (1.08,4.11)	1.41 (0.21,37.61)	transvaginal ultrasound to assess endometrium and ovaries - if normal then no clinical action required
(-0.43, -0.23)	1.65 (0.22,46.2)	3.6 (1.95,6.91)	23.53 (4.93,561.42)	Immediate colposcopy and HPV and cytology to assess cervix - if cervix normal perform hysteroscopy and endocervical and endometrial biopsy. CA125 and MRI pelvis to assess presence of ovarian cancer. In case all these tests negative then 6-monthly CA125, cell-free DNAme and transvaginal scan and yearly colpscopy and endometrial biopsy.
(-0.23, 1.03)	25.5 (5.27,612.01)	7.59 (4.25,14.23)	2696.02 (391.72,4.5e15)	Immediate colposcopy and HPV and cytology to assess cervix and hysteroscopy and endocervical and endometrial biopsy. CA125 and MRI pelvis to assess presence of ovarian cancer. In case all these tests are negative then consider prophylactic total hysterectomy and bilateral salpingoophorectomy in case family planning finished; alternatively 6-monthly CA125 and cell-free DNAme and colposcopy/HPV/cytology and yearly MRI pelvis

CLAIMS

1. An assay for assessing the presence, absence or development of cancer and/or grade 3 cervical intra-epithelial neoplasia (CIN3) in an individual, the assay comprising:
    a. providing a sample which has been taken from the individual, the sample comprising a population of DNA molecules;
    b. determining in the population of DNA molecules in the sample the methylation status of a panel of:
        i. one or more CpGs selected from a panel of CpGs identified in SEQ ID NOs 1 to 500 wherein the CpGs are identified at nucleotide positions 61 to 62; and/or
        ii. one or more CpGs selected from within a panel of one or more Differentially Methylated Regions (DMRs) defined by SEQ ID NOs 501 to 808, wherein the CpGs are denoted by CG;

    c. deriving a cancer index value based on the methylation status of the one or more CpGs in the panel; and
    d. assessing the presence, absence or development of cancer and/or CIN3 in the individual based on the cancer index value;

    wherein the assay is characterised as having an area under the curve (AUC) of 0.60 or more as determined by receiver operating characteristics (ROC).

2. An assay according to claim 1, wherein the panel of one or more CpGs comprises at least 50 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.90.

3. An assay according to claim 2, wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 50 and identified at nucleotide

positions 61 to 62, preferably wherein the assay is characterised as having an AUC of at least 0.95.

4. An assay according to claim 1, wherein the panel of one or more CpGs comprises at least 100 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.93.

5. An assay according to claim 4, wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62, preferably wherein the assay is characterised as having an AUC of at least 0.96.

6. An assay according to claim 1, wherein the panel of one or more CpGs comprises at least 150 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.93.

7. An assay according to claim 6, wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 150 and identified at nucleotide positions 61 to 62, preferably wherein the assay is characterised as having an AUC of at least 0.96.

8. An assay according to claim 1, wherein the panel of one or more CpGs comprises at least 200 CpGs selected from the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, preferably wherein the assay is characterised as having an AUC of at least 0.93.

9. An assay according to claim 9, wherein the panel of one or more CpGs comprises at least the CpGs identified in SEQ ID NOs 1 to 200 and identified at nucleotide

positions 61 to 62, preferably wherein the assay is characterised as having an AUC of at least 0.96.

10. An assay according to claim 1, wherein the panel of one or more CpGs comprises at least the 500 CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and further wherein the assay is characterised as having an AUC of at least 0.97.

11. An assay according to any one of claims 1 to 10, wherein the step of determining in the population of DNA molecules in the sample the methylation status of the one or more CpGs in the panel comprises determining a β value of each CpG.

12. An assay according to claim 11, wherein the step of deriving the cancer index value based on the methylation status of the one or more CpGs in the panel comprises:
    a. providing a methylation β-value data set comprising the methylation β-values for each CpG in the panel;
    b. providing a mathematical model capable of generating the cancer index from the methylation β-value data set; and
    c. applying the mathematical model to the methylation β-value data set, thereby generating the cancer index.

13. An assay according to claim 12, wherein the cancer index value is a WID-EC-Index cancer index value , and wherein the mathematical model which is applied to the methylation β-value data set to generate the cancer index is an algorithm according to the following formula:

$$WID - EC - index = \sum_{i=1}^{n} \frac{w_i \beta_i - \mu}{\sigma}$$

wherein:

a. $\beta_1, \ldots, \beta_n$ are methylation beta-values (between 0 and 1);

b. $w_1, \ldots, w_{500}$ are real valued coefficients;

c. μ and σ are real valued parameters used to scale the index; and

d. n refers to the number of CpGs in the panel of one or more CpGs;

preferably wherein the cancer is endometrial cancer.

14. An assay according to any one of claims 1 to 13, wherein when the cancer index value for the individual is about -0.201 or more, the individual is assessed as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, or wherein when the cancer index value for the individual is less than about -0.201, the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, preferably wherein:

a. the panel of one or more CpGs comprises at least 50 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 88% and the specificity is at least 76%;

b. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 90% and specificity is at least 80%;

c. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 92% and specificity is at least 79%; or

d. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 150 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 93% and specificity is at least 80%;

preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, more preferably wherein the cancer is endometrial cancer.

15. An assay according to any one of claims 1 to 13, wherein when the cancer index value for the individual is about 0.269 or more, the individual is assessed as having cancer and/or CIN3, or as having a high risk of cancer and/or CIN3 development, or

wherein when the cancer index value for the individual is less than about 0.269, the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, preferably wherein:

a. the panel of one or more CpGs comprises at least 50 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 75% and the specificity is at least 94%;
b. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 73% and specificity is at least 98%;
c. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 75% and specificity is at least 98%; or
d. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 150 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 79% and specificity is at least 97%;

preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, more preferably wherein the cancer is endometrial cancer.

16. An assay according to any one of claims 1 to 13, wherein when the cancer index value for the individual is about 1.072 or more, the individual is assessed as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, or wherein when the cancer index value for the individual is less than about 1.072, the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, preferably wherein:

a. the panel of one or more CpGs comprises at least 50 of the CpGs identified at nucleotide positions 61 to 62 in SEQ ID NOs 1 to 500, and wherein the sensitivity is at least 58% and the specificity is at least 99%;

b. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 50 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 60% and specificity is 100%;
c. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 100 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 63% and specificity is 100%; or
d. the panel of one or more CpGs comprises at least the CpGs defined by SEQ ID NOs 1 to 150 and identified at nucleotide positions 61 to 62, and wherein the sensitivity is at least 64% and specificity is 100%;

preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, more preferably wherein the cancer is endometrial cancer.

17. An assay according to any one of claims 1 to 13, wherein when the cancer index value for the individual is:
    a. less than about -0.660 the individual is assessed as not having cancer and/or CIN3;
    b. about -0.660 or more and less than about -0.430 the individual is assessed as having a low risk of cancer and/or CIN3 development;
    c. about -0.430 or more and less than about -0.230 the individual is assessed as having a moderate risk of cancer and/or CIN3 development; or
    d. about -0.230 or more the individual is assessed as having a high risk of cancer and/or CIN3 development;

    preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, more preferably wherein the cancer is endometrial cancer.

18. An assay according to claim 1 or according to any one of the preceding claims, wherein the step of determining the methylation status of a panel of one or more CpGs comprises determining the methylation status of one or more CpGs denoted

by CG identified in a panel of one or more DMRs defined by SEQ ID NOs 501 to 808, optionally wherein the panel of one or more CpGs comprises two or more CpGs denoted by CG identified in the panel of DMR(s), three or more CpGs denoted by CG identified in the panel of DMR(s), four or more CpGs denoted by CG identified in the panel of DMR(s), or all CpGs denoted by CG identified in the DMR(s) defined by SEQ ID NOs 501 to 808.

19. An assay according to claim 18, wherein the step of determining the methylation status of a panel of the one or more CpGs comprises determining the methylation status of five or more, six or more, seven or more, eight or more, or nine or more, or all of the CpGs denoted by CG within any one or more of the DMRs defined by SEQ ID NOs 501 to 808.

20. An assay according to claim 18 or 19, wherein the step of determining the methylation status of a panel of one or more CpGs comprises determining the methylation status of two or more, three or more, four or more, five or more, six or more, seven or more, eight or more, or nine or more, or all of the CpGs denoted by CG within:
    a. any combination of two, three, four, five, six, seven, eight, or nine or more of DMRs 1 to 308;
    b. any combination of ten, twenty, thirty, forty, fifty, sixty, seventy, eighty, or ninety or more of DMRs 1 to 308;
    c. all 237 of DMRs 1 to 308;
    d. one DMR defined by SEQ ID NO: 501, two DMRs defined by SEQ ID NOs: 501 to 502, three DMRs defined by SEQ ID NOs: 501 to 503, four DMRs defined by SEQ ID NOs: 501 to 504, five DMRs defined by SEQ ID NOs: 501 to 505, six DMRs defined by SEQ ID NOs: 501 to 506, seven DMRs defined by SEQ ID NOs: 501 to 507, eight DMRs defined by SEQ ID NOs: 501 to 508, or nine DMRs defined by SEQ ID NOs: 501 to 509;
    e. any combination of:

i. one or more DMRs defined by SEQ ID NOs: 525, 756 and 757, preferably within all of SEQ ID NOs 525, 756 and 757;
ii. one or more DMRs defined by SEQ ID NOs: 503, 504, 526, 740, 741, 743 and 744, preferably within all of SEQ ID NOs: 503, 504, 526, 740, 741, 743 and 744;
iii. one or more DMRs defined by SEQ ID NOs: 525, 756, 757, 503, 504, 526, 740, 741, 743 and 744, preferably within all of SEQ ID NOs: 525, 756, 757, 503, 504, 526, 740, 741, 743 and 744; or

f. ten DMRs defined by SEQ ID NOs: 501 to 510, twenty DMRs defined by SEQ ID NOs: 501 to 520, thirty DMRs defined by SEQ ID NOs: 501 to 530, forty DMRs defined by SEQ ID NOs: 501 to 540, fifty DMRs defined by SEQ ID NOs: 501 to 550, sixty DMRs defined by SEQ ID NOs: 501 to 560, seventy DMRs defined by SEQ ID NOs: 501 to 570, eighty DMRs defined by SEQ ID NOs: 501 to 580, or ninety DMRs defined by SEQ ID NOs: 501 to 590; or

g. ten DMRs defined by SEQ ID NOs: 501 to 510, SEQ ID NOs: 511 to 520, SEQ ID NOs: 521 to 530, SEQ ID NOs: 531 to 540, SEQ ID NOs: 541 to 550, SEQ ID NOs: 551 to 560, SEQ ID NOs: 561 to 570, SEQ ID NOs: 571 to 580, SEQ ID NOs: 581 to 590, SEQ ID NOs: 591 to 600, SEQ ID NOs: 601 to 610, SEQ ID NOs: 611 to 620, SEQ ID NOs: 621 to 630, SEQ ID NOs: 631 to 640, SEQ ID NOs: 641 to 650, SEQ ID NOs: 651 to 660, SEQ ID NOs: 661 to 670, SEQ ID NOs: 671 to 680, SEQ ID NOs: 681 to 690, SEQ ID NOs: 691 to 700, SEQ ID NOs: 701 to 710, SEQ ID NOs: 711 to 720, SEQ ID NOs: 721 to 730, SEQ ID NOs: 731 to 740, SEQ ID NOs: 741 to 750; SEQ ID NOs: 751 to 760; SEQ ID NOs: 761 to 770; SEQ ID NOs: 771 to 780; SEQ ID NOs: 781 to 790; SEQ ID NOs: 791 to 800 or SEQ ID NOs: 801 to 808.

21. An assay according to any one of claims 18 to 20, wherein the step of determining the methylation status of a panel of one or more CpGs comprises determining the

methylation status of one or more CpGs within any one or more DMRs selected from the group of DMRs consisting of DMRs 1 to 308 as defined by SEQ ID NOs 501 to 808, including:

a. one or more CpGs within DMR 1 as defined by SEQ ID NO: 501 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.911, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

b. one or more CpGs within DMR 2 as defined by SEQ ID NO: 502 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.903, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

c. one or more CpGs within DMR 3 as defined by SEQ ID NO: 503 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.899, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

d. one or more CpGs within DMR 4 as defined by SEQ ID NO: 504 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.899, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

e. one or more CpGs within DMR 5 as defined by SEQ ID NO: 505 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.899, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

f. one or more CpGs within DMR 6 as defined by SEQ ID NO: 506 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.897, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

g. one or more CpGs within DMR 7 as defined by SEQ ID NO: 507 and denoted by CG, preferably wherein the assay is characterised as having an

ROC AUC of at least 0.894, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

h. one or more CpGs within DMR 8 as defined by SEQ ID NO: 508 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.894, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]];

i. one or more CpGs within DMR 9 as defined by SEQ ID NO: 509 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.892, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]]; or

j. one or more CpGs within DMR 10 as defined by SEQ ID NO: 510 and denoted by CG, preferably wherein the assay is characterised as having an ROC AUC of at least 0.891, and more preferably wherein the panel of one or more CpGs comprises at least the CpGs denoted by [[CG]].

22. An assay according to any one of claims 18 to 21, wherein:

a. when the cancer index for the individual is about 0.025 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development; or

b. when the cancer index for the individual is less than about 0.025 the individual is classified as not having cancer and/or CIN3;

preferably wherein the assay has a specificity of 95% or more, more preferably wherein the assay comprises determining mean β-values for each CpG in the panel of one or more CpGs.

23. An assay according to any one of claims 18 to 21, wherein:

a. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 1 defined by SEQ ID NO: 501, and wherein when the cancer index for the individual is about 0.209 or more the individual is

classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 1, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 501;

b. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 1 defined by SEQ ID NO: 501, and wherein when the cancer index for the individual is less than about 0.209 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 70.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 1, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 501;

c. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 2 defined by SEQ ID NO: 502, and wherein when the cancer index for the individual is about 0.271 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 77.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least one CpG from DMR 2, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 502;

d. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 2 defined by SEQ ID NO: 502, and wherein when the cancer index for the individual is less than about 0.271 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 77.00% and the specificity of the assay is at least 95.00%, preferably

wherein the panel of one or more CpGs comprises at least one CpGs from DMR 2, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 502;

e. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 3 defined by SEQ ID NO: 503, and wherein when the cancer index for the individual is about 0.123 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 3, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 503;

f. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 3 defined by SEQ ID NO: 503, and wherein when the cancer index for the individual is less than about 0.123 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 3, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 503;

g. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 4 defined by SEQ ID NO: 504, and wherein when the cancer index for the individual is about 0.123 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 4, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 504;

h. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 4 defined by SEQ ID NO: 504, and wherein when the cancer index for the individual is less than about 0.123 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 73.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least three CpGs from DMR 4, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 504;

i. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 5 defined by SEQ ID NO: 505, and wherein when the cancer index for the individual is about 0.105 or more the individual is classified as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 5, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 505; or

j. CpGs denoted by CG whose cancer index value is determined are located within at least DMR 5 defined by SEQ ID NO: 505, and wherein when the cancer index for the individual is less than about 0.105 the individual is classified as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the sensitivity of the assay is at least 71.00% and the specificity of the assay is at least 95.00%, preferably wherein the panel of one or more CpGs comprises at least five CpGs from DMR 5, and more preferably wherein the cancer index value is the mean β-value for the CpGs denoted by [[CG]] in SEQ ID NO: 505.

24. An assay according to claim 1 or any one of the preceding claims, wherein the step of determining the methylation status of the one or more CpGs in the panel further

comprises or additionally comprises determining the methylation status of each CpG within one or more sequence identified by SEQ ID NOs 809 to 919.

25. An assay according to claim 24, wherein the step of determining the methylation status of the one or more CpGs in the panel comprises determining each CpG within:
    a. SEQ ID NO 809 and/or SEQ ID NO 846 and/or SEQ ID NO 883 and wherein when the cancer index value is about 0.282 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 809 and/or SEQ ID NO 846 and/or SEQ ID NO 883;
    b. SEQ ID NO 809 and/or SEQ ID NO 846 and/or SEQ ID NO 883 and wherein when the cancer index value is less than about 0.282 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 809 and/or SEQ ID NO 846 and/or SEQ ID NO 883;
    c. SEQ ID NO 810 and/or SEQ ID NO 847 and/or SEQ ID NO 884 and wherein when the cancer index value is about 0.212 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 55.00%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 810 and/or SEQ ID NO 847 and/or SEQ ID NO 884;

d. SEQ ID NO 810 and/or SEQ ID NO 847 and/or SEQ ID NO 884 and wherein when the cancer index value is less than about 0.212 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 55.00%, the specificity of the assay is about 100.00%, and the AUC is about 1.00, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 810 and/or SEQ ID NO 847 and/or SEQ ID NO 884;

e. SEQ ID NO 811 and/or SEQ ID NO 848 and/or SEQ ID NO 885 and wherein when the cancer index value is about 0.002 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 90.00%, the specificity of the assay is about 80.00%, and the AUC is about 0.98, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 811 and/or SEQ ID NO 848 and/or SEQ ID NO 885;

f. SEQ ID NO 811 and/or SEQ ID NO 848 and/or SEQ ID NO 885 and wherein when the cancer index value is less than about 0.002 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 90.00%, the specificity of the assay is about 80.00%, and the AUC is about 0.98, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 811 and/or SEQ ID NO 848 and/or SEQ ID NO 885;

g. SEQ ID NO 812 and/or SEQ ID NO 849 and/or SEQ ID NO 886 and wherein when the cancer index value is about 0.026 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 90.00%, and the AUC is about 0.98, preferably wherein the cancer index value is the percent

methylated reference for sequence defined by SEQ ID NO 812 and/or SEQ ID NO 849 and/or SEQ ID NO 886;

h. SEQ ID NO 812 and/or SEQ ID NO 849 and/or SEQ ID NO 886 and wherein when the cancer index value is less than about 0.026 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 90.00%, and the AUC is about 0.98, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 812 and/or SEQ ID NO 849 and/or SEQ ID NO 886;

i. SEQ ID NO 813 and/or SEQ ID NO 850 and/or SEQ ID NO 887 and wherein when the cancer index value is about 0.003 or more the individual is classified as having endometrial cancer or as having a high risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 85.00%, and the AUC is about 0.97, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 813 and/or SEQ ID NO 850 and/or SEQ ID NO 887; and/or

j. SEQ ID NO 813 and/or SEQ ID NO 850 and/or SEQ ID NO 887 and wherein when the cancer index value is less than about 0.003 the individual is classified as not having endometrial cancer or as having a low risk of endometrial cancer development, and wherein the sensitivity of the assay is at least 85.00%, the specificity of the assay is about 85.00%, and the AUC is about 0.97, preferably wherein the cancer index value is the percent methylated reference for sequence defined by SEQ ID NO 813 and/or SEQ ID NO 850 and/or SEQ ID NO 887;

26. An assay according to any one of claims 1 to 25, wherein the step of determining in the population of DNA molecules in the sample the methylation status of each CpG in the panel of one or more CpGs comprises:

a. performing a sequencing step to determine the sequence of each CpG;
b. hybridising DNA to an array comprising probes capable of discriminating between methylated and non-methylated forms of the CpGs and applying a detection system to the array so as to determine the methylation status of each CpG; and/or
c. performing a PCR step using methylation-specific primers, wherein the methylation status of the CpG is determined by the presence or absence of a PCR product.

27. An assay according to any one of claims 1 to 26, wherein the step of determining the methylation status of each CpG in the panel of one or more CpGs comprises:
a. bisulphite converting the DNA; or
b. performing the steps of oxidising 5-methylcytosine bases (5mC) to 5-carboxylcytosine bases (5caC), preferably by ten-eleven translocation (TET), and/or oxidising 5-hydroxymethylcytosine bases (5hmC) to 5-carboxylcytosine bases (5caC), preferably by ten-eleven translocation (TET); followed by reducing 5-carboxylcytosine bases (5caC) to dihydrouracil bases (DHU), optionally with pyridine borane.

