

**“METHOD OF PROGNOSED AND PREDICTING BREAST CANCER
RECURRENCE, MARKERS EMPLOYED THEREIN AND KIT THEREOF”**

TECHNICAL FIELD

5 The present disclosure pertains to the field of molecular oncology/biotechnology. The present disclosure relates to a method of prognosing and predicting breast cancer recurrence in patients. More particularly, the present disclosure relates to a method of prognosing which stratifies early stage breast cancer patients with hormone receptor positive and Her2 receptor negative invasive ductal/lobular carcinoma of the breast into
10 low risk or high risk for breast cancer recurrence by employing an IHC based assay which assesses or measures expression of a combination of 5 biomarkers and by employing a histopathological analysis which assesses 3 clinical prognostic parameters. The present disclosure also relates to a combination of 5 biological markers and 3 clinical parameters employed in the method for prognosis of breast cancer, a kit/test comprising the antibodies
15 against said markers for said prognosis and an IHC based assay system comprising said markers.

BACKGROUND OF THE DISCLOSURE

In the field of oncology, the detection, identification and characterization of tumor cells
20 is an important aspect for diagnosis of cancer and for detection/prognosis of cancer recurrence. Of the many challenges of medicine, none has had a more controversial beginning or has experienced more hard-fought progress than the treatment and cure of cancer and more importantly, prevention of cancer recurrence. Effective treatment for most patients is needed to reach every organ in the body to pin down the metastatic
25 disease. More than 70% of cancer patients undergo chemo/radio therapy.

Despite the path breaking progress in oncology therapy from multiple angles, cancer cure still remains elusive. Advanced solid malignancies remain therapeutic challenges despite maximal therapy, in part, due to the development of resistance to radiation and
30 chemotherapy. For eg. Glioblastomas are among the most lethal of cancers with current

therapies offering only palliation. Standard-of-care for glioblastoma consists of surgical resection, ionizing external beam irradiation, and chemotherapy. Though radiotherapy has been the most effective nonsurgical treatment modality, but yet recurrence is essentially universal.

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At present, about 95% of the patients with hormone receptor positive and Her2 negative early stage breast cancer get treated with chemotherapy, with majority of early stage cancer patients getting over-treated with Chemotherapy.

10 Thus, majority of patients undergoing chemo/radio therapy suffer from un-necessary severe side effects of the treatment. In addition, many patients also show resistance to the treatment resulting in treatment failure and cancer recurrence. Existing techniques for assessing risk of cancer recurrence in the abovementioned hormone receptor positive and Her2 receptor negative patients are expensive, applicable only for stage I cancer patients
15 and not predictive in nature.

Thus, in spite of availability of many ways of standardized methods for diagnosis & prognosis of breast cancer currently, there exists a need to develop prognostic and predictive tests that can determine risk of cancer recurrence and effectiveness of the
20 prescribed chemo/radio therapy, with accuracy and at affordable costs, which in-turn will help devise new drug therapy. Breast cancer recurrence risk in ER+ stage 1 and stage 2 patients being assessed currently by considering clinical parameters and biomarker based means (Prognostic markers: Age, tumor grade, size, nodes with metastasis (TNM) and Predictive markers: ER/PR/Her-2-neu) is insufficient, leading to over-treatment of
25 patients with chemotherapy thereby leading to unnecessary side-effects. Over the past decade, several molecular tests have been developed to predict risk of recurrence in Breast Cancer. Treatment of early stage patients in the West today is decided based on the risk predicted by any of these tests including Oncotype Dx, MammaPrint, PAM50 and EndoPredict. These tests are primarily based on hormone receptor & proliferative
30 pathways. These pathways are important, but insufficient to accurately predict risk of recurrence as Breast cancer is a heterogeneous disease and several pathways regulate the

molecular pathogenesis of the disease. Further, Oncotype Dx, Mammaprint, Endopredict and PAM50 are used primarily for ER+/PR+/Her2- Stage 1/2 patient who are lymph node negative (LN⁻) and for limited patients with 1-3 lymph nodes positive. Thus, these tests are applicable for a highly-limited set of Stage 1 patients which are not common outside the western world and are largely prognostic with limited chemo-predictivity. Further all the 4 tests mentioned above are based on gene expression detection in whole FFPE blocks by microarray or q-PCR, and do not detect protein expression thus unable to prescribe new targeted drugs apart from also being very expensive and impractical for application in Asian Patient Cohort, as only ~5% of patients are diagnosed in LN⁻, Stage 1 cancer.

The instant disclosure therefore provides for a prognostic and predictive method which addresses all the limitations existing in the prior art for treating cancer and devising new or personalized drug therapy.

SUMMARY

Accordingly, the present disclosure relates to a method of measuring biomarker expression, comprising measuring expression of five biomarkers by assaying a biological sample with a combination of antibodies, wherein the biological sample is obtained from a subject having early stage ER+/PR+ and Her2- breast cancer or after removal of the early stage ER+/PR+ and Her2- breast cancer and the five biomarkers are CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4; a method of performing immunohistochemistry (IHC) on a tumor sample obtained from a subject having early stage ER+/PR+ and Her2- breast cancer or after removal of the early stage ER+/PR+ and Her2- breast cancer, comprising performing IHC on the tumor sample to optionally detect hormone receptor expression by detecting whether cells are expressing at least one receptor selected from the group consisting of estrogen receptor and, progesterone receptor, and ensuring tumor samples do not express Her2 receptor and performing the method as above on the tumor sample by IHC to measure the expression of the five biomarkers CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4; a method of prognosing and treating a subject having early stage ER+/PR+ and Her2- breast cancer or after removal of the early stage ER+/PR+ and Her2- breast cancer, comprising

prognosing whether the subject is at high or low risk for breast-cancer recurrence by performing, and analyzing the results of, the method as above; and treating the prognosed subject with chemotherapy if prognosed as high risk for breast-cancer recurrence; a combination of antibodies, comprising antibodies specific for five biomarkers CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4; a kit comprising the combination of antibodies as above and instructions for measuring expression of the five biomarkers CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4; an IHC-based assay system, comprising the combination of antibodies as above; and a method of predicting the likelihood of recurrence of breast cancer in a subject having early stage ER+/PR+ and Her2- breast cancer or after removal of the early stage ER+/PR+ and Her2- breast cancer, comprising: measuring expression level of five biomarkers CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4, calculating a relapse score for said subject by measuring the differential expression levels of each of the biomarkers and their contribution to breast cancer recurrence along with three clinical parameters, and using said relapse score to determine the likelihood of breast cancer recurrence.

In a first aspect, the present disclosure refers to a method for measuring biomarker expression and assessing clinical parameters for use in prognosis of breast cancer or predicting the likelihood of recurrence of breast cancer in a subject, comprising:

measuring expression of five biomarkers by assaying a biological sample with a respective antibody against each of said five biomarkers, wherein:

the biological sample is obtained from a subject having ER+/PR+ and Her2- breast cancer or after removal of the breast cancer; and

the five biomarkers are CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4; and assessing the clinical parameters node status, tumor grade, and tumor size of the subject, wherein the node status includes tumor node positive (N1) and tumor node negative (N0), the tumor grade includes Grades 1, 2 and 3, and the tumor size includes T1, T2, or T3.

In a second aspect, the present disclosure refers to a combination of antibodies, consisting of antibodies specific for five biomarkers CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4.

In a third aspect, the present disclosure refers to in vitro use of the combination of antibodies of the second aspect for prognosis of breast cancer or predicting the likelihood of recurrence of breast cancer in a subject.

BRIEF DESCRIPTION OF THE ACCOMPANYING FIGURES

The features of the present disclosure will become fully apparent from the following description taken in conjunction with the accompanying figures. With the understanding that the figures depict only several embodiments in accordance with the disclosure and are not to be considered limiting of its scope, the disclosure will be described further through use of the accompanying figures:

Figure 1 illustrates current method of prognosis and improvement using CanAssist-Breast: Overview of factors considered for risk stratification of patients with early stage Her2 negative breast cancer .

Figure 2 illustrates description of CanAssist-Breast

Figure 3 illustrates Kaplan Meier (KM) curve results of risk stratification of early stage ER+/PR+ and Her2- breast cancer patients by employing the prognostic method/test of

the instant disclosures. As can be observed from the KM of the instant disclosure, low and high risk patients are separated well and predicted for all cases as there is no intermediate zone in the KM curve of CanAssist-Breast test.

- 5 **Figure 4** illustrates a brief work-flow of the method employed in predicting risk of recurrence in early stage ER+/PR+ and Her2- breast cancer patients, from start to finish.

DETAILED DESCRIPTION OF THE DISCLOSURE

Unless otherwise defined herein, scientific and technical terms used in connection with
10 the present disclosure shall have the meanings that are commonly understood by those of ordinary skill in the art. Further, unless otherwise required by context, singular terms shall include the plural and plural terms shall include the singular as is considered appropriate to the context and/or application. The various singular/plural permutations may be expressly set forth herein for the sake of clarity. Generally, nomenclatures used in
15 connection with, and techniques of biotechnology, molecular oncology, molecular and cellular biology described herein are those well-known and commonly used in the art. Certain references and other documents cited herein are expressly incorporated herein by reference. In case of conflict, the present specification, including definitions, will control. The materials, methods, figures and examples are illustrative only and not intended to be
20 limiting.

The present disclosure has utility in the field of oncology for stratifying early stage ER+/PR+ and Her2- breast cancer patients into high or low risk for breast cancer recurrence, prior to cancer treatment and/or post-surgery. In an embodiment, the
25 prognostic and/or predictive test in the instant invention is preferably performed on patient samples after surgery and before chemotherapy, since the decision to give chemotherapy is based on test results. The present disclosure thus relates to a prognostic test for detecting cancer recurrence preferably in early stage ER+/PR+ and Her2- breast cancer as well as a predictive test which will enable chemotherapy decision and also devising of new drugs
30 or personalized therapy specifically based on the prognostic outcome of the patient.

The present disclosure thus by helping in stratifying the early stage ER+/PR+ and Her2-breast cancer patients into low or high risk of breast cancer recurrence will therefore enable to intelligently chalk out a module to treat low and high risk patients, as per the optimal chemotherapy requirement; thus overcoming under treatment/over treatment of patients as applicable; and also help in devising new age effective drugs or personalized therapy for cancer treatment.

Before the method of prognosis, biomarkers, kit comprising antibodies against said markers and other embodiments of the present disclosure are disclosed and described, it is to be understood that the terminologies used herein are for the purpose of describing particular embodiments only and are not intended to be limiting. It must be noted that, as used in the specification and the appended claims, the singular forms “a,” “an” and “the” include plural referents unless the context clearly dictates otherwise.

As used herein, “tumor” or “cancer” are terms as well known in the art and used interchangeably throughout the disclosure. Similarly, the terms “*clinical prognostic factors*” “*clinical prognostic parameters*” or “*clinicopathological parameters/clinical parameters/clinical variables*”; “algorithm” or “module” or “equation”; “IHC scoring/scoring” or “IHC grading/grading”; are one and the same and used interchangeably throughout the disclosure.

“Status” means a state of gene expression of a set of genetic markers whose expression is strongly correlated with a particular phenotype. For example, “ER status” means a state of gene expression of a set of genetic markers whose expression is strongly correlated with that of ESR1 (estrogen receptor gene), wherein the pattern of these genes' expression differs detectably between tumors expressing the receptor and tumors not expressing the receptor.

The terms “ER+” or “ER+ve” or “estrogen receptor positive” are used interchangeably throughout the disclosure and intend to convey the positive expression of the estrogen receptor. Similarly, the terms “PR+” or “PR+ve” or “progesterone receptor positive” are

used interchangeably throughout the disclosure and intend to convey the positive expression of the progesterone receptor.

5 The term “hormone receptor positive” used throughout the disclosure intends to convey the positive expression of one of or both of estrogen receptor and progesterone receptor.

The terms “Her2-” or “Her2-ve” or “Her2 negative” or “Her-2-neu -ve” or “Her-2-neu receptor negative” or “Her-2-neu negative” or “negative for Her-2-neu receptor” are used interchangeably throughout the disclosure and intend to convey the absence of expression
10 of the human epidermal growth factor receptor 2.

“Marker” or “Bio-marker” means an entire gene/protein, or an EST derived from that gene, the expression or level of which changes between certain conditions. Where the expression of the gene correlates with a certain condition, the gene is a marker for that
15 condition.

The term “High” with regards to risk of breast cancer recurrence means that a patient is expected to have >9% probability of distant recurrence within five years of initial treatment of breast cancer.
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The term “Low” with regards to risk of breast cancer recurrence means that a patient is expected to have 9% or lower probability of distant recurrence of breast tumor within five years of initial treatment of breast cancer.

25 The term “breast cancer” in the present disclosure refers to hormone receptor positive invasive ductal carcinoma of the breast or invasive lobular carcinoma of the breast. Preferably, the carcinoma is hormone receptor positive invasive ductal carcinoma of the breast.

30 The term “prognosis” or “prognostic marker” in the present disclosure relates to predicting disease progression without taking into consideration any reference to

therapy/treatment/drug. A very qualitative way of prediction for eg: age, tumor stage, tumor grade are prognostic markers. This prognosis relates to understanding the long-term outcome of a disease.

- 5 The term “IHC grading” in the present disclosure relates to raw grading values assigned for each stained IHC slide by the Pathologist based on % staining (0-100%) and Intensity of staining (0-3).

10 The term IHC/immunohistochemistry in the present disclosure (devoid of reference to prior arts) relates to Morphometric immunohistochemistry. The term also intends to encompass the conventional histopathological techniques associated with the process of carrying out the IHC. The immunohistochemistry analysis carried out within the present disclosure encompasses the conventional IHC method, whereby the identification of biological markers is carried out by visualizing a colored reaction or fluorescence
15 obtained at completion of the method due to staining of the desired biomarkers present on the cells cells from the sample.

The terms “CanAssist Breast score” or “CanAssist Breast test score” or “relapse score” or “prediction score” or “score” in the present disclosure are used interchangeably and
20 relates to an algorithm generated score computed using the averages of raw grading (for percentage and/or intensity of staining) for each IHC marker as well as information regarding tumor size, node status and tumor grade.

25 The term “tumor grade” in the present disclosure relates to grade, ranging from 1-3 assigned to the tumor based on histopathological features according to the modified Bloom-Richardson Elston criteria.

The term “tumor stage” in the present disclosure relates to the TNM staging of Breast Cancer which is based on tumor size (T) Node status (N) and Metastasis in the body (M).

The term “predictive” or “predictive marker” in the present disclosure relates to a marker that not only gives some kind of reference to disease progression but more importantly will direct a therapy based on the presence of the markers for eg: ER, PR and Her2. Employing them is prognostic along with a direction as to what a possible therapy could be. Thus prediction is related to understanding benefit to the patient in response to certain treatment.

In the present disclosure, the prognostic and predictive test herein is also referred to as “CanAssist Breast test”.

The present disclosure relates to a method of measuring biomarker expression, comprising measuring expression of five biomarkers by assaying a biological sample with a combination of antibodies, wherein the biological sample is obtained from a subject having early stage ER+/PR+ and Her2- breast cancer or after removal of the breast cancer; and the five biomarkers are CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4. The biomarker expression is measured for prognosis about whether the subject having cancer is at high or low risk for breast-cancer recurrence at a distant site.

The present disclosure also relates to a method of performing immunohistochemistry (IHC) on a tumor sample obtained from a subject having early stage ER+/PR+ and Her2- breast cancer or after removal of the breast cancer, comprising performing IHC on the tumor sample to detect receptor expression by detecting whether cells are expressing at least one receptor selected from the group consisting of estrogen receptor and progesterone receptor and not having Her2 receptor and performing the method as above on the tumor sample by IHC if receptor expression is detected to measure the expression of the five biomarkers CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4. Alternatively, the IHC is directly performed on samples known to be positive for estrogen receptor and/or progesterone receptor and negative for Her-2-neu receptor. Thus, the method of the present disclosure may comprise performing IHC to determine the status of estrogen receptor, progesterone receptor and Her-2-neu receptor; or may not comprise

performing IHC to determine the status of estrogen receptor, progesterone receptor and Her-2-neu receptor, if such status is already/previously known for a sample.

Thus, preferably, the present disclosure relates to a method of performing immunohistochemistry (IHC) on a tumor sample obtained from a subject having early stage ER+/PR+ and Her2- breast cancer or after removal of the breast cancer, comprising performing IHC on the tumor sample to measure the expression of the five biomarkers CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4.