28. A method of treating or preventing cancer in an individual, the method comprising:
a. assessing the cancer status of the individual by assessing the presence, absence or development of cancer in the individual by performing the assay of any one of claims 1 to 27;
b. administering one or more therapeutic or preventative treatments to the individual based on the assessment.

29. A method according to claim 28, wherein the individual is assessed as not having cancer and/or CIN3 or as having a low risk of cancer and/or CIN3 development, and wherein the cancer index value is about -0.660 or more and less than about -0.430, and preferably wherein the assay comprises determining methylation β-values for

each CpG in the panel of one or more CpGs, the individual is subjected to one or more treatments according to their cancer index value, the one or more treatments comprise:

a. a transvaginal ultrasound to assess endometrium and ovaries;
b. a repeat assay according to any one of claims 1 to 27, preferably wherein the repeat assay is performed about two years after the previous assay.

30. A method according to claim 28, wherein the individual is assessed as having a moderate risk of having cancer and/or CIN3 or as having a moderate risk of cancer and/or CIN3 development, and wherein the cancer index value is about -0.430 or more and less than about -0.230, and preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, the individual is subjected to one or more treatments according to their cancer index value, the one or more treatments comprise any of:

a. a transvaginal ultrasound to assess endometrium and ovaries;
b. intensified screening, preferably wherein the intensified screening comprises one or more of:
    i. a colposcopy;
    ii. a HPV test;
    iii. a cervical cytology test;
    iv. a test for CA125, preferably wherein the test is repeated six-monthly;
    v. a test for cell-free tumour DNA methylation in plasma/serum, preferably wherein the test is repeated annually;
    vi. a test for cell-free tumour DNA methylation in vaginal fluid, preferably wherein the test is repeated annually
    vii. a pelvic MRI scan, preferably wherein the individual being subjected to the pelvic MRI scan is post-menopausal, and preferably wherein the scan is repeated annually;

viii. a repeat assay according to any one of claims 1 to 27, preferably wherein the repeat assay is performed about one year after the previous assay

c. administration of one or more of progestogens, particularly wherein the progestogens are delivered locally or systemically, Aspirin, Metformin, aromatase-inhibitors, weight-loss regimen.

31. A method according to claim 30 wherein, when the colposcopy, HPV and cytology tests are negative, the intensified screening further comprises a hysteroscopy and endocervical and endometrial biopsy.

32. A method according to claim 31 wherein, when the transvaginal ultrasound and intensified screening are both negative:
    a. the transvaginal ultrasound, the test for CA125, the test for cell-free tumour DNA methylation in plasma/serum, and the test for cell-free tumour DNA methylation in vaginal fluid is repeated about six months after the previous assay; and
    b. the colposcopy, the HPV test, and the cervical cytology test, is repeated about one year after the previous assay.

33. A method according to claim 28, wherein the individual is assessed as having cancer and/or CIN3 or as having a high risk of cancer and/or CIN3 development, and wherein the cancer index value is about -0.230 or more, and preferably wherein the assay comprises determining methylation β-values for each CpG in the panel of one or more CpGs, the individual is subjected to one or more treatments according to their cancer index value, the one or more treatments comprise any of:
    a. a transvaginal ultrasound to assess endometrium and ovaries;
    b. intensified screening, preferably wherein the intensified screening comprises one or more of:
        i. a colposcopy;

ii. a HPV test;
iii. a cervical cytology test;
iv. a test for CA125, preferably wherein the test is repeated six-monthly;
v. a test for cell-free tumour DNA methylation in plasma/serum, preferably wherein the test is repeated annually;
vi. a test for cell-free tumour DNA methylation in vaginal fluid, preferably wherein the test is repeated annually
vii. a pelvic MRI scan, preferably wherein the individual being subjected to the pelvic MRI scan is post-menopausal, and preferably wherein the scan is repeated annually;
viii. a repeat assay according to any one of claims 1 to 27, preferably wherein the repeat assay is performed about one year after the previous assay;

c. administration of one or more of progestogens, particularly wherein the progestogens are delivered locally or systemically, Aspirin, Metformin, aromatase-inhibitors, weight-loss regimen;
d. a total hysterectomy and bilateral salpingo-oophorectomy.

34. A method according to claim 33 wherein, when the colposcopy, HPV and cytology tests are negative, the intensified screening further comprises a hysteroscopy and endocervical and endometrial biopsy.

35. A method according to claim 34 wherein, when the transvaginal ultrasound and intensified screening are both negative:
a. the transvaginal ultrasound, the test for CA125, the test for cell-free tumour DNA methylation in plasma/serum, the test for cell-free tumour DNA methylation in vaginal fluid, the colposcopy, the HPV test, and the cervical cytology test is repeated about six months after the previous assay; and
b. the pelvic MRI scan is repeated about one year after the previous assay.

36. A method according to any one of claims 33 to 35, wherein the progestogens are delivered locally via an intrauterine device.

37. A method according to any one of claims 28 to 36, wherein the one or more treatments that the individual is subjected to are repeated on a monthly, three monthly, six monthly, yearly or two yearly basis following an initial administration.

38. A method of monitoring the cancer status of an individual according to the individual's cancer index value, the method comprising: (a) assessing the presence, absence or development of cancer in an individual by performing the assay according to any one of claims 1 to 27 at a first time point; (b) assessing the presence, absence or development of cancer in the individual by performing the assay according to any one of claims 1 to 27 at one or more further time points; and (c) monitoring any change in the cancer index value and/or cancer status and/or CIN3 status of the individual between time points.

39. A method according to claim 38, wherein the further time points are monthly, three monthly, six monthly, yearly or two yearly basis following an initial assessment.

40. A method according to claim 38 or 39 wherein depending on the cancer index value and/or cancer status and/or CIN3 status of the individual, one or more treatments are administered to the individual according to any one of claims 28 to 35, or when the cancer index value of the individual is less than about -0.660 no treatment is administered to the individual.

41. A method according to any one of claims 38 to 40, wherein an increase in the cancer index value indicates a negative response to the one or more treatments.

42. A method according to claim 41, wherein changes are made to the one or more treatments if a negative response is identified.

43. A method according to any one of claims 38 to 40, wherein a decrease in the cancer index value indicates a positive response to the one or more treatments.

44. A method according to claim 43, wherein changes are made to the one or more treatments if a positive response is identified.

45. An assay according to any one of the preceding claims, wherein the sample is obtained from a tissue comprising epithelial cells, preferably wherein the sample is not obtained from ovarian or endometrial tissue.

46. An assay according to claim 45, wherein the sample is obtained from:
    a. cervical tissue;
    b. vaginal tissue;
    c. cervicovaginal tissue;
    d. buccal tissue;

preferably wherein the sample is obtained from cervical tissue, most preferably wherein the sample is obtained from tissue from a cervical smear, and optionally wherein the sample is self-collected.

47. An assay according to any one of the preceding claims, wherein the assay is for assessing the presence, absence or development of:
    a. endometrial cancer, preferably wherein the endometrial cancer is an endometriod cancer, uterine carcinosarcoma, squamous cell carcinoma, small cell carcinoma, transitional carcinoma, serous carcinoma, clear-cell carcinoma, mucinous adenocarcinoma, undifferentiated carcinoma, dedifferentiated carcinoma or serous adenocarcinoma;
    b. ovarian cancer, particularly wherein the ovarian cancer is serious carcinoma, mucinous carcinoma, endometrioid carcinoma, clear cell carcinoma, lop malignant potential (LMP) tumor, borderline epithelial ovarian cancer, teratoma, dysgerminoma, endodermal sinus tumor, Choriocarcinoma,

granulosa-theca tumor, Sertoli-Leydig tumor, granulosa cell tumor, small cell carcinoma of the ovary or primary peritoneal carcinoma;

c. grade 3 cervical epithelial neoplasia (CIN3) and/or cervical cancer, particularly wherein the cervical cancer is squamous cell cancer, an adenocarcinoma or an adenosquamous carcinoma.

48. An array capable of discriminating between methylated and non-methylated forms of CpGs; the array comprising oligonucleotide probes specific for a methylated form of each CpG in a CpG panel and oligonucleotide probes specific for a non-methylated form of each CpG in the panel; wherein the panel consists of at least 50 CpGs selected from the CpGs identified in SEQ ID NOs 1 to 500 and identified at nucleotide positions 61 to 62, and identified in SEQ ID NOs 501 to 808 and denoted by CG.

49. An array according to claim 48, provided that the array is not an Infinium MethylationEPIC BeadChip array or an Infinium HumanMethylation450, and/or provided that the number of CpG-specific oligonucleotide probes of the array is 482,000 or less, 480,000 or less, 450,000 or less, 440,000 or less, 430,000 or less, 420,000 or less, 410,000 or less, or 400,000 or less.

50. An array according to claim 48 or 49, wherein the panel comprises any panel of CpGs defined in the assays of any one of claims 1 to 27.

51. An array according to any one of claims 48 to 50, further comprising one or more oligonucleotides comprising any set of CpGs defined in the assays of any one of claims 1 to 27, wherein the one or more oligonucleotides are hybridized to corresponding oligonucleotide probes of the array.

52. A hybridized array, wherein the array is obtainable by hybridizing to an array according to any one of claims 48 to 50 a group of oligonucleotides comprising any panel of CpGs defined in the assays of any one of claims 1 to 27.

53. A process for making the hybridized array according to claim 52, comprising contacting an array according to claims 45 to 48 with a group of oligonucleotides comprising any panel of CpGs defined in the assays of any one of claims 1 to 27.

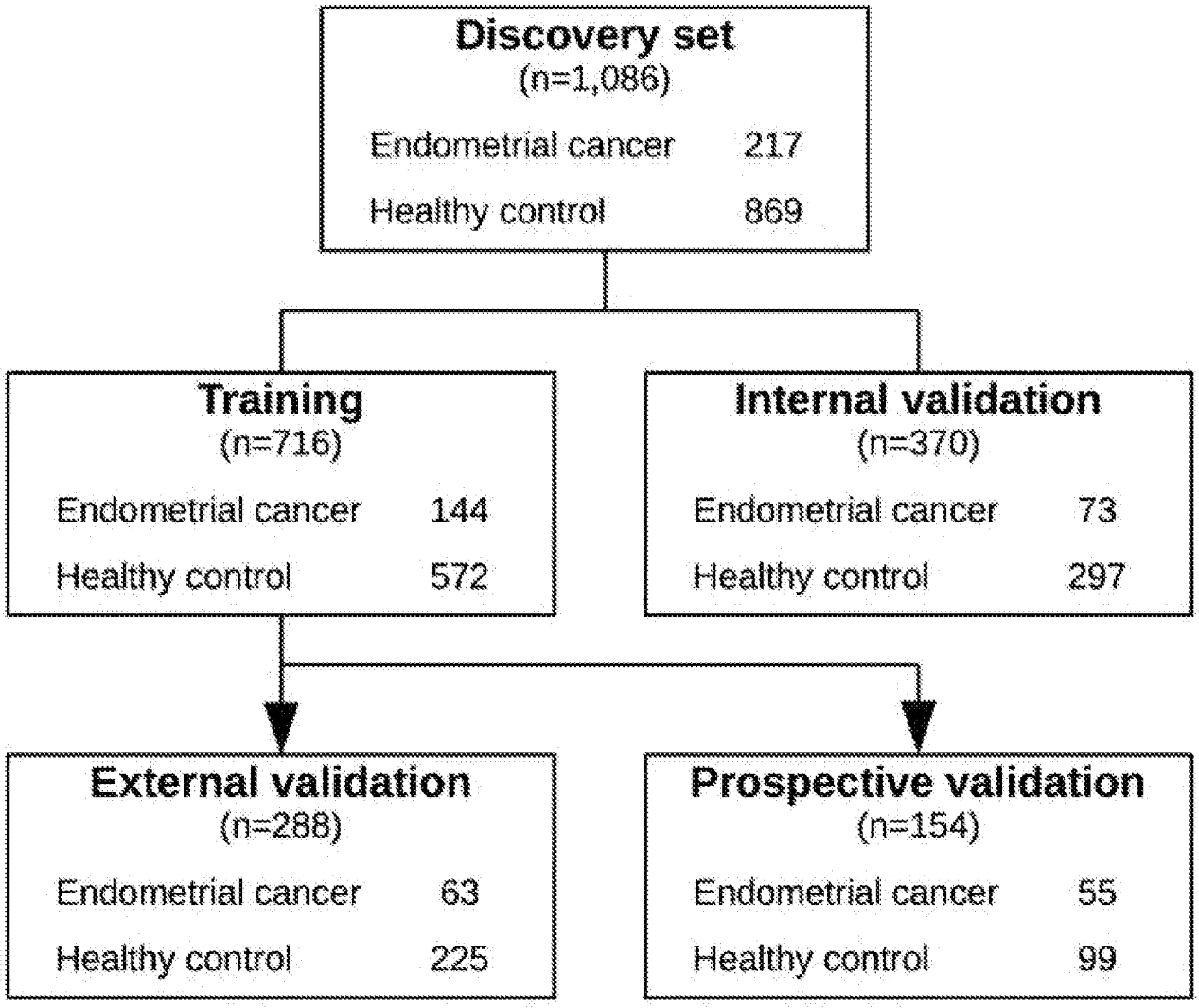
Discovery set
(n=1,086)
Endometrial cancer 217
Healthy control 869
Training
(n=716)
Endometrial cancer 144
Healthy control 572
Internal validation
(n=370)
Endometrial cancer 73
Healthy control 297
External validation
(n=288)
Endometrial cancer 63
Healthy control 225
Prospective validation
(n=154)
Endometrial cancer 55
Healthy control 99

Figure 1

A

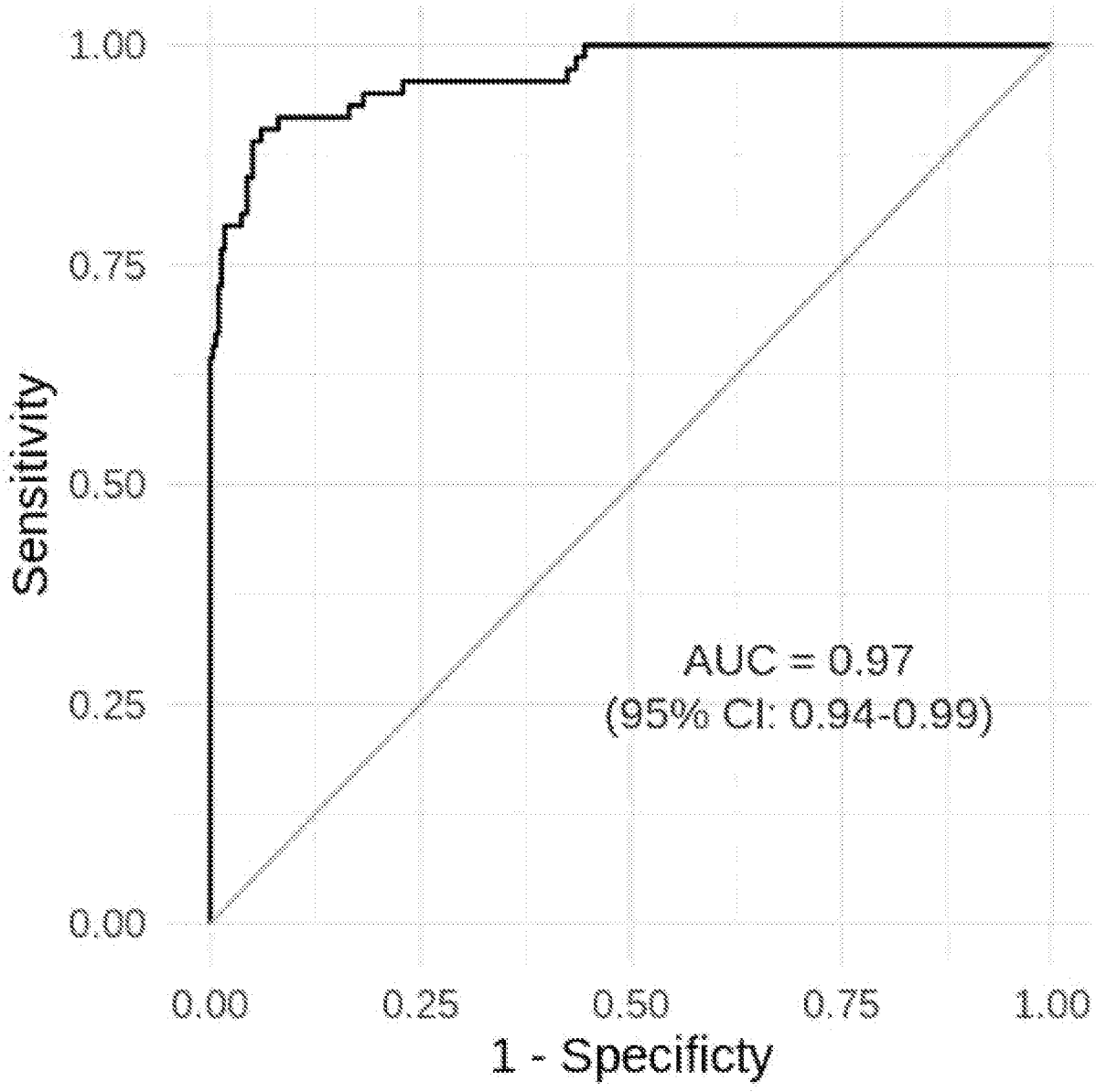
1.00
0.75
0.50
0.25
0.00
Sensitivity
AUC = 0.97
(95% CI: 0.94-0.99)
0.00
0.25
0.50
0.75
1.00
1 - Specificty