The present disclosure also relates to a method of prognosing and treating a subject having early stage ER+/PR+ and Her2- breast cancer or after removal of the breast cancer, comprising prognosing whether the subject is at high or low risk for breast-cancer recurrence by performing, and analyzing the results of, the method as above; and treating the prognosed subject with chemotherapy if prognosed with high risk for breast-cancer recurrence.

The breast cancer referred to in the present disclosure is stage I, II or IIIA hormone receptor positive, Her2 receptor negative invasive ductal carcinoma, or invasive lobular carcinoma of the breast.

In embodiments of the present disclosure, the breast-cancer recurrence is prognosed in patients having early stage ER+/PR+ and Her2- breast cancer or in patients after surgical removal of the early stage ER+/PR+ and Her2- breast cancer.

The breast cancer recurrence risk in the present disclosure is measured by analyzing the expression of the five biomarkers along with three clinical parameters only if expression of at least one of estrogen receptor or progesterone receptor is detected on the tumor cells which also do not express Her2 receptor. The expression of the five biomarkers is thereafter measured on basis of percentage of cells (0-100) stained and staining intensity of cells (0-3).

The CanAssist-Breast test further comprises assessing three clinical parameters *viz* node status, tumor grade, and tumor size, wherein the node status includes tumor node positive and tumor node negative, the tumor grade includes Grades 1, 2 and 3 according to the modified Bloom-Richardson-Elston criteria, and the tumor size includes T1, T2, or T3 according to the TNM classification of breast cancer.

The tumor sample obtained from the subject is collected, fixed, sectioned, and IHC is performed by adding primary antibodies and secondary antibodies conjugated with a detectable label and detecting a color or fluorescence from the detectable label.

The present disclosure also relates to a combination of antibodies specific for the five biomarkers CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4.

The present disclosure also relates to a kit comprising the combination of antibodies and instructions for measuring expression of the five biomarkers CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4.

In embodiments of the present disclosure, the kit also comprises at least one member from IHC reagents such as xylene, isopropanol, ethanol, buffer solutions, protein blocking agents, primary antibodies, secondary antibodies labeled with enzymes such as horseradish peroxidase (HRP) or alkaline phosphatase (AP) or with fluorescent tags such as fluorescein isothiocyanate (FITC) or phycoerythrin (PE) or with molecule biotin/streptavidin, and substrates such as diaminobenzidine (DAB) or p-nitrophenyl phosphate (PNPP).

The present disclosure also relates to an IHC-based assay system, comprising the combination of antibodies specific for CD44, ABCC11, N-cadherin, Pan-cadherin, and ABCC4.

In embodiments of the present disclosure, the IHC-based assay system further comprises at least one member from IHC reagents such as xylene, isopropanol, ethanol, buffer

solutions, protein blocking agents, primary antibodies, secondary antibodies labeled with enzymes such as horseradish peroxidase (HRP) or alkaline phosphatase (AP) or with fluorescent tags such as fluorescein isothiocyanate (FITC) or phycoerythrin (PE) or with molecule biotin/streptavidin, and substrates such as diaminobenzidine (DAB) or p-nitrophenyl phosphate (PNPP).

The present disclosure also relates to a method of predicting the likelihood of recurrence of breast cancer in a subject having early stage ER+/PR+ and Her2- breast cancer or after removal of the breast cancer, comprising: measuring expression level of five biomarkers CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4; calculating a relapse score for said subject by measuring the differential expression levels of each of the biomarkers and their contribution to breast cancer recurrence along with three clinical parameters; and using said relapse score to determine the likelihood of breast cancer recurrence.

In embodiments of the present disclosure, the method further comprises assessing clinical parameters node status, tumor grade, and tumor size, wherein the node status includes tumor node positive and tumor node negative, the tumor grade includes Grades 1, 2 and 3, and the tumor size includes T1, T2, or T3.

In further embodiments of the present disclosure, the breast cancer is stage I, II or IIIA hormone receptor positive, Her-2-neu receptor negative invasive ductal carcinoma, or invasive lobular carcinoma of the breast. Accordingly, the term 'early stage' used to describe the stage of breast cancer of the present disclosure refers to breast cancer at stage I, II or IIIA.

The method of the present disclosure thus relates to a cost-effective, accurate, robust, prognostic and predictive, ISO-certified, Morphometric IHC test, which is useful for ER+/PR+ and Her2- breast cancer patients across Stages I, II and IIIA of cancer.

The method of the present disclosure is a 'New' biomarker/ 'New' biomarker combination leading to 'broadly distributed prognostic and predictive' test which can assess 'risk of

recurrence' and can offer 'targeted' treatments to pre or post-menopausal patients, ER+ve and/or PR+ve, Her2 -ve, and Lymph node -ve or +ve patients in stage I, stage II or stage IIIA cancer.

5 The present disclosure therefore relates to a method of prognosing early stage ER+/PR+ and Her2- breast cancer patients for risk of breast cancer recurrence. The risk of recurrence is considered high if the probability of recurrence is greater than about 9% and low if it is less than or equal to about 9%.

10 In a non-limiting embodiment, the method of prognosis involves employing a morphometric IHC based assay to predict the risk of breast cancer recurrence.

In a preferred embodiment, the breast cancer patients are patients, with I, II or IIIA stage hormone receptor positive, Her2 negative invasive ductal or lobular carcinoma of the
15 breast.

In another preferred embodiment, hormone receptor positive includes ER⁺ (Estrogen receptor positive) and/or PR⁺ (Progesterone receptor positive).

20 In preferred embodiments of the present disclosure, the IHC based assay quantifies expression of a 5 biomarker combination in the early stage ER+/PR+ and Her2- breast cancer patient sample. Said biomarker expression is considered along with 3 specific clinical prognostic factors/clinicopathological parameters by employing histopathological analysis, to classify patients into high risk or low risk of recurrence based on a CanAssist
25 Breast score which is devised by a statistical algorithm (Figure 2).

In preferred embodiments of the present disclosure, the clinical prognostic factors are selected from a group comprising, but not limiting to tumor size, node status and tumor grade, which are conventionally known and well understood by a person skilled in the art.

In an exemplary embodiment, the node status includes tumor node positive and tumor node negative including N0 and N1, and tumor grade includes Grades 1, 2 and 3 according to the Bloom-Richardson-Elston criteria and tumor size as T1, T2, or T3 according to the TNM classification of Breast Cancer.

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In further preferred embodiments of the present disclosure, the CanAssist Breast score or relapse score is an estimate of the patient's risk of recurrence that is based on combined expression of the marker combination along with the clinical factors, which is computed based on a machine-learning statistical *algorithm or module*. The algorithm or composite
10 module of the present disclosure relates to a machine learning based risk classifier which stratifies patients as low or high risk of recurrence within 5 years from diagnosis. The relapse score is computed on a scale of 1-100 and scores of 15.5 and below are classified as low risk, and above 15.5 are classified as high risk.

15 The CanAssist-Breast algorithm/algorithm of the present disclosure is constructed/developed in a series of steps which are defined as follows:

- 1) Formulation of the problem,
- 2) Pre-processing of raw data,
- 3) Classifier selection and assessment, and
- 20 4) Selection of the final 5 biomarkers and 3 clinical parameters.

In embodiments of the present disclosure, the algorithm development includes:

Formulation of the problem-

The problem of predicting breast cancer recurrence within five years (prognostic problem)
25 is formulated as a binary classification problem with two outcomes, Recurrence and No Recurrence. The goal is to develop a classifier which computes a relapse score (also called CanAssist-Breast score) (a number between 0 and 100) which corresponds to five-year probability of recurrence for the given patient. State-of-the-art machine learning methodology is used to solve this problem.

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Pre-processing of raw data:

The raw training set data consists of about 298 samples which are represented by 57 IHC measurements or features (where each feature corresponds to a marker, and its staining pattern which is evaluated based on location, intensity and % of staining) and clinical variables/parameters/clinical prognostic factors (grade, age and TNM status). The dataset contains about 68 recurred samples (breast cancer recurrence within five years) and about 230 non-recurred samples (breast cancer recurrence-free within five years). The raw data is pre-processed as follows:

- TNM codes are converted into three discrete variables (size, number of nodes, metastasis status)

- the discrete variables (TNM and grade) are one-hot encoded

- all variables are centered-scaled to zero mean and unit standard deviation

Subsequently, classifier assessment proceeds as per the well-defined statistical learning paradigm involving cross-validation for the assessment of statistical predictions.

A representative set of the complete training set is provided herewith by way of table no. 3 (cumulative of tables 3A, 3B, 3C and 3D), wherein IHC measurements are provided for 160 data samples.

Classifier Selection and Assessment:

The classifier selection considers two types of parameters: internal ("weights") and external ("hyperparameters"). The external hyperparameters that are selected include cost, number of variables used in the classifier, and decision threshold. The internal parameters are selected using core classifier algorithms such as Support Vector Machine, Random Forest and Deep Learning. External hyperparameter selection is more complex, and includes an extensive grid search over a plausible set of values of the hyperparameters. For each fixed hyperparameter n-tuple, the performance of the classifier is computed using repeated cross-validation.

The following classifiers are evaluated: 1) Support Vector Machine (SVM) with linear and Radial Basis Function (RBF) kernel 2) Random Forest 3) ElasticNet [ESL] 4) multi-layer perceptron 5) normal mixture modeling.

Model selection is performed using Receiver Operator Graph (ROG) whereby each classifier is represented by its sensitivity and specificity. The principal model selection criterion is maximum sensitivity among classifiers with greater than 90% specificity. The ROG displays a potentially large family of classifiers which cover the full grid of external parameters, and the statistics are computed using cross-validation. The RBF SVM proved superior by the selected criteria (sensitivity and specificity) and is therefore selected for model assessment. This problem is also evaluated as a survival problem, whereby the goal is to estimate actual probability of survival at various time points for a given patient. A regularized Cox model is used in this approach. However, as this approach proved inferior to the performance achieved by the classifiers, it is not carried forward.

Selection of the final 5 biomarkers:

The training set is evaluated for a total of 41 biomarkers (listed in table 1 below) most commonly associated in the literature with the type of breast cancer provided by the present disclosure. However, no meaningful relevance was observed for 24 biomarkers with respect to their ability in being prognostic in nature. The data for the remaining 17 markers was analyzed more closely for the training set, and based on the interplay of markers, and their relevance in correlation with the prognosis of breast cancer, five distinct IHC markers are chosen to be part of the algorithm along with 3 clinical parameters/clinical prognostic factors. To select the markers, the markers are ranked by the absolute value of Pearson correlation coefficient between the marker value and the outcome (Recurrence/No Recurrence). This method is chosen, as no other marker selection algorithm matches or surpasses its performance. Each IHC marker corresponds to multiple IHC features (numeric values), since the protein levels are evaluated in the cell nucleus, cytoplasm and/or membrane. The marker selection process is integrated inside the cross-validation loop to avoid selection bias. The top 5 markers chosen from this list are as follows: CD44, Pan-Cadherin, N-Cadherin, ABCC11 and ABCC4.

Marker Code	Biomarkers
A	CD44
B	CD24
C	ABCG2
D	ALDH1A1
E	ESA
F	ABCC4
G	CD133
H	NANOG
I	Oct3/4
J	SOX2
K	APC
L	P-CADHERIN
M	HIF2A
N	THY1
O	p-B-CATENIN
P	FOXA1
Q	CD15
R	ABCC11
S1	NESTIN
T	Ki67
U	N-CADHERIN
V	E-CADHERIN
W	Pan-CADHERIN
X	Klf4
Y	Alpha v beta 3
Z	Klk6
ZA	Total b-cat
ZB	MAGE-A9
ZC	MAGE-A11
ZD	CxCR4
ZE	IFITM1
ZF	Nrf2
ZF	p-Nrf2
ZG	CD147

ZH	XBP1
ZI	Notch 1
ZJ	DLL-3
ZK	GATA3
ZL	HSP 70
ZM	Integrin beta 6
ZN	MDR1

Table 1

Accurate risk stratification using the method of the present disclosure enables a physician to design an optimal therapeutic strategy for patients, i.e., patients who are stratified as low risk can be spared of chemotherapy and patients who are stratified as high risk to require adjuvant chemotherapy. The method of the present disclosure when compared to prior art prognostic tests is capable of separating high and low risk patients well, without having any intermediate risk category of patients, thus being accurate and capable of predicting all patients into either high/low risk of recurrence (Figure 3).

The markers employed in the IHC based assay of the present disclosure function in molecular pathways other than hormone receptor regulation and proliferation. Said molecular pathways are involved in initiation and progression of breast cancer including apoptosis, self-renewal, angiogenesis, hypoxia, and drug resistance etc. Therefore, antigens towards these markers in the instant disclosure are from said molecular pathways and which are localized to different parts of a cell, not limiting to cell membrane. However, these markers have not been used in the art till date for breast cancer disease prognosis and recurrence prediction.

The IHC based assay of the present disclosure is developed and validated on both tumor node negative and tumor node positive patients from tumor stage ranging from Stage I to Stage IIIA and hence is a broad spectrum assay. The IHC based assay of the present disclosure is developed and validated on Hormone receptor positive (ER^{+} and/or PR^{+}) and Her2 -ve samples. In other words, the IHC based assay of the present disclosure is

applicable for patient samples where at least one of or both of ER and PR are +ve; and Her2 is -ve.

5 The method of identifying unique biomarker combination and employing the same for possible prognosis of breast cancer recurrence has been devised through rigorous experimentation and research and carefully studying the data sets over a period of more than 5 years, which involved biomarker selection and analysis in training samples set by employing IHC assay for biomarker combination shortlisting; testing for presence of shortlisted biomarker combination and clinicopathological parameters; followed by
10 clinical validation of test-samples for predicting breast cancer recurrence.

The training sample set of the present disclosure relates to patient tumor samples of 298 patients, which satisfied the inclusion criteria of the present disclosure and includes samples of women having invasive ductal or lobular carcinoma of the breast; tumor stage
15 I, II and III, and Age of the patient being preferably below 74 years; Positive for expression of hormone receptor ER and/or PR; Negative for expression of Her2 status; having minimum of 5 years follow-up and known clinical outcome data. This training sample set in the present disclosure is analyzed by IHC for ~41 gene-biomarker expression, most commonly associated with breast cancer in the literature. Based on the
20 relevance of the markers in prognosis of breast cancer vis-à-vis the patient outcome, 17 markers were shortlisted for final screening and analysis. Each biomarker is graded quantitatively and this data along with three clinical parameters/clinical prognostic factors viz tumor size, tumor grade and node status is analyzed by the Statistician using Support Vector Machine based model. 5 biomarkers are shortlisted for their consistent prognostic
25 ability and an algorithm is developed using staining intensity (0-3) and percentage of staining (0-100) of said 5 biomarkers in conjunction with three clinical prognostic parameters. The algorithm developed gives a certain score ranging from 1-100 to each patient's tumor sample, and if the score is under the cutoff point then the patient has a low probability of distant recurrence in the first 5 years and if the score is higher than the cut-
30 off point, then the patient has a higher probability of distant recurrence.

The predictive ability of the 5 biomarker plus 3 clinical parameter combination arrived at from the training sample is further validated with a validation sample set. The validation sample set comprises patient tumor samples of around 700 patients, which again satisfy the inclusion criteria as aforementioned except that tumor stage was restricted until Stage 3A. The validation sample of the present disclosure is analyzed by IHC for the shortlisted 5 biomarker combination and information on percentage staining and biomarker staining intensity in conjunction with 3 clinical prognostic parameters is assessed with the statistical algorithm, for risk stratification. Results from the said analysis are compared with the known outcomes for each sample (from the patient history provided for each of the patients in validation set) to determine the accuracy of the 5 biomarker plus 3 clinical parameter combination. A representative set of the complete validation set is provided herewith by way of table no. 4, wherein IHC measurements are provided for 299 data samples.

In some embodiments of the present disclosure, the biomarker selection and analysis by IHC assay involves shortlisting about 17 proteins belonging to different molecular pathways involved in initiation and progression of breast cancer including apoptosis, self-renewal, angiogenesis, hypoxia and drug-resistance. Analyzing expression of these 17 genes in patients samples (Training set for 298 patient samples: having minimum 5 year follow-up data and known clinical outcome) is done by employing IHC, wherein the IHC assay involves analysis by observing the patient sample slides and scoring/grading of the samples based on percentage tumor stained and staining intensity for all the about 17 genes and further analyzing the *scoring/grading data* using known statistical tools and shortlisting most significant biomarker combination of 5 genes of the present disclosure. The 5 biomarkers analyzed by the IHC based assay of the present disclosure are CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4.

In a preferred embodiment, the selection/inclusion criteria for the training patient set samples involve selection of samples which are positive for hormone receptor status ER and/or PR; negative for Her2 status; and positive or negative for tumor node status; and tumor stage ranging from stage I, II, or IIIA.