Figure 2

B

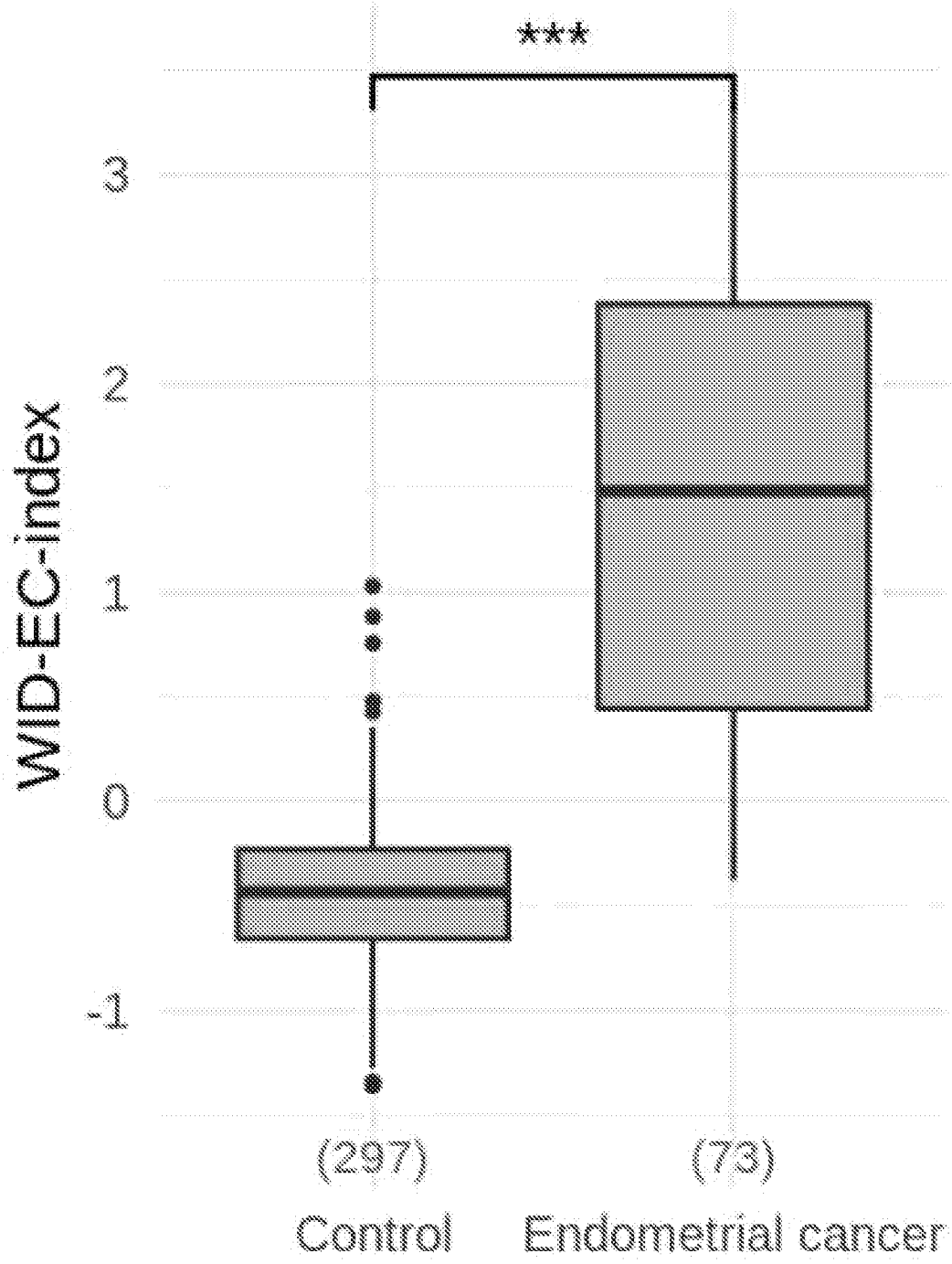

Figure 2 Continued

A

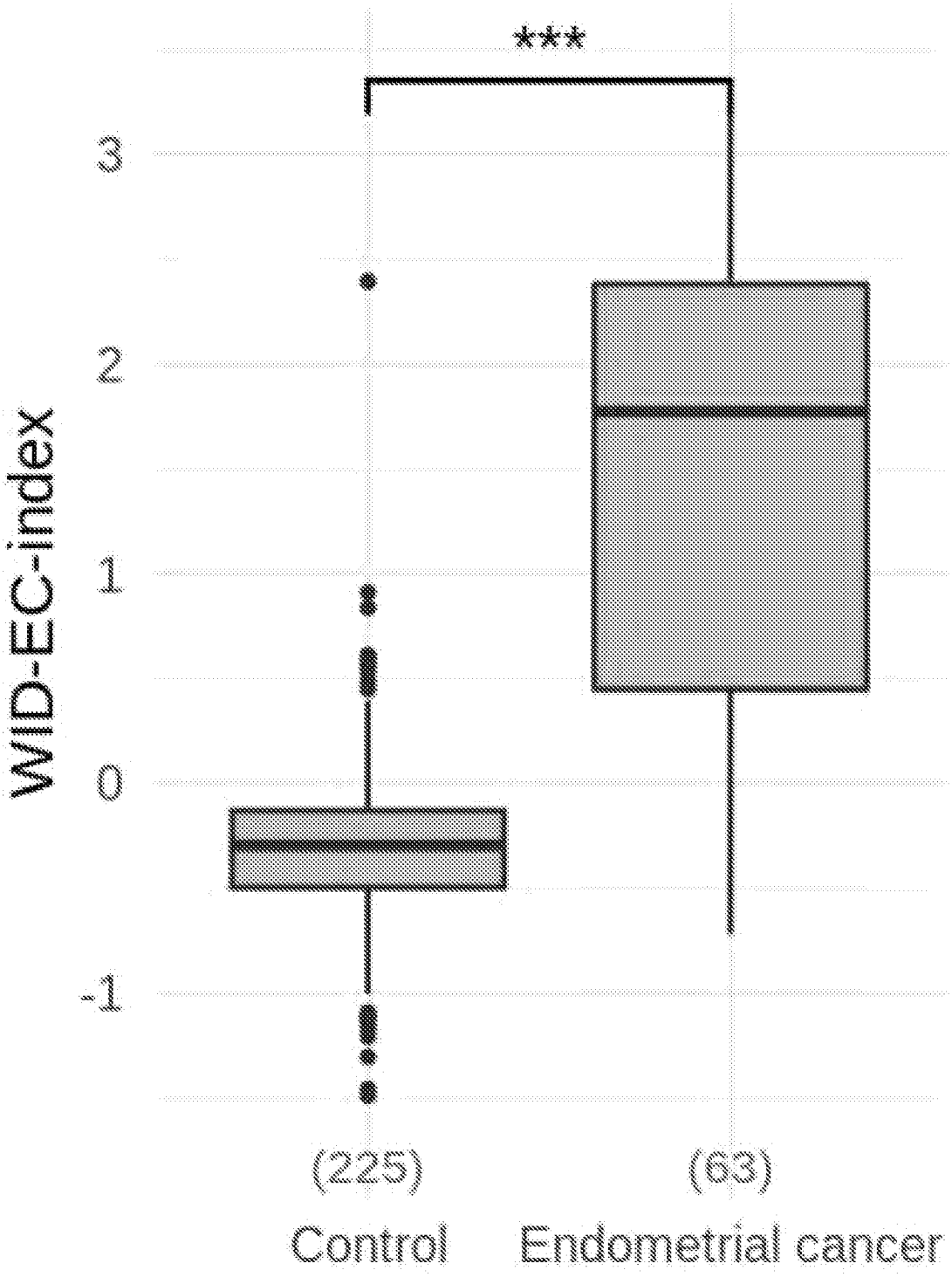

Figure 3

B

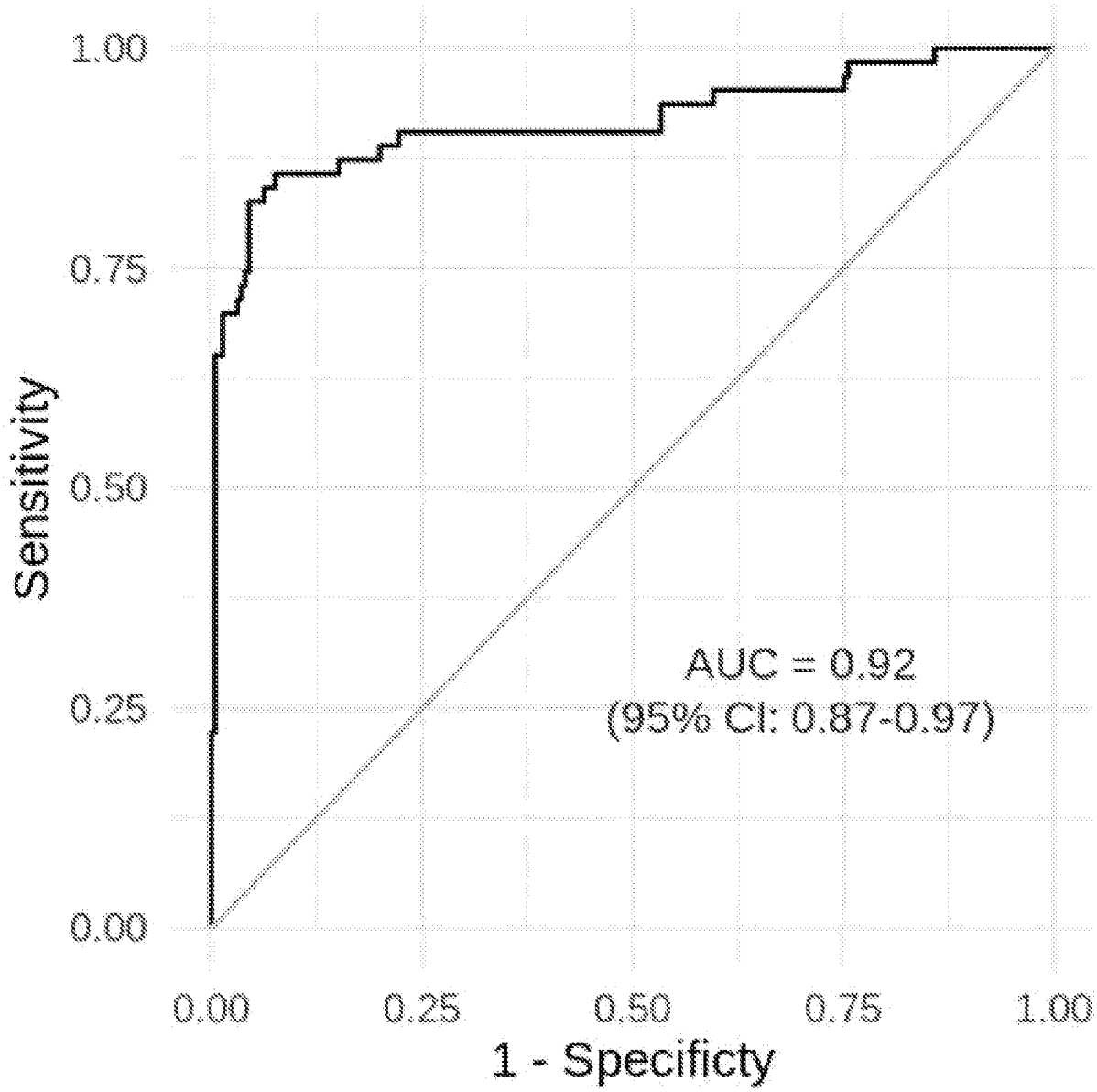

Figure 3 Continued

C

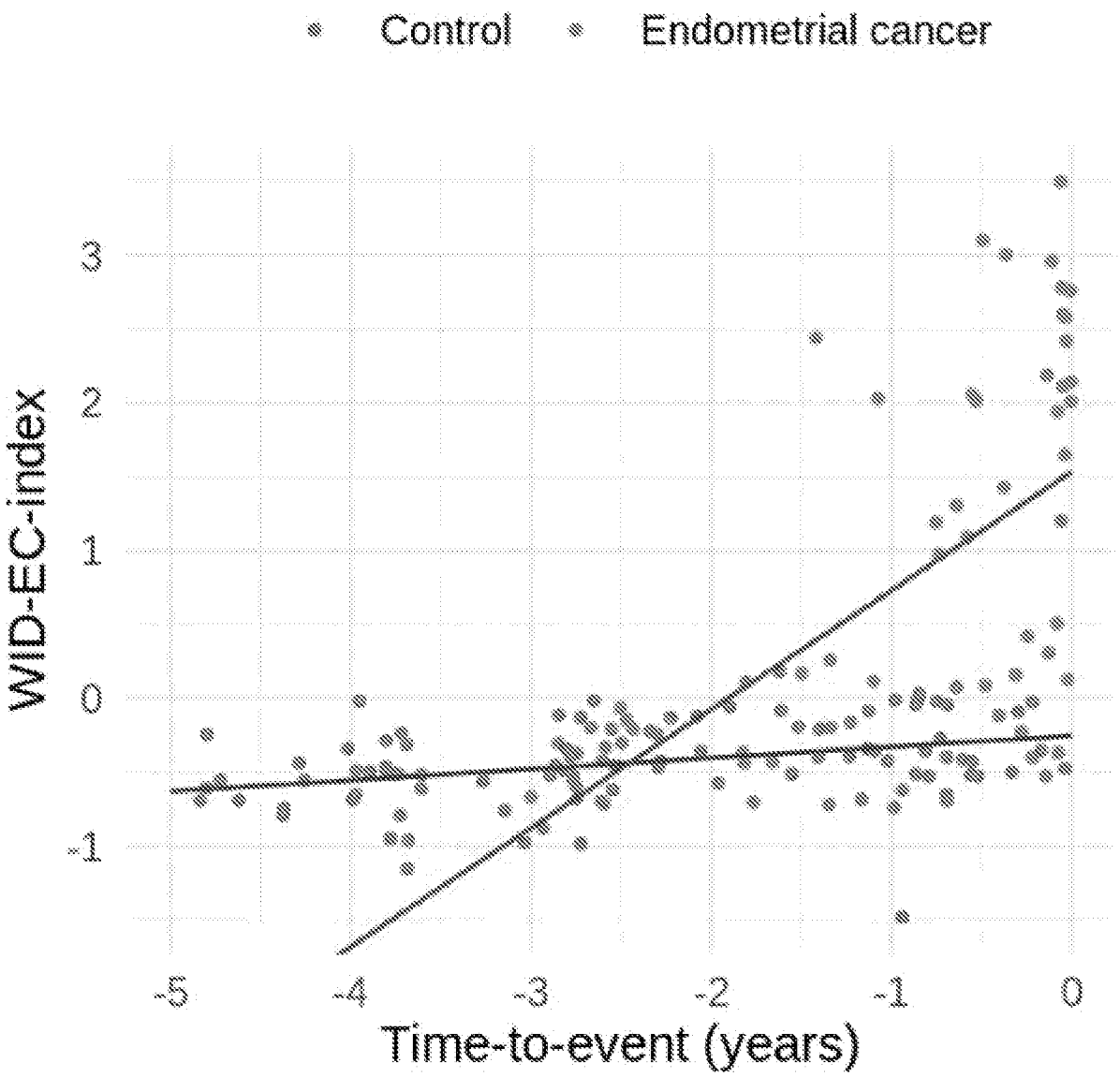

Figure 3 Continued

D

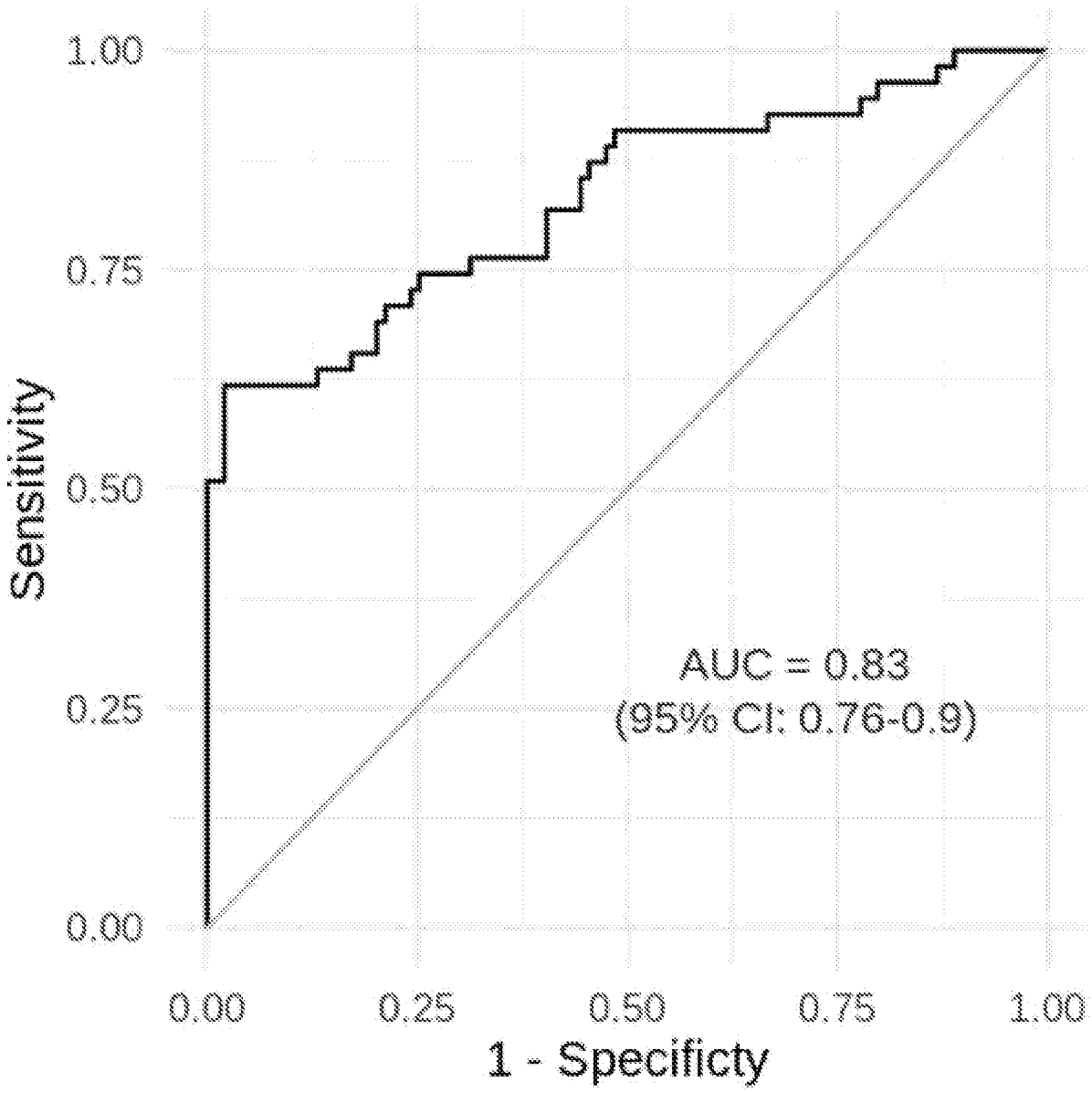

Figure 3 Continued

A

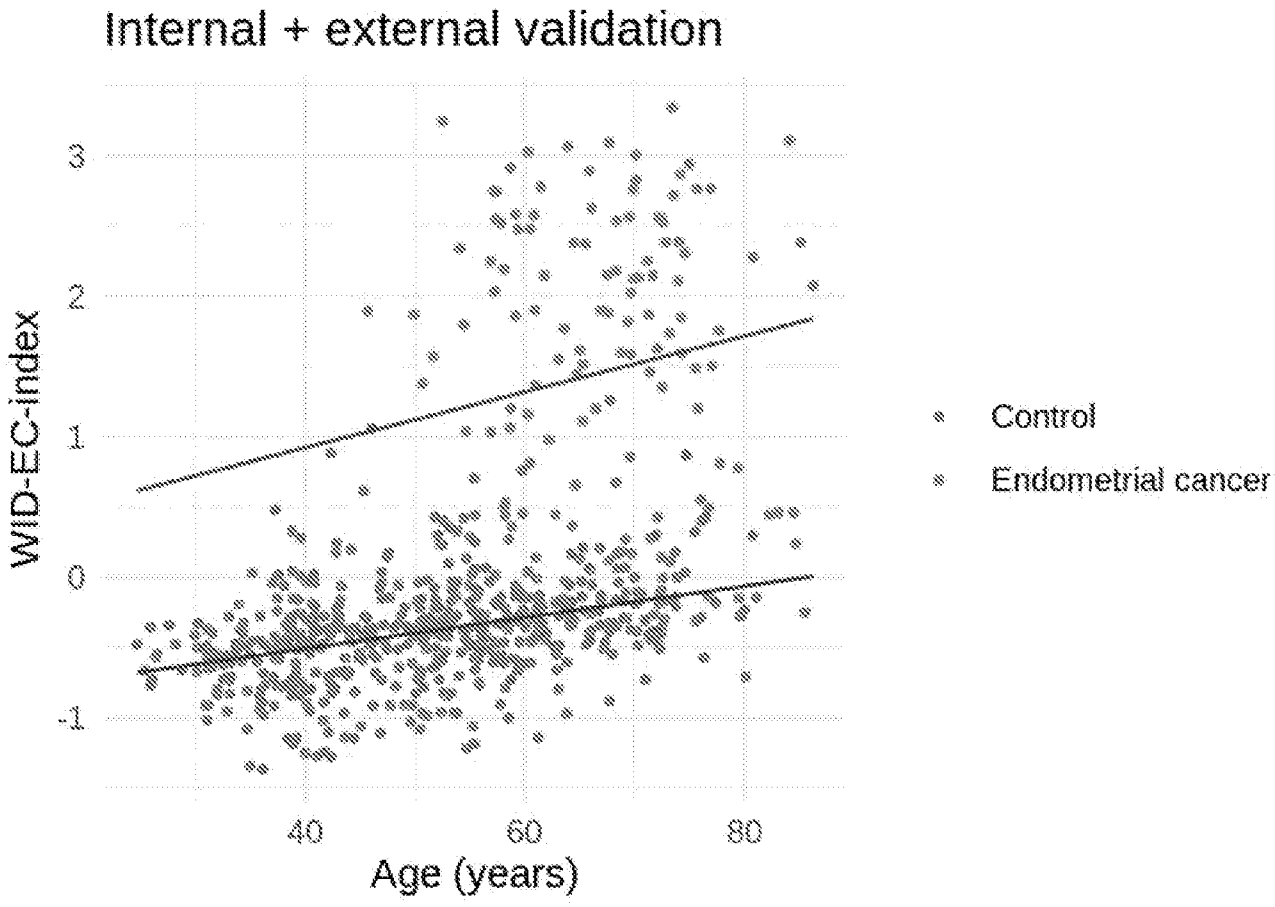
Internal + external validation
WID-EC-index
3
2
1
0
-1
40
60
80
Age (years)
Control
Endometrial cancer