In exemplary embodiments of the present disclosure, the statistical tools involve, multivariate analysis, Cox regression, Lasso and SVM models.

The present disclosure thus relates to a prognostic test which analyses the expression of a combination of five markers CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4 for detecting cancer recurrence in early stage ER+/PR+ and Her2- breast cancer as well as a predictive test which will enable devising of new drugs or personalized therapy specifically based on the prognostic outcome of the patient.

10 The present disclosure thus provides a tool for analyzing expression of 5 markers, i.e., CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4 and three clinical parameters thereby helping in stratifying the early stage ER+/PR+ and Her2- breast cancer patients into low or high risk of breast cancer recurrence.

15 In a non-limiting embodiment, the risk of recurrence is high if the CanAssist Breast score is higher than designated cut off point or low if the CanAssist Breast score is less than the designated cut off point.

In a preferred embodiments of the present disclosure, the testing of validation samples is done by employing the composite module or algorithm which takes into consideration and computes the expression of 5 most relevant biomarker combination data (which is based on the IHC analysis data of the training-set) in combination with the 3 clinicopathological parameters/clinical prognostic factors, for risk stratification of samples. The clinical validation of samples for breast cancer prognosis involves employing about 700 test samples of breast cancer in a retrospective study with the same inclusion criteria as for the training set and analyzing the test samples by the composite algorithm/module of the instant disclosure, which enables predicting the risk of distant recurrence in patients with early stage ER+/PR+ and Her2- stage breast cancer and thereby validating by comparing the same with actual outcomes of the respective patient history data.

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In preferred embodiments of the present disclosure, manual grading is carried out before inputting the data in the statistical algorithm or module and the grading comprises of assessing the percentage of staining along with the intensity of staining of each of the biomarkers. The statistical algorithm or module employed in the present disclosure
5 considers the grading values of % of staining and intensity of staining and clinical prognostic parameters of a sample and arrives at a predictive score.

In preferred embodiments of the present disclosure, the method of prognosis of the instant disclosure provides significant prognosis of breast cancer risk recurrence in terms of
10 providing NPV (negative predictive value) of about 95%, when compared with the patient history data available.

In an exemplary embodiment, the validation study module of the instant disclosure is depicted in the flow-chart as below:

15 Conducting model retrospective validation study on additional 700 breast cancer patients (Stages I-III A).



IHC is performed on the tumor blocks for selected 5 markers.



20 'CanAssist Breast relapse score' is calculated based on the IHC results and 3 clinical parameters using the composite algorithm/Breast model equation.



25 Predicted 'risk of recurrence'/results are compared with actual outcomes confirming the prediction.

The present disclosure, further relates to a method of identifying expression of biological marker combination on cells in a biological sample being or suspected of being a early stage tumor/ cancer, said method comprising acts of:

- a) collecting, fixing, sectioning and treating the biological sample (which fulfills all the inclusion criteria as provided by the instant invention) with IHC reagents, followed by antigen retrieval using predetermined buffer solution and heat and adding primary antibody against ER/PR and/or Her-2-neu receptor (in case the ER/PR/Her-2-neu status is not previously known) followed by antibodies against biological marker combination of CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4; and
- b) adding secondary antibody conjugated with an enzyme and reagents for obtaining a colored reaction (i.e: substrate specific to the enzyme) or fluorescence for identifying positive expression of the hormonal receptors ER and/or PR; and biological marker combination.

Preferably, the present disclosure relates to a method of identifying expression of biological marker combination on cells in a biological sample, having one or both of ER and PR positive, and Her-2-neu negative, being or suspected of being a tumor/ cancer, said method comprising acts of:

- a) collecting, fixing, sectioning and treating the biological sample (which fulfills all the inclusion criteria as provided by the instant invention) with IHC reagents, followed by antigen retrieval using predetermined buffer solution and heat and adding antibodies against biological marker combination of CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4; and
- b) adding secondary antibody conjugated with an enzyme and reagents for obtaining a colored reaction (i.e: substrate specific to the enzyme) or fluorescence for identifying expression of the biological marker combination.

The biological samples are first checked for presence of ER and/or PR receptors and for absence of Her-2-neu receptors by IHC assay and only if the samples match the inclusion criteria of the instant invention and presence of ER⁺ and/or PR⁺ receptor status is confirmed (along with absence of Her-2-neu), said samples are considered for biomarker

combination expression using IHC assay. The samples are not tested for the 5 biomarker combination of the instant invention, if the hormone receptor status is found negative for both ER and PR expression. Alternatively, if the status of ER/PR/Her-2-neu receptors on the samples are already/previously known, the samples can directly be tested for the 5 biomarker combination of the present disclosure.

In another non-limiting embodiment of the present disclosure, the collecting, fixing, sectioning and treating is carried out under predetermined conditions by conventional immunohistochemistry technique. All possible ways and means to carry out immunohistochemistry known to a person skilled in the art is envisaged by the method and assay of the present disclosure.

In another non-limiting embodiment of the present disclosure, the samples are subjected to H&E (Haemotoxylin and Eosin) staining to measure the tumor content before the IHC assay of the present disclosure is performed.

In exemplary embodiments of the present disclosure, the process of identifying the biomarker in patient samples is carried out by collecting the tumor sample from the patients having inclusion criteria mentioned above. The sample is processed using formalin and other organic solvents and then embedded in paraffin to make a block; and the block is sectioned on a slide. The slide is then passed through a series of organic solvents to rehydrate the tumor. Thereafter, antigen retrieval is carried out under controlled experimental conditions, using specific buffer solutions and heat by Multiple Epitope Retrieval System (MERS) or water bath at 90°C. This is followed by cooling the section on the slide to room temperature (RT), followed by adding a blocking agent. This is followed by adding of primary antibody against the antigen of interest; which is in turn followed by addition of secondary antibody conjugated with an enzyme. Finally, appropriate reagents are added for obtaining a coloured reaction. The staining of the section is observed for identification of percentage of staining and intensity of staining, optionally along with location of staining for biomarker expression in patient tumor/cancer samples. Thus, IHC reagents employed in the present disclosure include at

least one of xylene, isopropanol, ethanol, buffer solutions, protein blocking agents, primary antibodies, secondary antibodies labeled with enzymes such as horseradish peroxidase (HRP) or alkaline phosphatase (AP) or with fluorescent tags such as fluorescein isothiocyanate (FITC) or phycoerythrin (PE) or with molecule
5 biotin/streptavidin, and substrates such as diamino benzydene (DAB) or p-nitrophenyl phosphate (PNPP).

Once the biological sample was identified for the ER/PR and/or Her-2-neu and found positive for ER and/or PR and negative for Her-2-neu by employing IHC assay, such
10 samples were identified for 5 biomarker combination expression and scored for percentage of tumors stained (0-100) and staining intensity (0-3) again by using IHC assay. Alternatively, if the biological sample is already known to be ER+ and/or PR+ and Her-2-neu -ve, IHC assay is directly performed to identify expression of 5 biomarker combination of the present disclosure. Manual grading is carried out before inputting the
15 data in the statistical algorithm or module and the grading comprises computing the percentage of staining along with the intensity of staining of each of the biomarkers. This IHC based data was analyzed using various statistical tools and information obtained therefrom was fed into a statistical algorithm along with 3 clinicopathological parameters data, for breast cancer risk stratification.

20 The present disclosure further relates to a method of prognosis of a subject having cancer or suspected of having early stage ER+/PR+ and Her2- breast cancer for cancer recurrence, said method comprising acts of:

- a) collecting biological sample from the subject having positive expression
25 of at least one receptor selected from a group comprising estrogen receptor and progesterone receptor and absence of Her-2-neu receptor in cells of the sample;
- b) carrying out IHC analysis on the cells of step (a) with antibody against biological marker combination of CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4;
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- c) identifying expression of the biological marker combination along with clinical prognostic parameters; and
- d) inputting this information in a statistical algorithm or module for predicting the prognosis of the subject (Figure 4).

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In embodiments of the present disclosure, the immunohistochemistry analysis is carried out by conventional method and wherein the identification of markers is carried out by visualizing a colored reaction or fluorescence obtained at completion of the method due to staining of the cells from the sample.

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In further embodiments of the present disclosure, parameters employed for analyzing expression of biomarkers are selected from a group comprising percentage of staining, intensity of staining and optionally location of staining or any combination thereof; and wherein the location of the staining is selected from a group comprising cell membrane, cytoplasm and nucleus or any combination thereof.