Figure 4

B

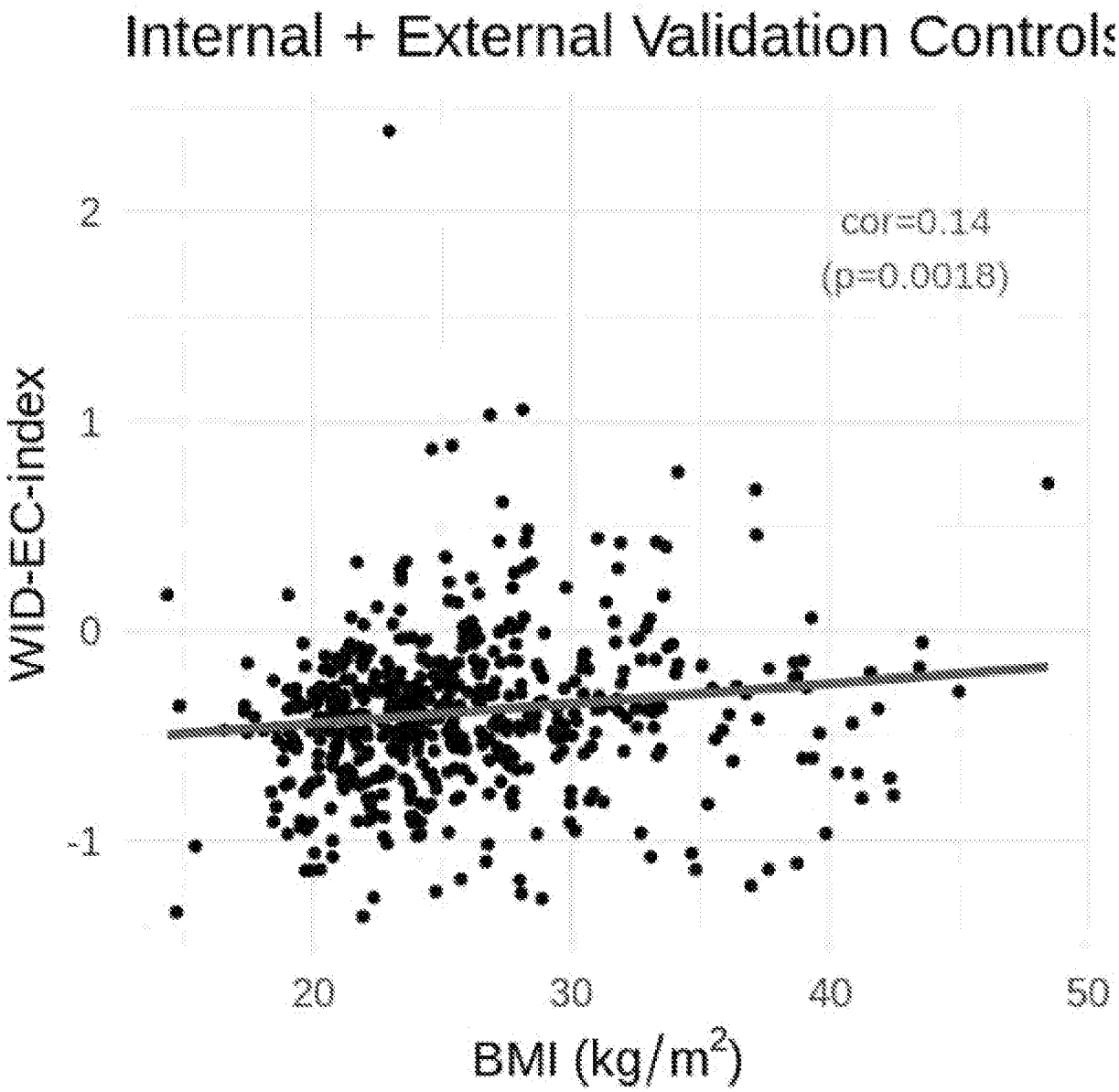

Figure 4 Continued

C

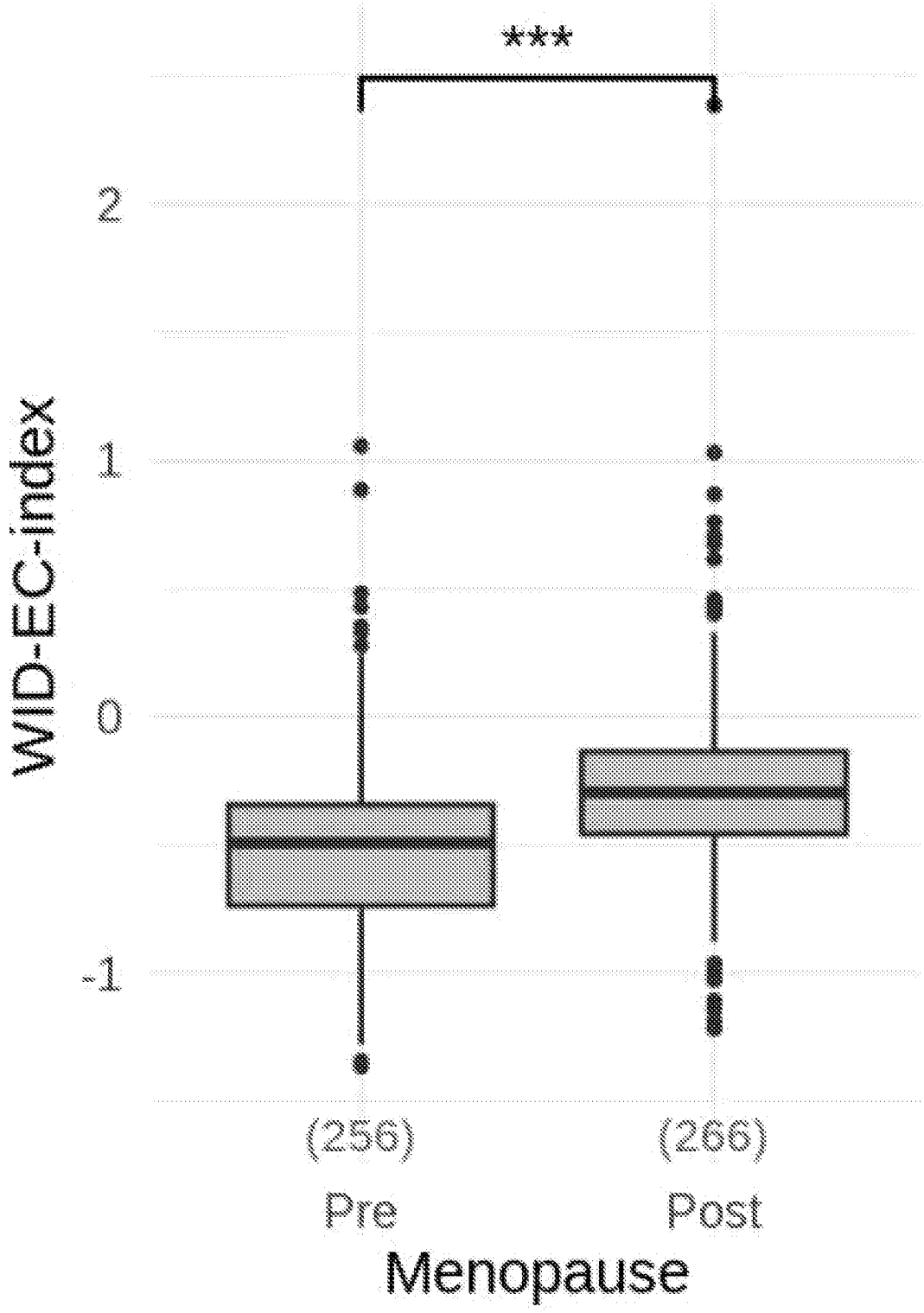

Figure 4 Continued

D

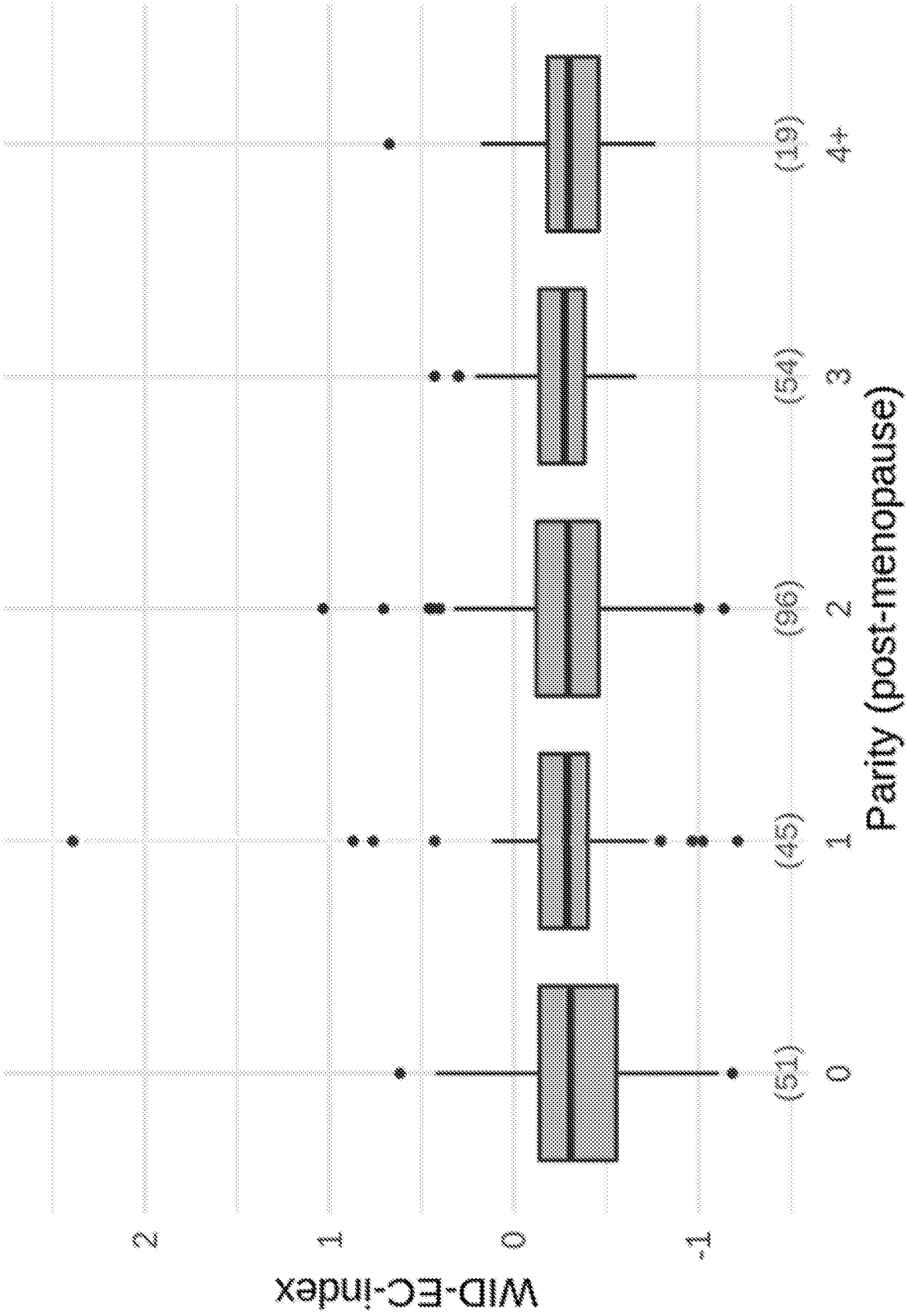

Figure 4 Continued

E

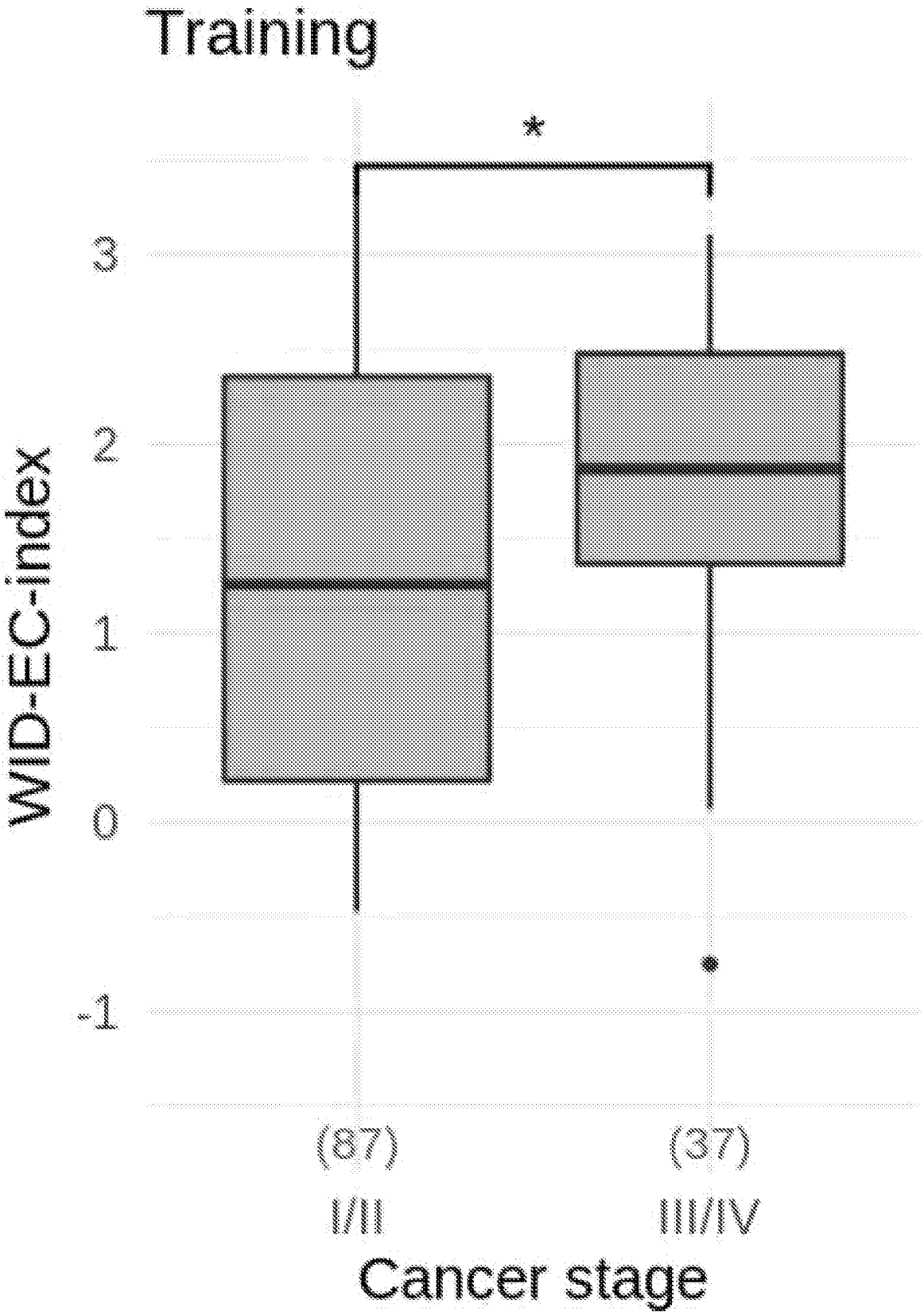

Figure 4 Continued

F

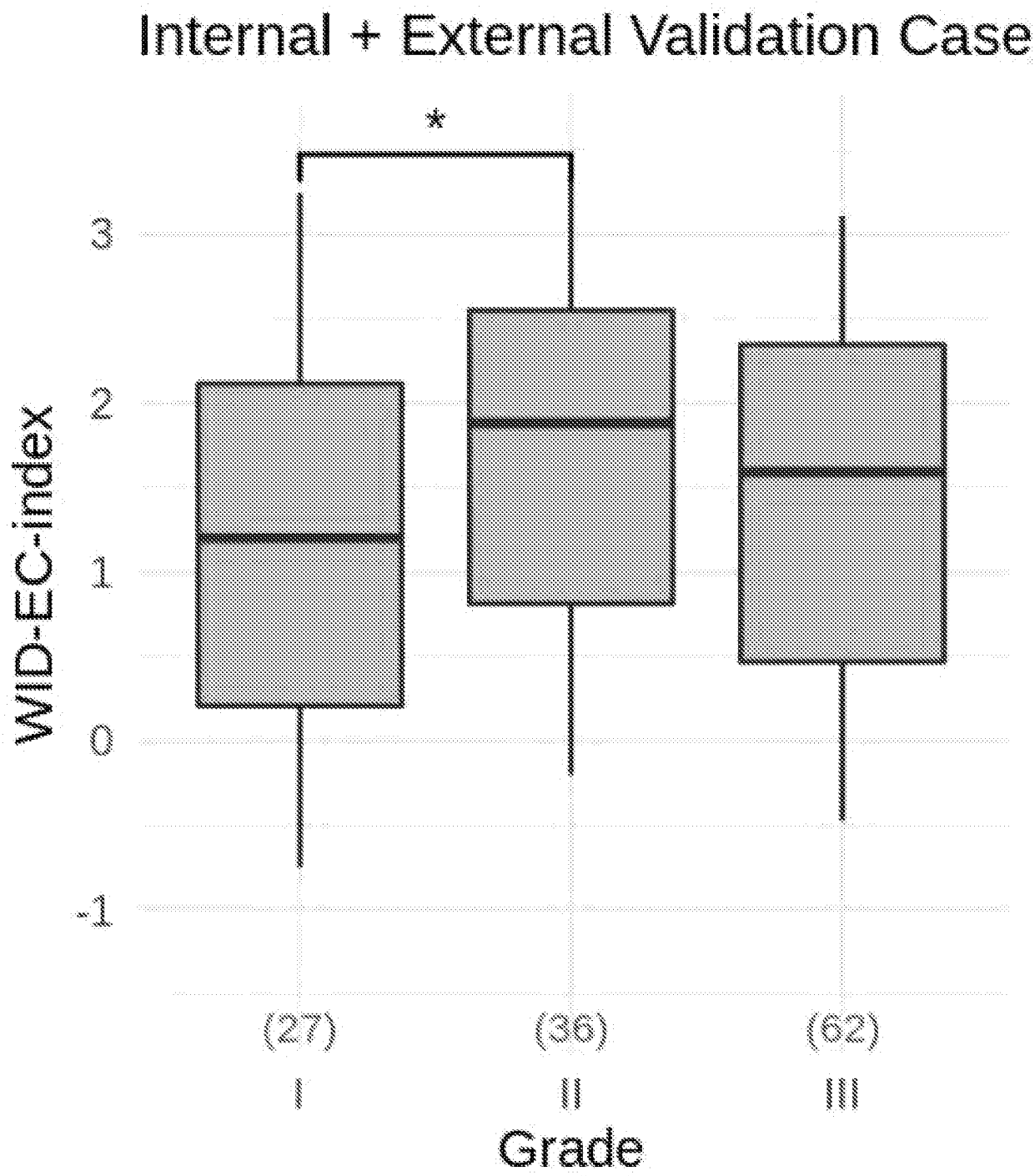

Figure 4 Continued

G

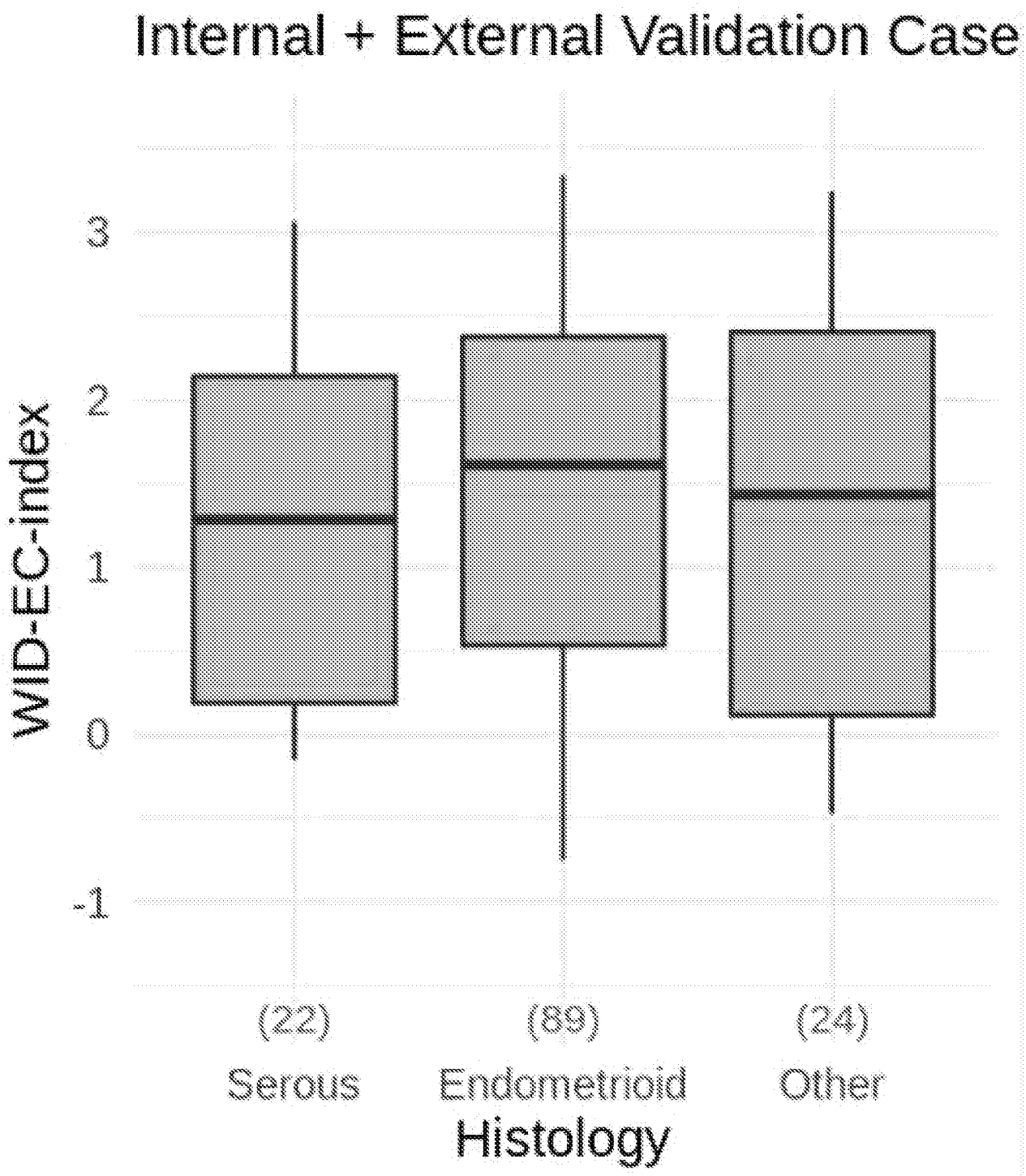

Figure 4 Continued

A

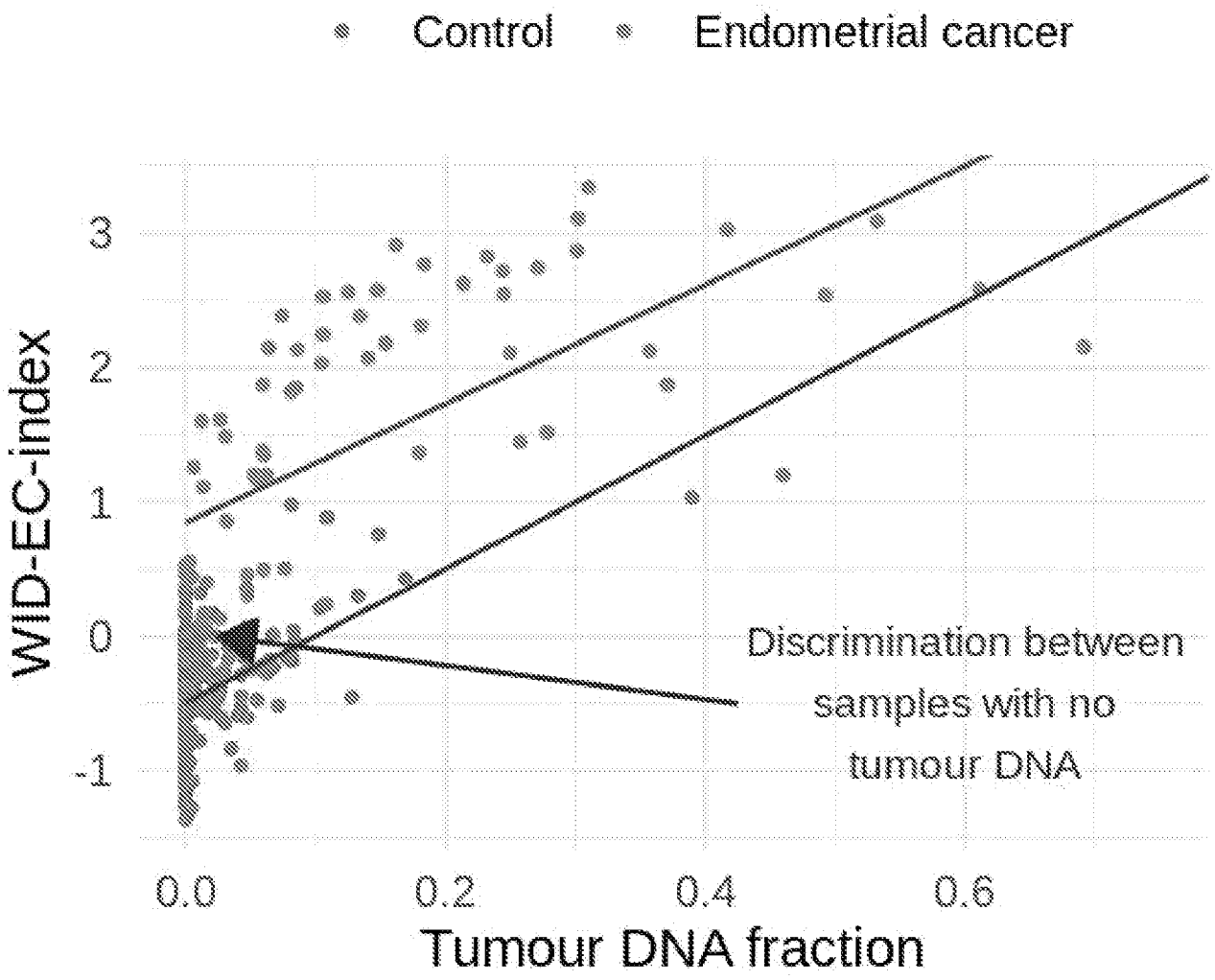
Control
Endometrial cancer
WID-EC-index
3
2
1
0
-1
0.0
0.2
0.4
0.6
Tumour DNA fraction
Discrimination between samples with no tumour DNA