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In further embodiments of the present disclosure, manual grading is carried out before inputting the data in a statistical algorithm or module and the grading comprises computing the percentage of staining along with the intensity of staining of each of the biomarkers. The statistical algorithm or module employed in the present disclosure considers the grading scores and clinical prognostic parameters of a sample and arrives at a predictive score, in order to predict the prognosis as being high risk or low risk for breast cancer recurrence. The statistical algorithm or module computes the prediction score by taking into account the expression data of the 5 biomarker combination and clinical prognostic parameters (which is devised from the retrospective study on training set and respective patient history data).

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Thus, the present disclosure provides an assay or a tool for prognosis of breast cancer recurrence by studying and analyzing expression of a specific combination of biomarkers along with clinical prognostic parameters. The assay is performed by carrying out an immunohistochemistry based method which helps in studying and analyzing said

expression of biomarkers. Initially, as an optional step, the assay or method provides for identification of estrogen receptor and/or progesterone receptor, and proceeds to the next step only if one or both of the receptors are present. However, if the information on status of estrogen receptor and/or progesterone receptor is already known for a sample/patient, this step is not performed. In the next step, the assay provides for identification of expression of biomarkers CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4; preferably 5 biomarker combination of CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4, followed by grading the expression on the basis of parameters including percentage of staining and intensity of staining. The data from said grading along with status of clinical prognostic parameters is inputted into a proprietary statistical algorithm or module for obtaining a prediction score. The proprietary statistical algorithm or module is built on the basis of data obtained by retrospective study of 298 patient samples (training set) and comprises of expression data pertaining to each of the 5 biomarkers and clinical prognostic parameters. Since the retrospective study takes into consideration the patient history of all the samples, the expression data is calculated by the algorithm or module accordingly and a relapse score is computed. The relapse score is computed on a scale of 1-100 and scores of 15.5 and below are classified as low risk, and above 15.5 are classified as high risk. Lastly, the prediction score stratifies the respective patient into low risk or high risk category, based on the prediction of the prognosis of the subject. The patients are classified as high risk if the patient is expected to have >9% probability of distant recurrence within five years of initial treatment of breast cancer. Similarly, the patients are classified as low risk if the patient is expected to have 9% or lower probability of distant recurrence of breast tumor within five years of initial treatment of breast cancer. The cutoff of 9% risk of recurrence for 'low risk' patients is line with population recurrence rate of 10% and is lower than what similar prognostic tests offer for their low risk categories. As it can be understood lower the cutoff for the low risk category, higher would be usefulness of the same.

The present disclosure also relates to marker(s) employed in the method of prognosis of the instant disclosure, which are CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4,.

In preferred embodiments of the present disclosure, the marker acts as a bio-marker for prognosis of cancer recurrence in patients having breast cancer or suspected of having breast cancer.

- 5 In preferred embodiments of the present disclosure, the marker(s) of the instant disclosure are employed in combination for breast cancer prognosis.

The present disclosure also relates to method of using the markers of the present disclosure for prognosis of breast cancer in samples of patients having breast cancer or
10 suspected of having breast cancer.

The present disclosure also relates to a kit for prognosis of a subject having early stage ER+/PR+ and Her2- breast cancer or suspected of having early stage ER+/PR+ and Her2- breast cancer, said kit comprising antibody against biological markers CD44, ABCC11,
15 N-cadherin, Pan-cadherin and ABCC4, optionally along with at least one member from IHC reagents such as xylene, isopropanol, ethanol, buffer solutions, protein blocking agents, primary antibodies, secondary antibodies labeled with enzymes such as horseradish peroxidase (HRP) or alkaline phosphatase (AP) or with fluorescent tags such as fluorescein isothiocyanate (FITC) or phycoerythrin (PE) or with molecule
20 biotin/streptavidin, and substrates such as diaminobenzydene (DAB) or p-nitrophenyl phosphate (PNPP), for performing immunohistochemistry and instruction manual.

A more complete understanding can be obtained by reference to the following specific examples, which are provided for purposes of illustration only and are not intended to
25 limit the scope of the disclosure.

EXAMPLES

Biomarkers & antibodies

The biomarkers and antibodies against said biomarker being used in the instant disclosure
30 are selected from one or more of the following:

CD44; ABCC11; N-cadherin; Pan-cadherin; ABCC4. These antibodies are purchased from reputed Antibody manufacturers including Thermo Scientific, Novus, Abnova Spring, and AbCam.

- 5 The organic solvents, reagents (buffer, detergent etc), secondary antibody and enzymes (substrate specific to the enzyme), mentioned in the detailed protocol below are only for the purposes of illustration and should not be construed to be limiting in nature. The instant disclosure envisages and encompasses all possible combinations and alternatives of such solvents, reagents/substrates, secondary antibody and enzymes known and
10 commonly used by a person skilled in the art.

Furthermore, the abbreviations referred in the instant disclosure have the following meaning (table no. 2):

Column Name	Description
Outcome	1- Good Outcome/ No recurrence 0- Bad Outcome/Recurrence
Sample No.	Unique patient code
TNM	T- Tumor size (0-n) N- Node status (0-n) M- Metastases (present - 1, absent - 0, unknown - x)
Stage	Stage of disease based on TNM at the time of diagnosis
Age	Age of patient at the time of diagnosis
ER	Percentage expression of Estrogen Receptor in Nucleus of tumor cells
ER-I	Intensity of marker Estrogen Receptor expression in Nucleus of tumor cells
PR	Percentage expression of Progesterone Receptor in Nucleus of tumor cells
PR-I	Intensity of marker Progesterone Receptor expression in Nucleus of tumor cells

Her-2	Her-2-neu Status 0-Negative 1-Positive
A%-M	Percentage expression of marker A on Membrane of tumor cells
AI-M	Intensity of marker A expression on Membrane of tumor cells
C%-C	Percentage expression of marker C in Cytoplasm of tumor cells
CI-C	Intensity of marker C expression in Cytoplasm of tumor cells
C%-N	Percentage expression of marker C in Nucleus of tumor cells
CI-N	Intensity of marker C expression Nucleus of tumor cells
F%-M	Percentage expression of marker F on Membrane of tumor cells
FI-M	Intensity of marker F expression on Membrane of tumor cells
F%-C	Percentage expression of marker F in Cytoplasm of tumor cells
FI-C	Intensity of marker F expression in Cytoplasm of tumor cells
K%-M	Percentage expression of marker K on Membrane of tumor cells
KI-M	Intensity of marker K expression on Membrane of tumor cells
K%-C	Percentage expression of marker K in Cytoplasm of tumor cells
KI-C	Intensity of marker K expression in Cytoplasm of tumor cells
M%-C	Percentage expression of marker M in Cytoplasm of tumor cells
MI-C	Intensity of marker M expression in Cytoplasm of tumor cells
N%-C	Percentage expression of marker N in Cytoplasm of tumor cells
NI-C	Intensity of marker N expression in Cytoplasm of tumor cells
O%-M	Percentage expression of marker O on Membrane of tumor cells

OI-M	Intensity of marker O expression on Membrane of tumor cells
P%-N	Percentage expression of marker P in Nucleus of tumor cells
PI-N	Intensity of marker P expression Nucleus of tumor cells
R%-M	Percentage expression of marker R on Membrane of tumor cells
RI-M	Intensity of marker R expression on Membrane of tumor cells
R%-C	Percentage expression of marker R in Cytoplasm of tumor cells
RI-C	Intensity of marker R expression in Cytoplasm of tumor cells
U%-M	Percentage expression of marker U on Membrane of tumor cells
UI-M	Intensity of marker U expression on Membrane of tumor cells
U%-C	Percentage expression of marker U in Cytoplasm of tumor cells
UI-C	Intensity of marker U expression in Cytoplasm of tumor cells
V%-M	Percentage expression of marker V on Membrane of tumor cells
VI-M	Intensity of marker V expression on Membrane of tumor cells
V%-C	Percentage expression of marker V in Cytoplasm of tumor cells
VI-C	Intensity of marker V expression in Cytoplasm of tumor cells
W%-M	Percentage expression of marker W on Membrane of tumor cells
WI-M	Intensity of marker W expression on Membrane of tumor cells
W%-C	Percentage expression of marker W in Cytoplasm of tumor cells
WI-C	Intensity of marker W expression in Cytoplasm of tumor cells
ZA1%-M	Percentage expression of marker ZA1 on Membrane of tumor cells
ZA1I-M	Intensity of marker ZA1 expression on Membrane of tumor cells

ZA1%-C	Percentage expression of marker ZA1 in Cytoplasm of tumor cells
ZA1I-C	Intensity of marker ZA1 expression in Cytoplasm of tumor cells
ZB%-C	Percentage expression of marker ZB in Cytoplasm of tumor cells
ZBI-C	Intensity of marker ZB expression in Cytoplasm of tumor cells
ZC%-M	Percentage expression of marker ZC on Membrane of tumor cells
ZCI-M	Intensity of marker ZC expression on Membrane of tumor cells
ZC%-C	Percentage expression of marker ZC in Cytoplasm of tumor cells
ZCI-C	Intensity of marker ZC expression in Cytoplasm of tumor cells
ZD%-C	Percentage expression of marker ZD in Cytoplasm of tumor cells
ZDI-C	Intensity of marker ZD expression in Cytoplasm of tumor cells
ZF2%-N	Percentage expression of marker ZF2 in Nucleus of tumor cells
ZF2I-N	Intensity of marker ZF2 expression Nucleus of tumor cells
Date of Diagnosis	Date of diagnosis of breast cancer
Date of Last follow up	Date of latest visit of patient at the hospital
Date of Death	Date of Death of patient due to disease
Current Status	Current Status 0 - Dead 1 - Alive
Status Unknown	Current status is unknown
DFS (in months)	DFS: Disease Free Survival (in months)
TTP 1st Recurrence (in months)	TTP: Time to Tumor Progression 1st Recurrence (in months)
Date of 1st Recurrence	Date of diagnosis of 1st recurrence
Location of 1st Recurrence	Site of 1st recurrence Eg: Lung, Liver, brain

TTP 2nd Recurrence (in months)	TTP: Time to Tumor Progression 2nd Recurrence (in months)
Date of 2nd Recurrence	Date of diagnosis of 2nd recurrence
Location of 2nd Recurrence	Site of 2nd recurrence Eg: Lung, Liver, brain
TTP 3rd Recurrence (in months)	TTP: Time to Tumor Progression 3rd Recurrence (in months)
Date of 3rd Recurrence	Date of diagnosis of 3rd recurrence
Location of 3rd Recurrence	Site of 3rd recurrence Eg: Lung, Liver, brain
TTP 4th Recurrence (in months)	TTP: Time to Tumor Progression 4th Recurrence (in months)
Date of 4th Recurrence	Date of diagnosis of 4th recurrence
Location of 4th Recurrence	Site of 4th recurrence Eg: Lung, Liver, brain

Table 2

Examples 1: Identification and development of 5 biomarker combination of the present disclosure

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Sample selection and H&E Staining

All studies are performed with approval of the Institutional Review Board and Ethics Committees of the Hospitals participating in the study. Informed consent is waived according to Indian Council of Medical Research (ICMR) guidelines since the study is retrospective, observational, non-interventional and anonymized. For the present study, women with Stage I, II and III Invasive Ductal Carcinoma (IDC) of the Breast, Aged <74, ER+ve and/or PR+ve, Her2-ve, with minimum 5-year follow up and known clinical outcome are considered. Majority of the patients are in Stage II. All patient samples are stripped of personal identifiers, information is collected on age and calendar year of diagnosis, surgery, tumor (size, grade, histologic type, and ER status), nodal status, radiation treatment, hormonal therapy or chemotherapy, and clinical follow-up, including local, loco-regional, or distant recurrences, second primary malignancies, and death or

15

date of last visit. Primary breast tumor surgical samples less than 15 years old (from either Modified Radical Mastectomy or Breast Conserving Surgery) are used.

H&E staining was carried out to ensure that samples mandatorily have a major component of IDC, and have at least 30% tumor content. Samples with extensive necrosis, crush artifacts, poorly processed tissue, only DCIS component and singly scattered cells are excluded.

ER/PR staining is carried out for all samples, and only those samples that are ER+ and/or PR+ are included.

IHC assay in the prognostic test of the instant disclosure and Development of the CanAssist Breast algorithm

A total of 298 tumor samples having the inclusion criteria mentioned above are considered for the IHC assay. The technique used for the identification of markers in a patient sample in the present disclosure involves Immunohistochemistry (IHC).

The process of identifying the biomarker in patient samples is carried out using the technique as below:

Tumor sample is collected from the patients identified above. The sample is processed using formalin and other organic solvents and then embeded in paraffin to make a block

↓

The block is sectioned on a slide

↓

The slide is passed through a series of organic solvents to rehydrate the tumor

↓

Antigen retrieval is carried out under controlled experimental conditions, using specific buffer solution and heat, using Multiple Epitope Retrieval System (MERS) or Water Bath at 90°C.

↓

This is followed by cooling the section on the slide to room temperature (RT)

↓

Followed by adding blocking agent

↓

5 Followed by adding of primary antibody against the antigen of interest

↓

Followed by adding of secondary antibody conjugated with an enzyme

↓

Followed by adding of reagents for obtaining a coloured reaction

10

↓

Observing staining for grading of % of staining and intensity of staining, optionally along with location of staining for biomarker expression in patient tumor/cancer samples.

15 The above process is carried out and then repeated for identifying expression of each of the biomarkers in each sample. Initially, a total of 41 biomarkers most commonly associated in the literature with breast cancer are considered for screening each sample. However, no meaningful relevance was observed for 24 biomarkers with respect to their ability of being prognostic in nature. The data from the remaining 17 markers was
20 analyzed in detail and used for the training set for determining critical biomarkers to be used for the Statistical algorithm development.

The stained slides (slides containing tumor section from training set samples stained with antibodies against each of the 17 markers) are thereafter analyzed manually by a
25 Pathologist for scoring/grading Each sample is scored for percentage of tumors stained (0-100) and the staining intensity (0-3) for each of the markers. A representative set of the complete training set is provided herewith by way of table no. 3 (cumulative of tables 3A, 3B, 3C and 3D) wherein IHC measurements for each of the 17 markers are provided for 160 data samples, along with consideration of clinical prognostic parameters (tumor size,
30 node status and tumor grade).

To select the most relevant prognostic markers, the markers are ranked by the absolute value of Pearson correlation coefficient between the marker value and the outcome (Recurrence/No Recurrence from the corresponding patient history). This method is chosen, as no other marker selection algorithm matches or surpasses its performance.

- 5 Each IHC marker corresponds to multiple IHC features (numeric values), since the protein and intensity levels are evaluated in the cell nucleus, cytoplasm and/or membrane. The marker selection process is integrated inside the cross-validation loop to avoid selection bias. Based on comparison of scoring against the patient history available for each of the samples, a set of 5 most relevant biomarkers is selected for its ability of being prognostic
- 10 in nature. These markers are CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4.