Figure 5

B

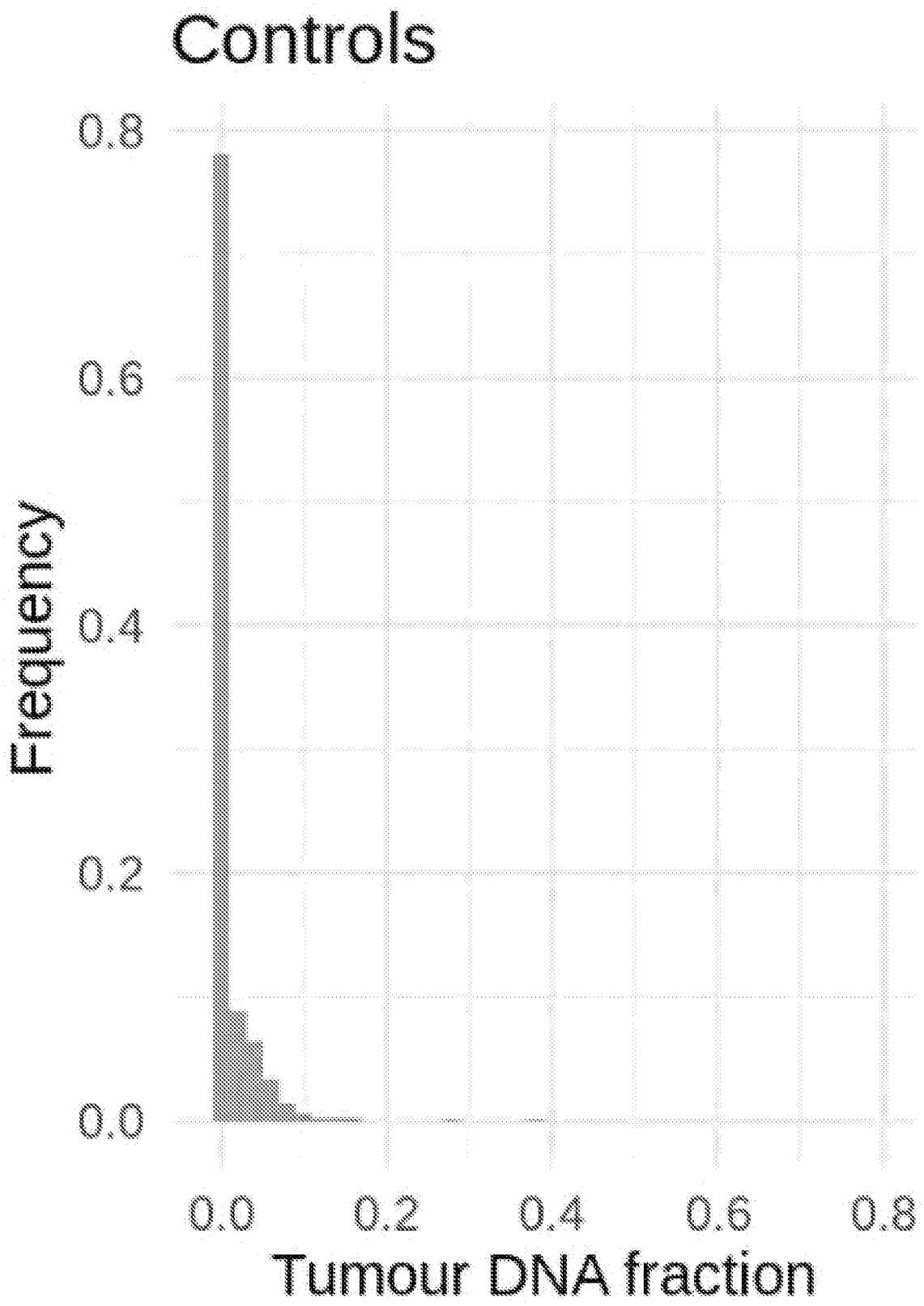

Figure 5 Continued

C

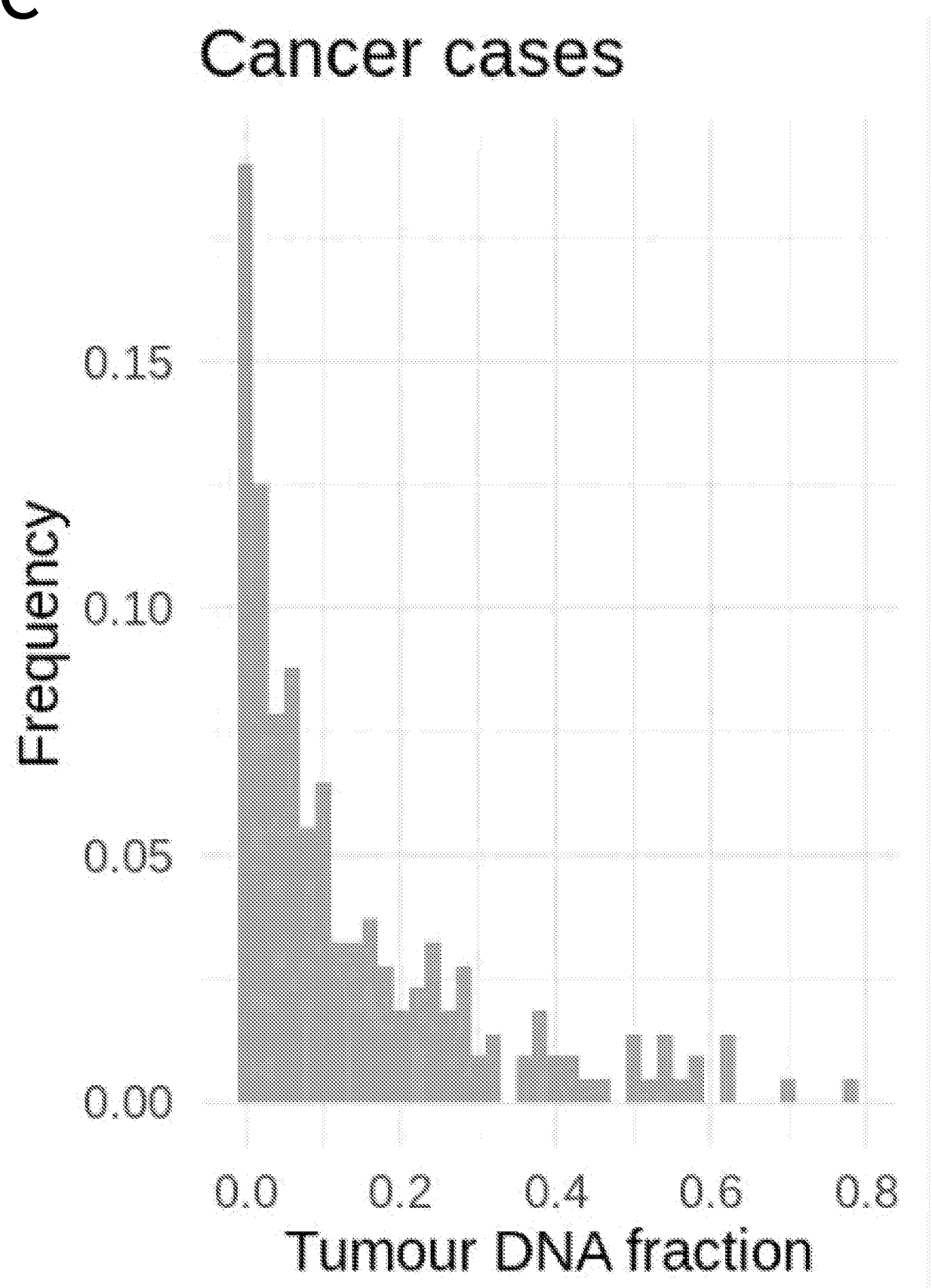

Figure 5 Continued

A

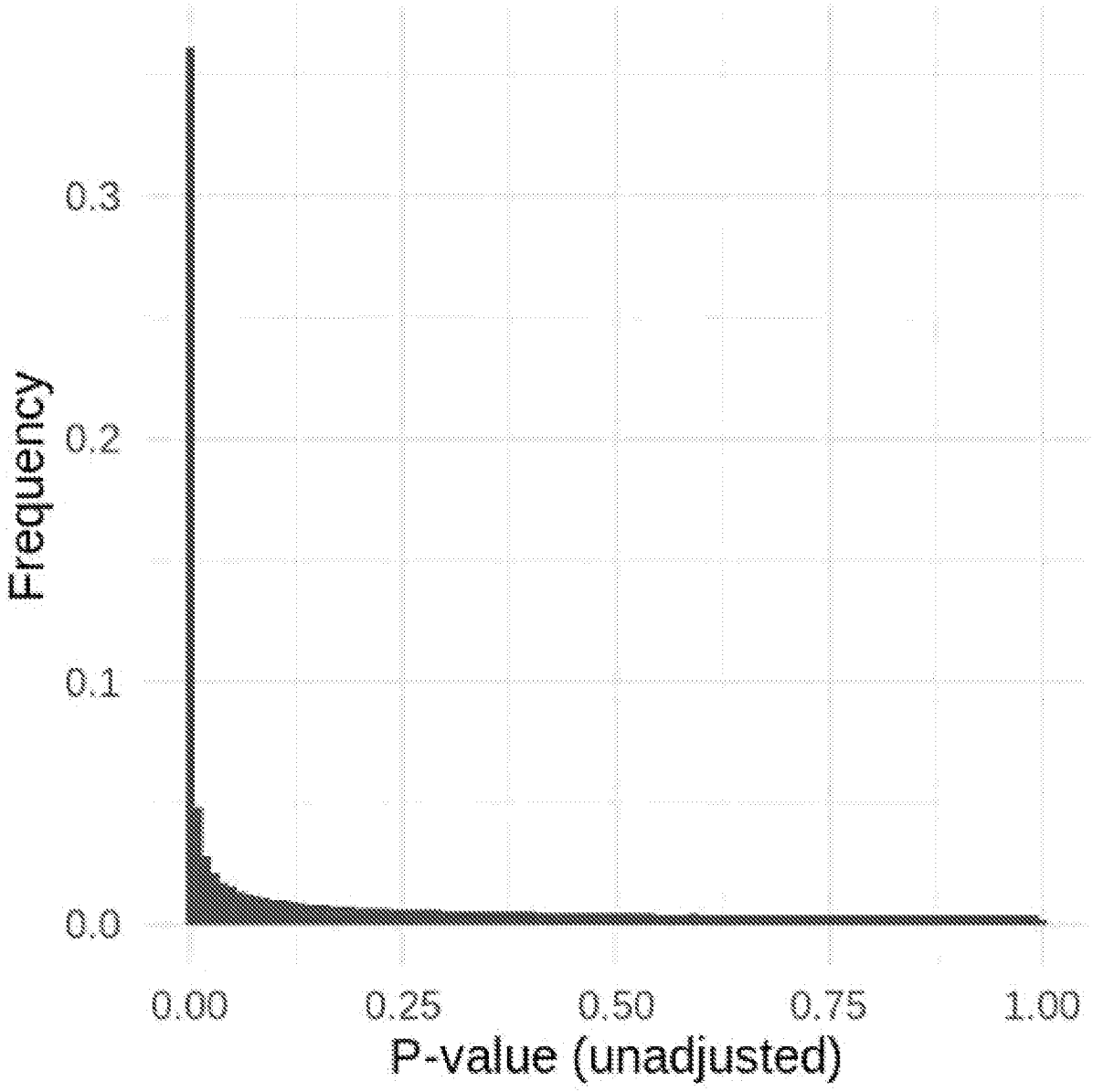

Figure 6

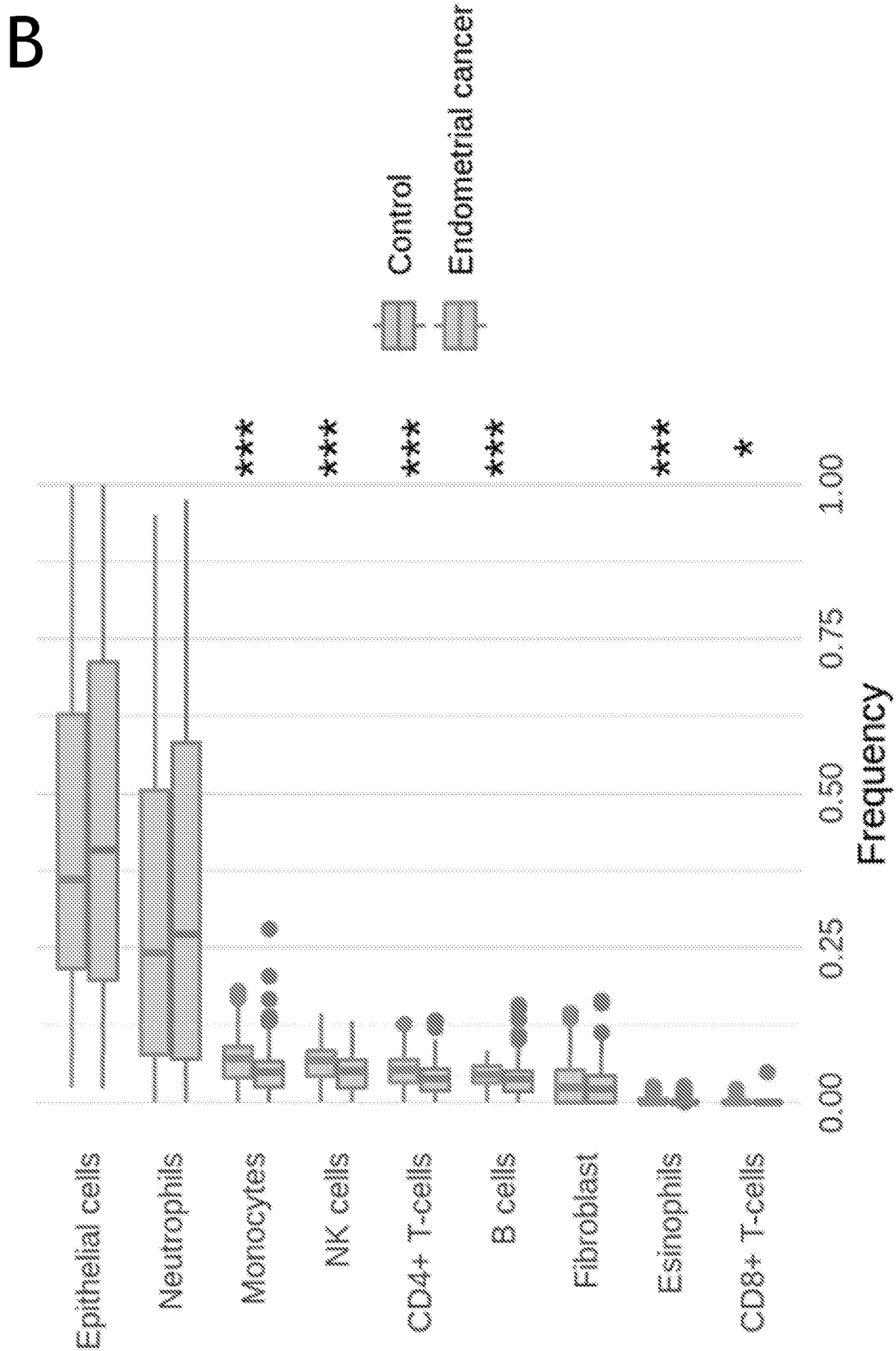

Figure 6 Continued

C

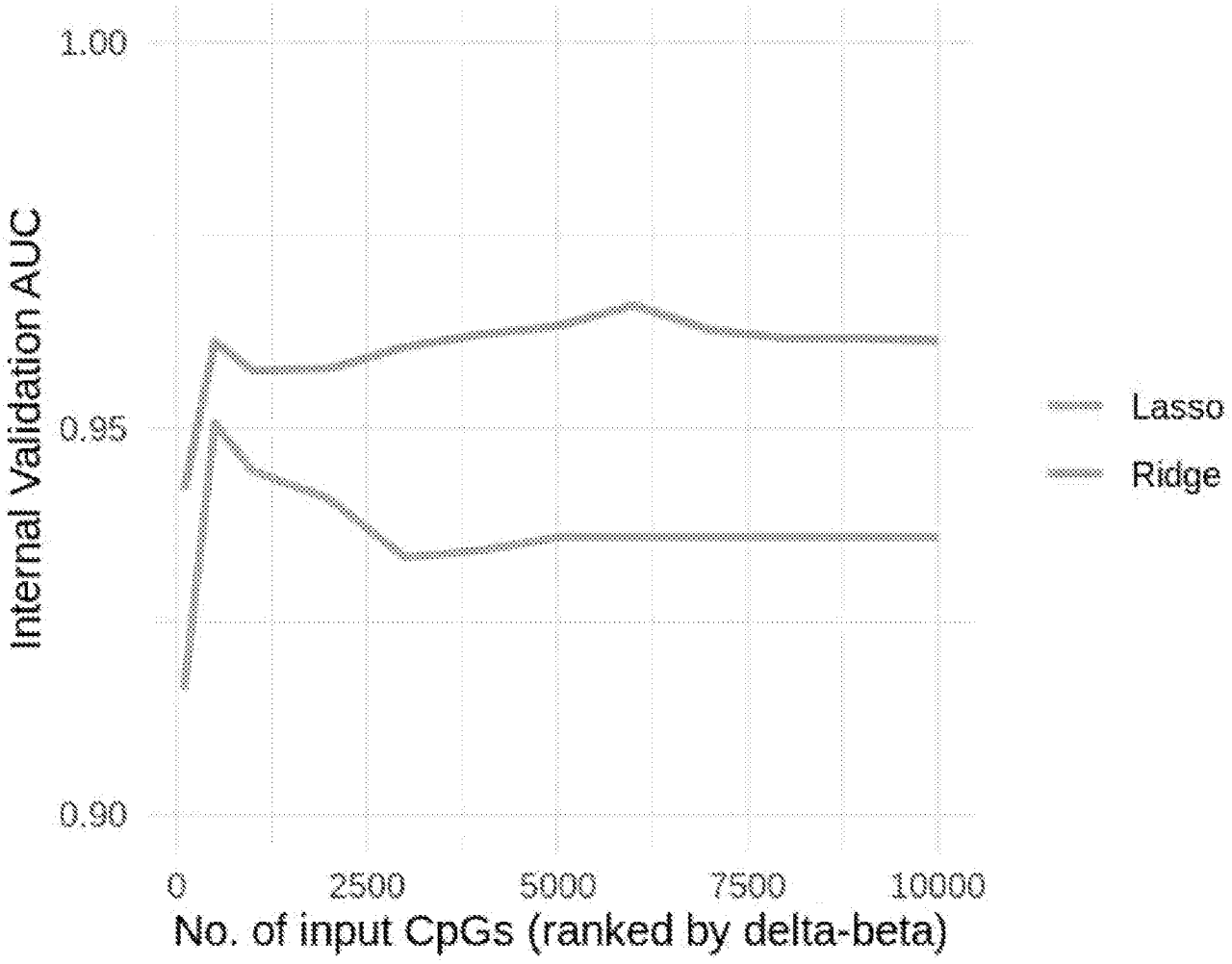

Figure 6 Continued

D

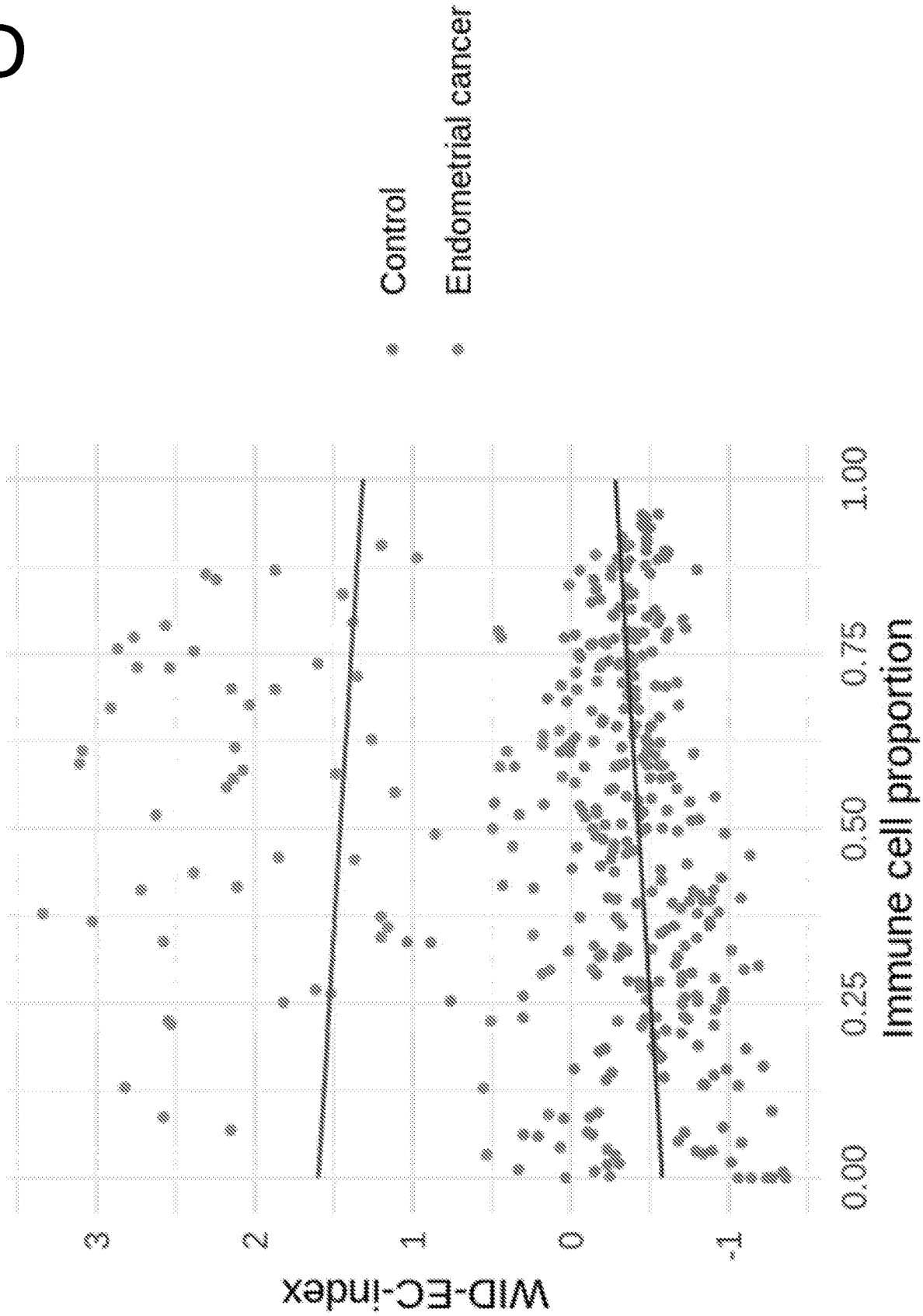

Figure 6 Continued

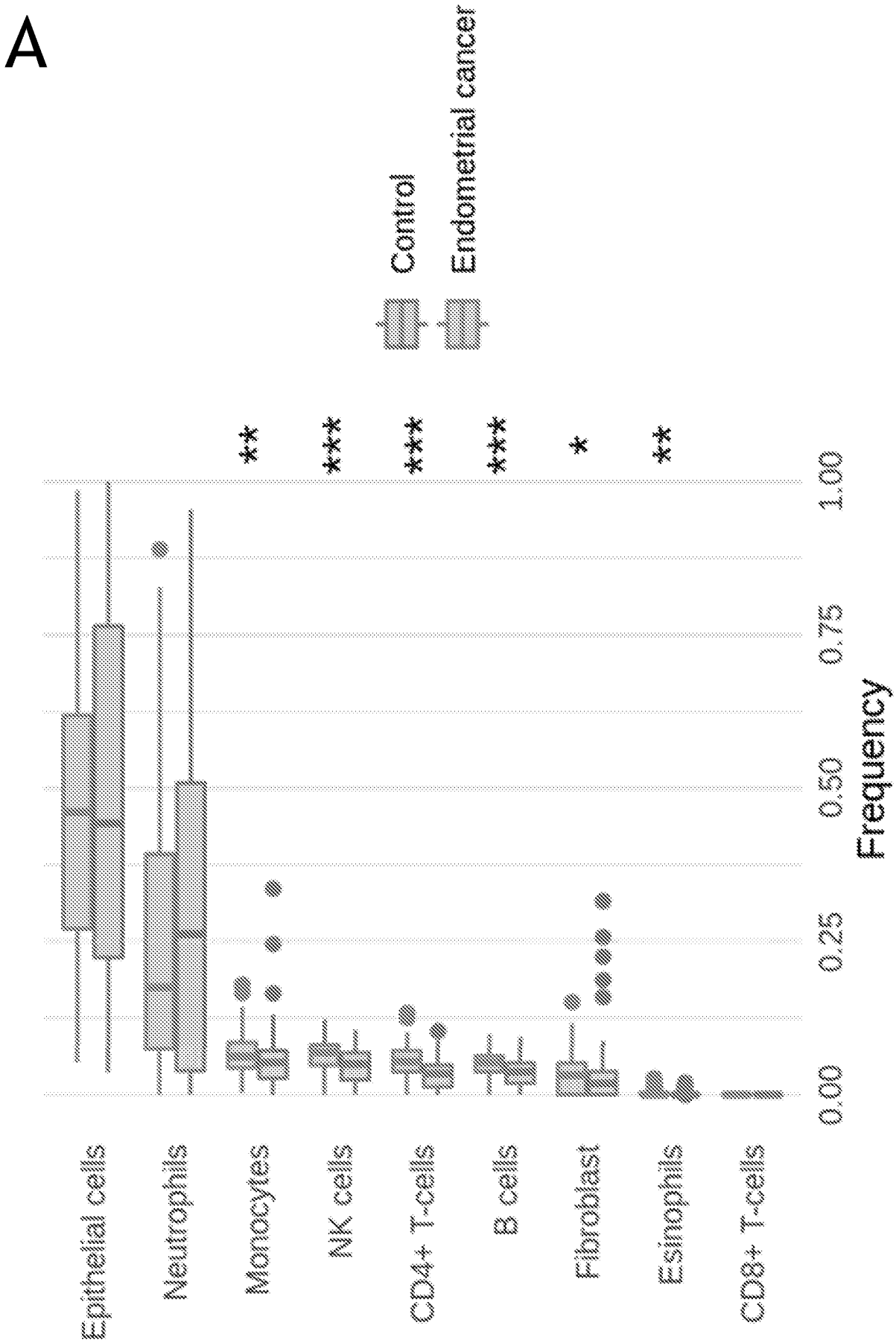
A
Control
Endometrial cancer
Epithelial cells
Neutrophils
Monocytes
NK cells
CD4+ T-cells
B cells
Fibroblast
Esinophils
CD8+ T-cells
**
***
***
***
*
**
0.00
0.25
0.50
0.75
1.00
Frequency

Figure 7

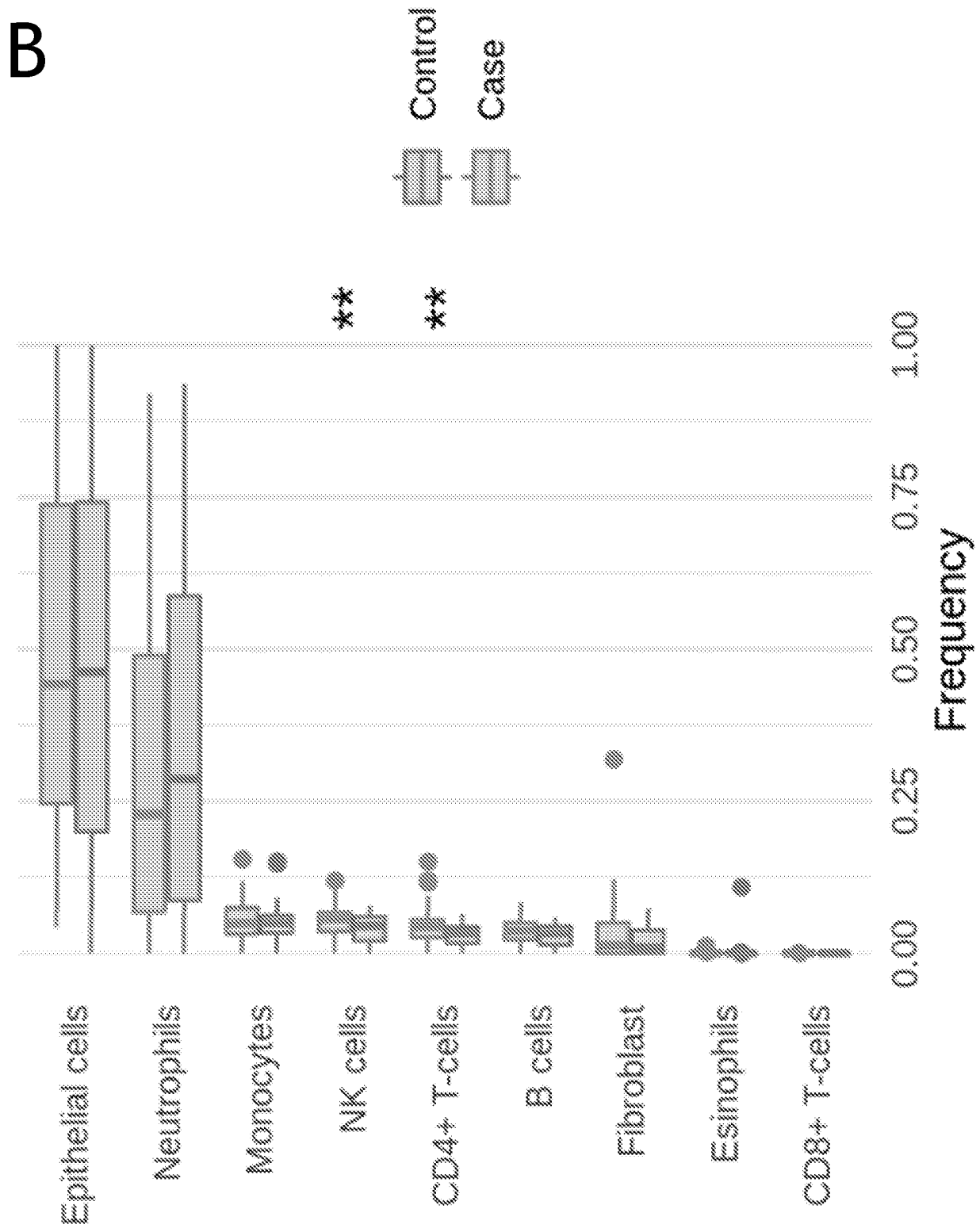

Figure 7 Continued

C

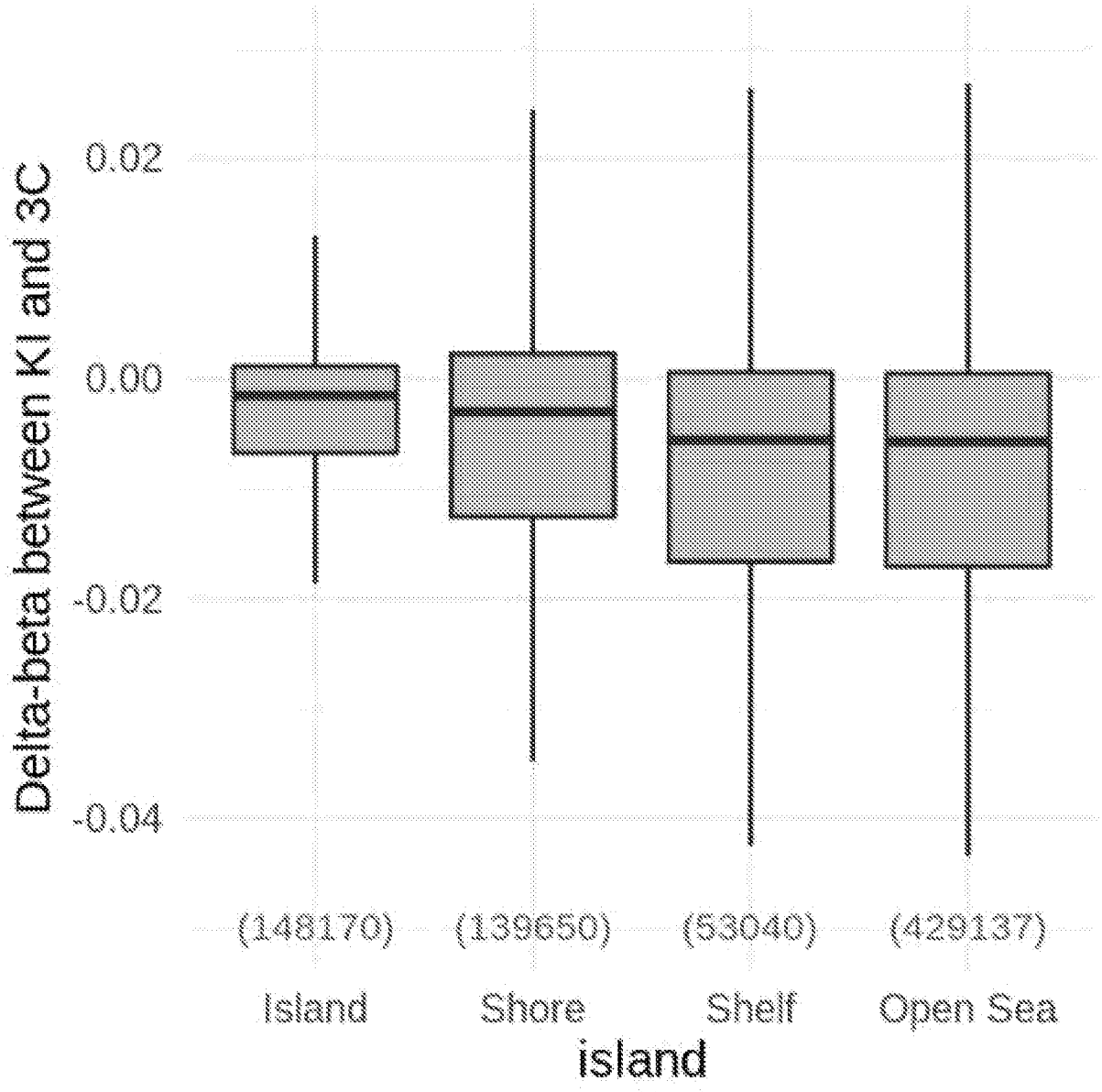

Figure 7 Continued

D

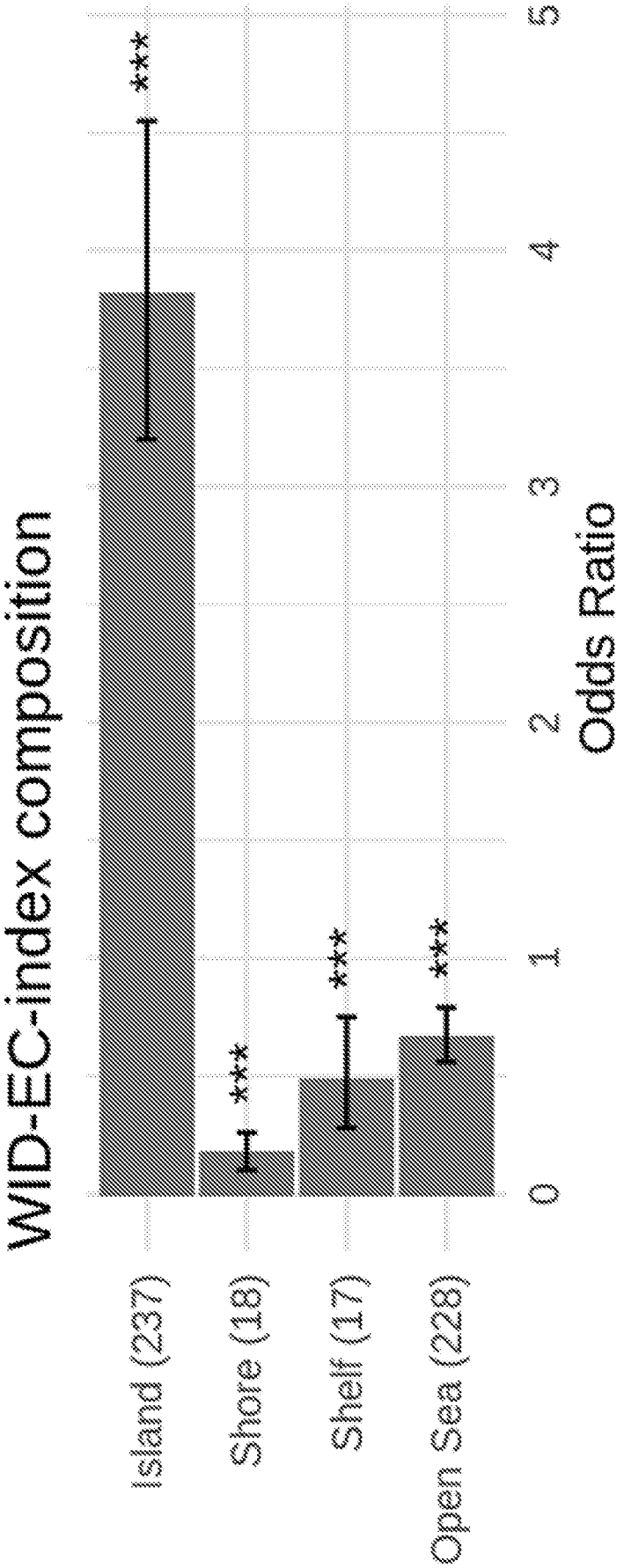

Figure 7 Continued

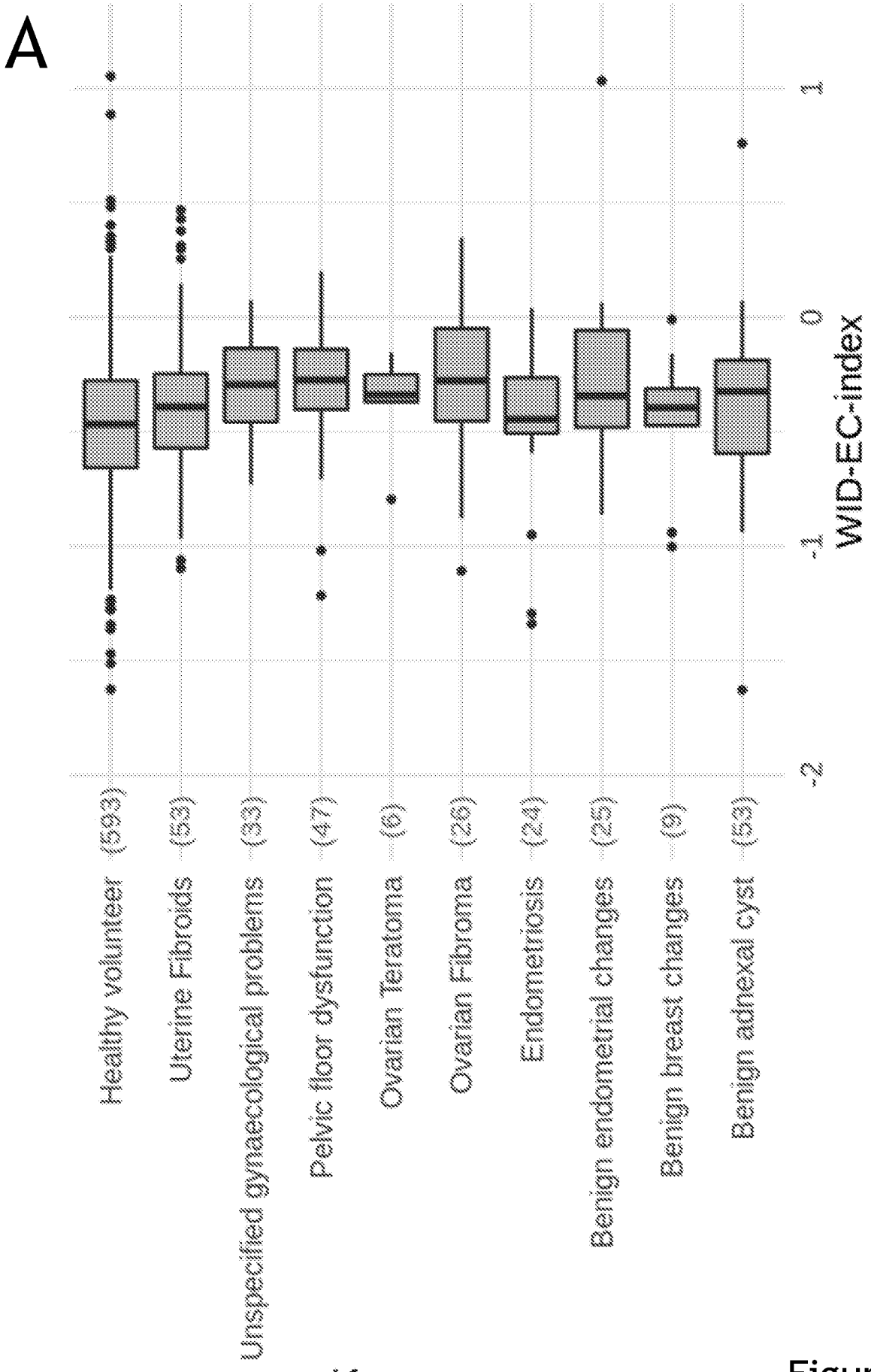
A
WID-EC-index
1
0
-1
-2
Healthy volunteer (593)
Uterine Fibroids (53)
Unspecified gynaecological problems (33)
Pelvic floor dysfunction (47)
Ovarian Teratoma (6)
Ovarian Fibroma (26)
Endometriosis (24)
Benign endometrial changes (25)
Benign breast changes (9)
Benign adnexal cyst (53)
Control subtype

Figure 8

B

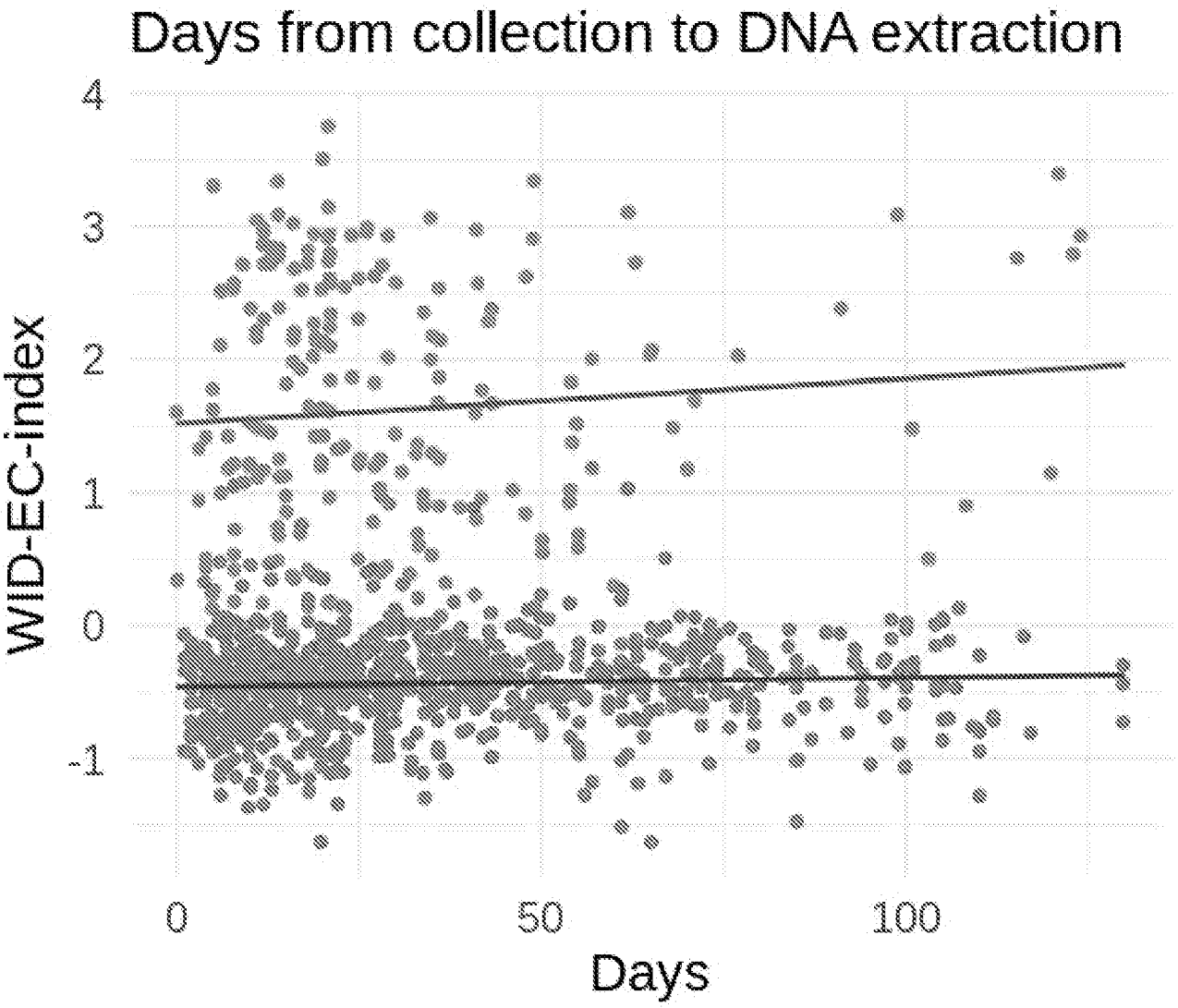

Figure 8 Continued

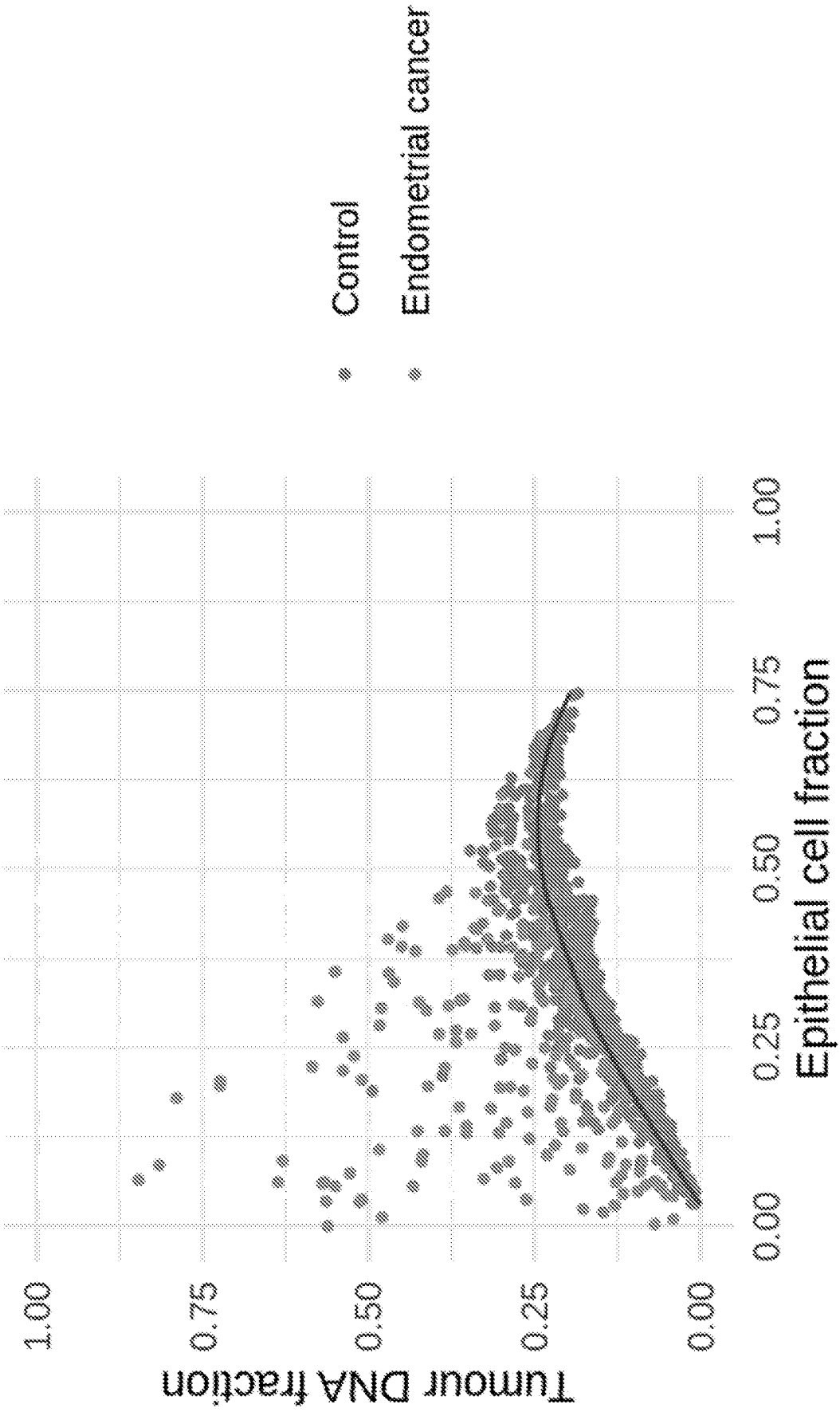
Control
Endometrial cancer
Tumour DNA fraction
1.00
0.75
0.50
0.25
0.00
Epithelial cell fraction
0.00
0.25
0.50
0.75
1.00

Figure 9

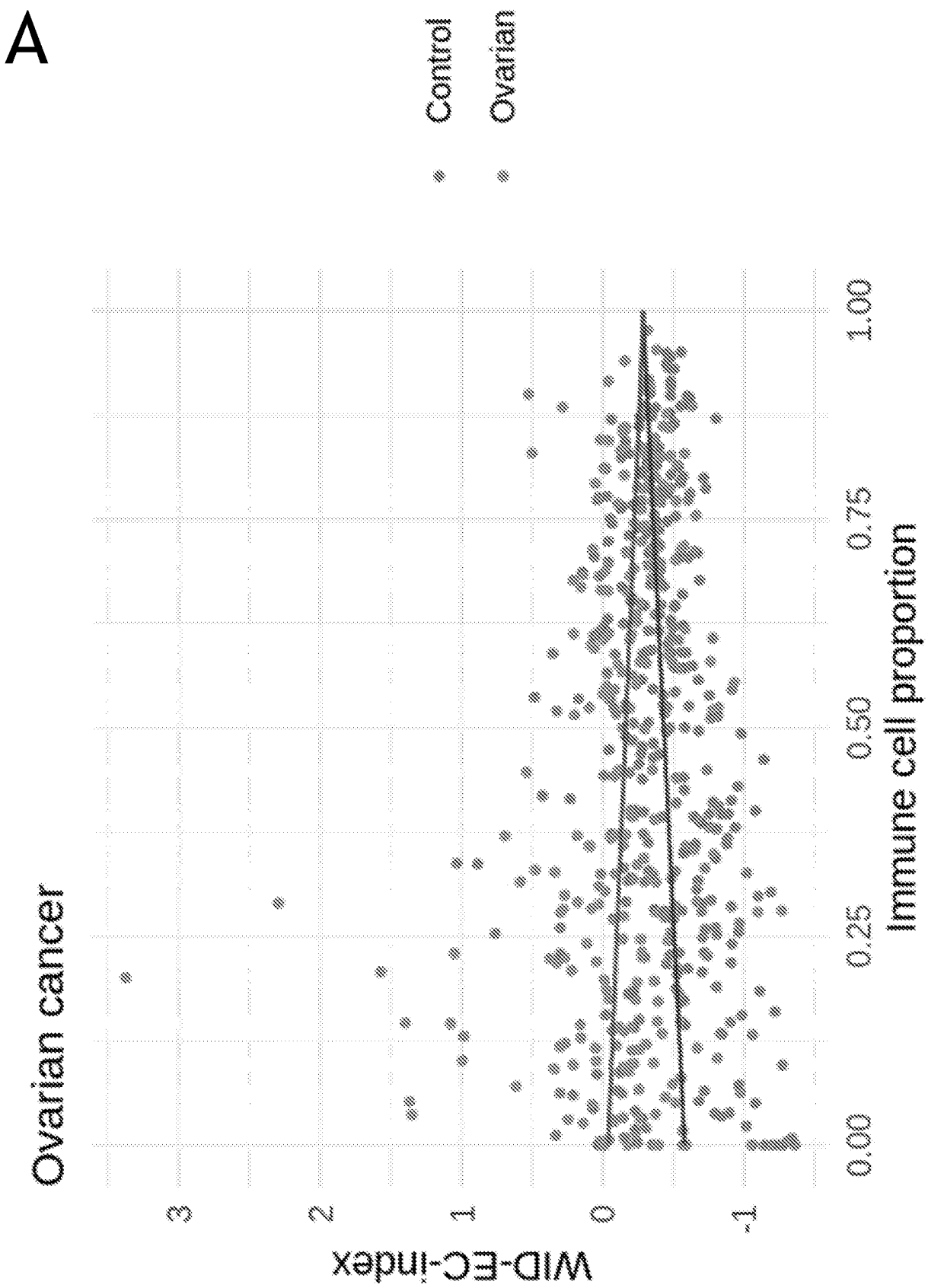
A
Control
Ovarian
Ovarian cancer
WID-EC-index
3
2
1
0
-1
0.00
0.25
0.50
0.75
1.00
Immune cell proportion

Figure 10

B

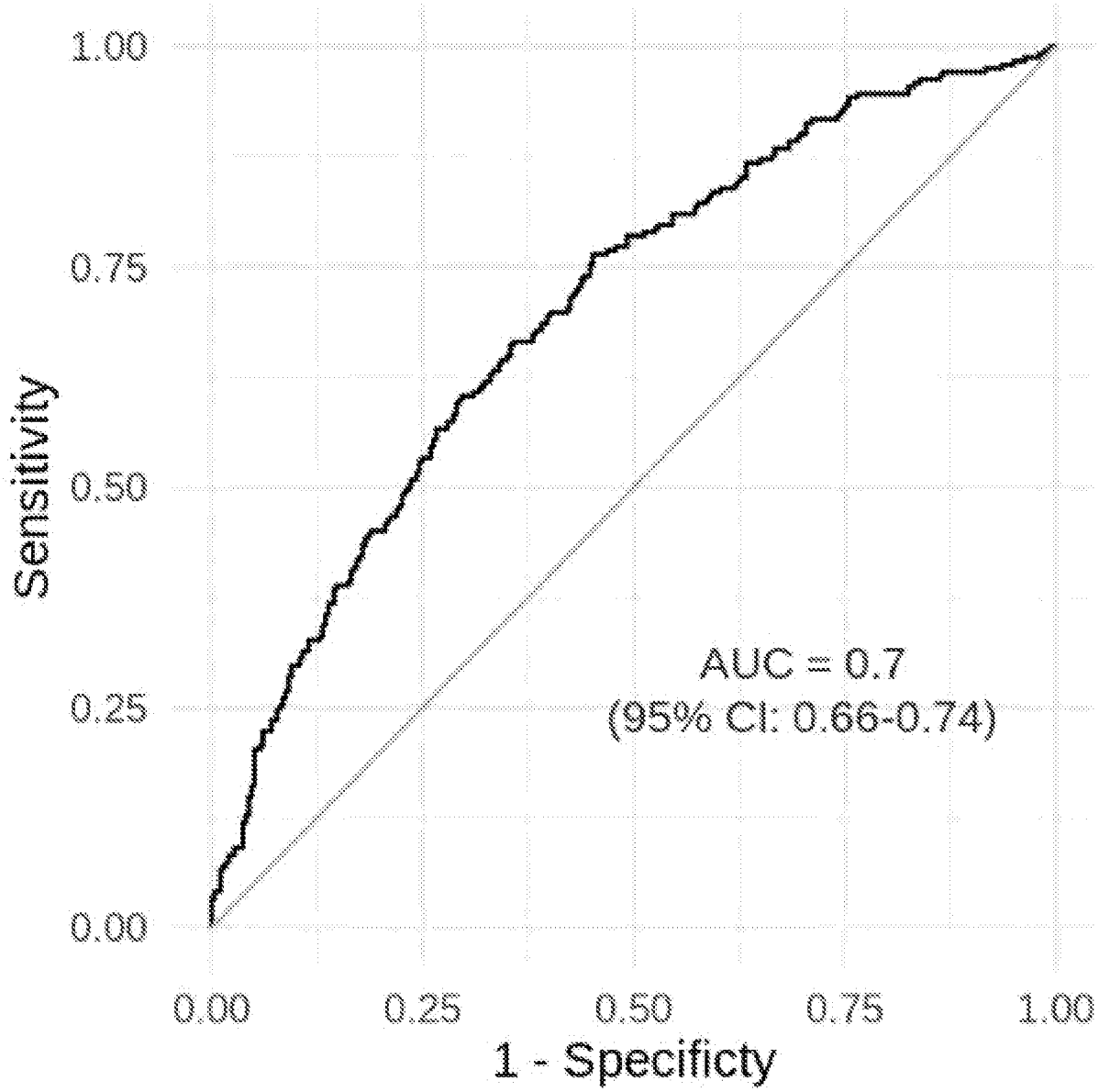

Figure 10 Continued

A

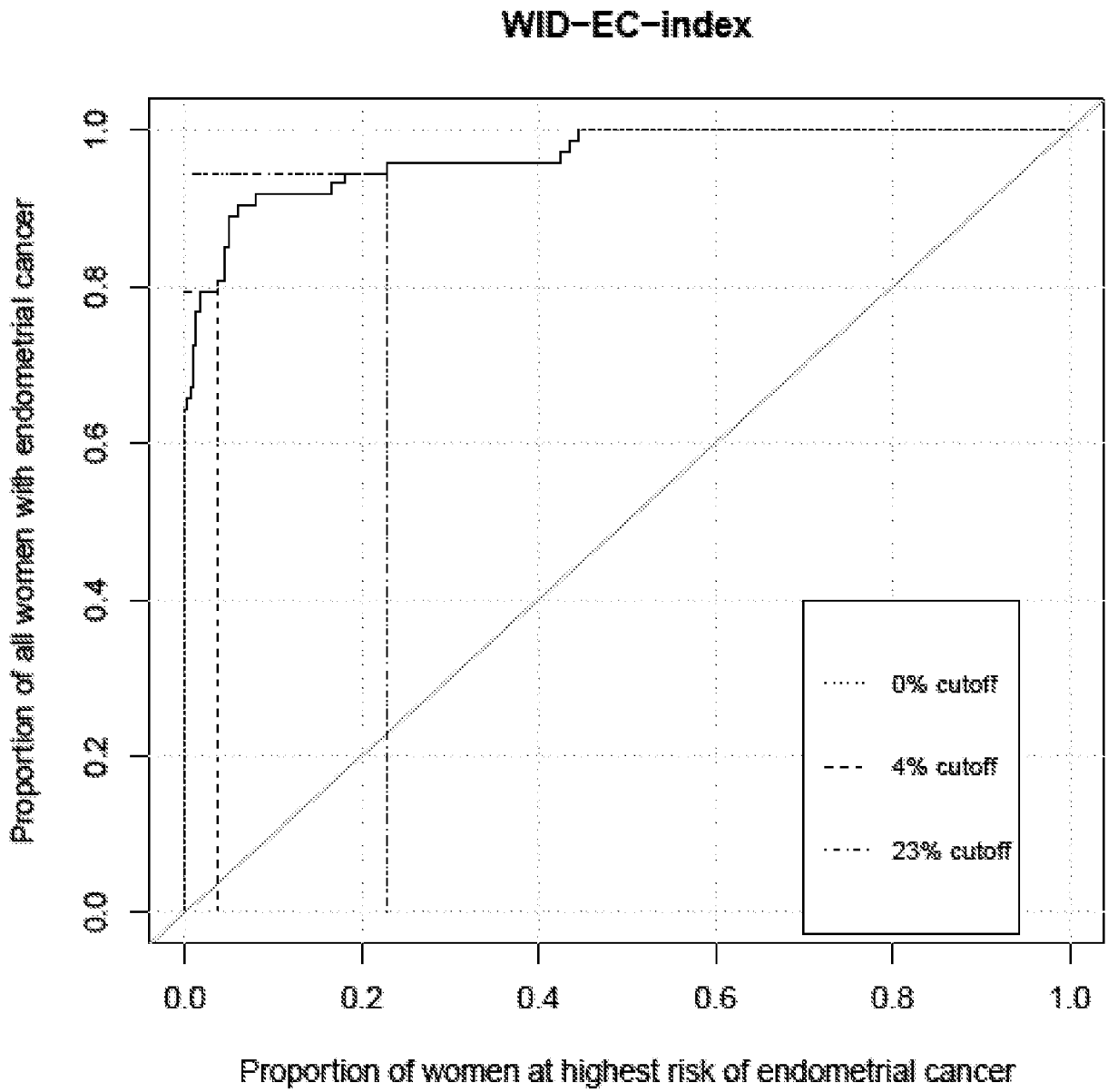
WID-EC-index
Proportion of all women with endometrial cancer
0.0
0.2
0.4
0.6
0.8
1.0
0% cutoff
4% cutoff
23% cutoff
0.0
0.2
0.4
0.6
0.8
1.0
Proportion of women at highest risk of endometrial cancer

Figure 11

B

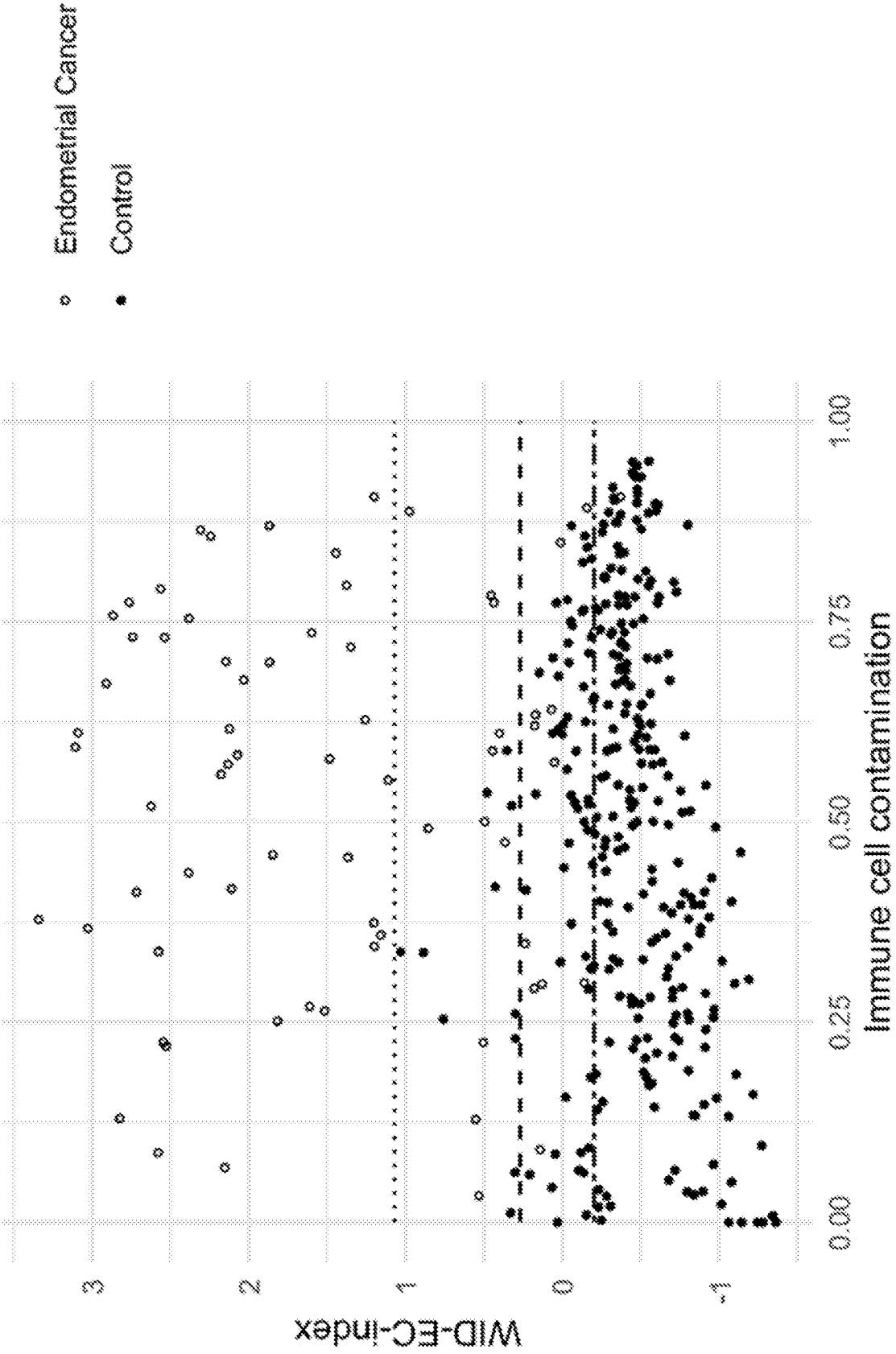

Figure 11 Continued

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2021/051536

A. CLASSIFICATION OF SUBJECT MATTER
INV. C12Q1/6886
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)
C12Q

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, BIOSIS, Sequence Search, EMBASE, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2020/115728 A2 (HKG EPITHERAPEUTICS LTD [CN]) 11 June 2020 (2020-06-11) the whole document	1-53
A	WO 2018/164577 A1 (SELF SCREEN B V [NL]) 13 September 2018 (2018-09-13) the whole document	1-53

-/--

[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

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 September 2021	25/11/2021

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	Botz, Jürgen

1

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2021/051536

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DOUFEKAS KONSTANTINOS ET AL: "DNA Methylation Signatures in Vaginal Fluid Samples for Detection of Cervical and Endometrial Cancer :", INTERNATIONAL JOURNAL OF GYNECOLOGICAL CANCER, [Online] 1 June 2016 (2016-06-01), pages 1-6, XP055844119, US ISSN: 1048-891X, DOI: 10.1097/IGC.0000000000000739 Retrieved from the Internet: URL:http://dx.doi.org/10.1097/IGC.0000000000000739> the whole document	1-53
A	WO 2016/041010 A1 (GARVAN INST MED RES [AU]) 24 March 2016 (2016-03-24) the whole document	1-53
A	BARTLETT THOMAS E. ET AL: "Epigenetic reprogramming of fallopian tube fimbriae in BRCA mutation carriers defines early ovarian cancer evolution", NATURE COMMUNICATIONS, [Online] vol. 7, no. 1, 1 September 2016 (2016-09-01), XP055844436, DOI: 10.1038/ncomms11620 Retrieved from the Internet: URL:https://www.nature.com/articles/ncomms11620.pdf> the whole document	1-53
A	VAN OSTADE XAVEER ET AL: "Candidate biomarkers in the cervical vaginal fluid for the (self-)diagnosis of cervical precancer", ARCHIVES OF GYNECOLOGY AND OBSTETRICS, SPRINGER VERLAG, BERLIN, DE, vol. 297, no. 2, 15 November 2017 (2017-11-15), pages 295-311, XP036391909, ISSN: 0932-0067, DOI: 10.1007/S00404-017-4587-2 [retrieved on 2017-11-15] the whole document	1-53
X	WO 2013/033627 A2 (UNIV CALIFORNIA [US]; FIRESTEIN GARY [US]; NAKANO KAZUHISA [US]) 7 March 2013 (2013-03-07) the whole document	48-52

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2021/051536

Box No. I Nucleotide and/or amino acid sequence(s) (Continuation of item 1.c of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of a sequence listing:

   a. [X] forming part of the international application as filed:

      [X] in the form of an Annex C/ST.25 text file.

      [ ] on paper or in the form of an image file.

   b. [ ] furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

   c. [ ] furnished subsequent to the international filing date for the purposes of international search only:

      [ ] in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

      [ ] on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

2. [ ] In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

3. Additional comments:

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2021/051536

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.:

1-53(partially)

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: 1-53(partially)

An assay for assessing the presence, absence or development of cancer and / or grade 3 cervical intra-epithelial neoplasia (CIN3) in an individual, the assay comprising: a. providing a sample which has been taken from the individual, the sample comprising a population of DNA molecules; b. determining in the population of DNA molecules in the sample the methylation status of a panel of: i. one or more CpGs selected from a panel of CpGs identified in SEQ ID NOs 1 to 808 whereby the marker selection comprises at least SEQ. ID. NO:1 and wherein the CpGs are identified at nucleotide positions 61 to 62; c. deriving a cancer index value based on the methylation status of the one or more CpGs but at least the methylation marker with the SEQ. ID. NO:1 in the panel; and d. assessing the presence, absence or development of cancer and/or CIN3 in the individual based on the cancer index value; wherein the assay is characterised as having an area under the curve (AUC) of 0.60 or more as determined by receiver operating characteristics (ROC) as presented in claims 1 - 28, a method as detailed with claims 28 - 37, a method of monitoring the cancer status as detailed with claims 38 - 44, the assay of claims 45 - 47, the array of claims 48 - 51, the hybridized array of claim 52 and the process for making the hybridized array according to claim 52, all of said claims being specific and limited to SEQ. ID. NO:1.

2-808. claims: 1-53(partially)

IDEM for SEQ. ID. NOs 2 - 808, whereby SEQ. ID. NO:2 is comprised in invention number 2 and SEQ. ID. NO:808 is comprised in invention 808.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2021/051536

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2020115728 A2	11-06-2020	AU 2020203961 A1	17-06-2021
		CA 3121886 A1	11-06-2020
		CN 113423843 A	21-09-2021
		EP 3891296 A2	13-10-2021
		KR 20210117262 A	28-09-2021
		SG 11202104288P A	28-05-2021
		WO 2020115728 A2	11-06-2020
WO 2018164577 A1	13-09-2018	AU 2018231578 A1	26-09-2019
		BR 112019018743 A2	05-05-2020
		CA 3055895 A1	13-09-2018
		CN 110753761 A	04-02-2020
		EA 201991883 A1	06-03-2020
		EP 3592867 A1	15-01-2020
		EP 3744861 A1	02-12-2020
		JP 2020509758 A	02-04-2020
		KR 20190141130 A	23-12-2019
		MA 47821 A	15-01-2020
		PH 12019550180 A1	29-06-2020
		SG 10202106932Y A	30-08-2021
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		US 2020032348 A1	30-01-2020
		WO 2018164577 A1	13-09-2018
WO 2016041010 A1	24-03-2016	AU 2015318823 A1	24-03-2016
		EP 3194624 A1	26-07-2017
		US 2017283886 A1	05-10-2017
		WO 2016041010 A1	24-03-2016
WO 2013033627 A2	07-03-2013	US 2013129668 A1	23-05-2013
		WO 2013033627 A2	07-03-2013