Sl. No.	Outcome	TNM	Grade	Stage	Age	ER	ER-I	PR	PR-I	Her-2	A%-M	AI-M	C%-C	CI-C	C%-N	CI-N
1	1	T1N0M0	2	1	43	80	2	60	3	0	22.5	2	52.5	1.5	52.5	1.75
2	1	T1N0M0	3	1	38	95	3	60	3	1	20	2	27.5	1.25	47.5	2
3	1	T1N0M0	2	1	53	90	3	60	2	0	12.5	0.5	27.5	1	12.5	0.5
4	1	T1N0M0	2	1	57	80	3	90	3	0	55	2	42.5	1.25	50	2
5	1	T1N0M0	3	1	47	70	3	25	3	0	12.5	0.5	47.5	1.5	12.5	0.5
6	1	T1N0M0	3	1	56	0	0	35	1	1	50	2	12.5	0.25	22.5	1
7	1	T1N0M0	2	1	43	95	3	80	3	1	57.5	2	22.5	0.75	50	2
8	1	T1N0M0	2	1	56	50	2	50	3	0	47.5	2	25	1	32.5	1.75
9	1	T1N0M0	2	1	73	80	2	90	3	0	25	1.25	35	1.25	35	1.5
10	1	T1N0M0	2	1	54	80	3	90	3	0	57.5	1.5	12.5	0.25	57.5	1.5
11	1	T1N0M0	1	1	53	80	2	90	3	0	50	2	37.5	0.75	22.5	1
12	1	T1cN0M0	2	1	49	90	3	90	3	0	52.5	1.5	12.5	0.25	47.5	1.5
13	1	T1cN0M0	1	1	41	83	3	80	3	0	47.5	1.75	12.5	0.25	25	1.25
14	1	T1N0M0	3	1	59	70	3	0	0	0	27.5	1.25	45	0.75	30	1.25
15	1	T1N0M0	2	1	51	80	2	50	2	0	12.5	0.5	52.5	1.75	12.5	0.5
16	1	T1N0M0	2	1	60	35	1.5	0	0	0	27.5	1.5	45	1.25	12.5	0.5
17	1	T1N0M0	3	1	57	75	2	50	2	0	12.5	0.5	37.5	1.5	12.5	0.5
18	1	T1N0M0	2	1	33	40	2	5	2	0	17.5	0.75	50	1.25	12.5	0.5
19	1	T1N0M0	1	1	47	75	2.5	90	3	0	22.5	1.5	52.5	1.5	12.5	0.5
20	1	T1N0M0	2	1	65	80	2	0	0	1	52.5	1.5	52.5	1.5	12.5	0.5
21	1	T1N0M0	2	1	37	20	1.5	70	2.5	0	17.5	1.5	25	1.25	12.5	0.5
22	1	T1N0M0	2	1	37	80	2	25	2	0	17.5	1.5	45	1.5	12.5	0.5
23	1	T1N0M0	2	1	35	75	2	70	2	0	27.5	1.5	50	1.25	12.5	0.5
24	1	T1N0M0	2	1	47	90	3	90	3	0	50	1.5	52.5	1.5	12.5	0.5
25	1	T2N0M0	2	2A	58	60	3	30	3	0	27.5	2	12.5	0.25	42.5	1.75
26	1	T2N0M0	2	2A	26	75	3	100	3	0	22.5	1.75	12.5	0.25	50	2
27	1	T2N0M0	3	2A	54	95	3	95	3	1	32.5	1.75	52.5	1.5	12.5	0.5
28	1	T2N0M0	3	2A	61	75	3	0	0	1	22.5	1	47.5	1.5	12.5	0.5
29	1	T2N0M0	3	2A	54	90	3	20	3	0	30	1.75	47.5	1	55	1.5
30	1	T2N0M0	2	2A	48	75	2	90	3	1	30	1.5	57.5	1.5	12.5	0.5
31	1	T2N0M0	2	2A	54	100	3	100	3	0	12.5	0.5	57.5	1	57.5	2
32	1	T2N0M0	2	2A	23	65	3	10	3	1	12.5	0.5	52.5	1	37.5	1.5
33	1	T2N0M0	3	2A	62	70	3	0	0	0	17.5	1.25	47.5	1.25	57.5	2
34	1	T2N0M0	3	2A	46	30	2	0	0	0	32.5	2	22.5	1	17.5	2
35	1	T2N0M0	3	2A	64	80	3	10	3	1	17.5	2	47.5	1.25	42.5	1.5
36	1	T2N0M0	2	2A	63	90	3	90	3	1	12.5	0.5	60	1.25	42.5	1.5

37	1	T2N0M0	3	2A	49	5	3	0	0	1	20	1.25	37.5	1.25	42.5	1.5
38	1	T2N0M0	3	2A	54	90	3	70	3	0	12.5	0.5	32.5	1.25	22.5	1
39	1	T2N0M0	2	2A	66	10	1.5	40	2	0	30	2	27.5	1	27.5	1.5
40	1	T2N0M0	2	2A	45	40	2	90	3	0	17.5	1.25	47.5	1.25	17.5	1.5
41	1	T2N0M0	3	2A	80	80	3	75	3	1	57.5	2	37.5	0.75	57.5	2
42	1	T2N0M0	3	2A	53	75	3	75	3	1	50	2	22.5	0.75	47.5	1.75
43	1	T2N0M0	2	2A	43	10	2	50	2	0	17.5	1.25	37.5	1.25	12.5	0.5
44	1	T2N0M0	2	2A	66	75	2	20	2	0	32.5	1.25	47.5	1.25	22.5	1.25
45	1	T2N0M0	1	2A	77	90	3	30	2.5	0	32.5	1.5	12.5	0.25	27.5	1.25
46	1	T2N0M0	1	2A	48	60	2.5	70	3	0	50	1.5	12.5	0.25	12.5	0.5
47	1	T2N0M0	2	2A	50	60	3	25	2	0	12.5	0.5	12.5	0.25	12.5	0.5
48	1	T2N0M0	2	2A	53	30	2	50	2	0	47.5	1.5	27.5	1	27.5	0.75
49	1	T2N0M0	2	2A	53	80	2.5	80	3	1	42.5	2	37.5	0.75	37.5	1
50	1	T2N0M0	2	2A	65	90	3	90	3	0	42.5	1	42.5	1.25	32.5	1.5
51	1	T2N0M0	2	2A	52	80	3	35	2	0	25	1	52.5	1.5	27.5	1
52	1	T2N0M0	2	2A	38	70	2	0	0	0	12.5	0.5	17.5	0.75	32.5	1.5
53	1	T2N0M0	2	2A	63	70	2.5	50	2	0	22.5	1.25	32.5	0.75	47.5	1.5
54	1	T2N0M0	1	2A	56	80	2.5	50	2	1	30	1.25	52.5	1.5	12.5	0.5
55	1	T2N0M0	1	2A	62	90	3	65	2.5	1	20	1.5	52.5	1.5	12.5	0.5
56	1	T2N0M0	3	2A	41	30	2	40	2.5	0	47.5	2	32.5	1	27.5	1.5
57	1	T2N0M0	2	2A	42	30	2	30	2	1	22.5	2	52.5	1.5	12.5	0.5
58	1	T2N0M0	3	2A	55	10	2	50	2	1	22.5	1.5	52.5	1.5	12.5	0.5
59	1	T2N0M0	3	2A	45	60	2	40	2	0	57.5	2	52.5	1.5	12.5	0.5
60	1	T2N0M0	2	2A	65	70	2	0	0	0	22.5	1	47.5	1.25	12.5	0.5
61	1	T2N0M0	3	2A	49	60	3	30	2	0	20	1.25	42.5	1.25	12.5	0.5
62	1	T2N0M0	2	2A	67	70	2.5	30	2.5	0	42.5	1.25	52.5	1.5	17.5	1.5
63	1	T2N0M0	3	2A	56	20	3	20	3	0	42.5	1.5	12.5	0.25	12.5	0.5
64	1	T2N0M0	2	2A	57	0	0	25	1.5	0	25	1.5	42.5	1.5	20	1.25
65	1	T2N0M0	2	2A	49	20	1.5	35	1.5	0	27.5	1.5	52.5	1.5	17.5	1.5
66	1	T2N0M0	2	2A	54	60	2	10	2	0	12.5	0.5	52.5	1.5	12.5	0.5
67	1	T2N0M0	2	2A	57	10	2	0	0	1	22.5	1	52.5	1	12.5	0.5
68	1	T2N0M0	2	2A	43	40	2.5	40	3	0	12.5	0.5	47.5	1.5	12.5	0.5
69	1	T2N0M0	2	2A	41	60	2.5	20	2.5	0	20	1.5	47.5	1.5	12.5	0.5
70	1	T2N0M0	2	2A	40	60	2.5	70	2.5	0	37.5	1.5	47.5	1	12.5	0.5
71	1	T2N0M0	3	2A	50	0	0	20	2	1	17.5	1.25	42.5	1.25	12.5	0.5
72	1	T2N0M0	3	2A	43	90	3	60	3	0	20	1	12.5	0.25	42.5	1.5
73	1	T2N0M0	2	2A	42	80	3	50	3	0	22.5	2	42.5	1.25	12.5	0.5
74	1	T2N0M0	3	2A	46	0	0	25	2.5	0	37.5	1.5	12.5	0.25	27.5	1.25
75	1	T2N0M0	2	2A	38	70	2	45	2	1	27.5	1.5	45	1.25	12.5	0.5

76	1	T2N0M0	2	2A	69	60	1.5	10	2	1	30	1.5	42.5	1.25	27.5	1.5
77	1	T2N0M0	2	2A	38	75	2	0	0	0	47.5	1.75	22.5	1	12.5	0.5
78	1	T2N0M0	2	2A	64	90	2.5	80	2	0	45	1.5	42.5	1.25	12.5	0.5
79	1	T2N0M0	3	2A	54	65	2.5	45	2	0	12.5	0.5	52.5	1.5	12.5	0.5
80	1	T2N0M0	3	2A	73	0	0	30	2	0	50	2	52.5	1.5	12.5	0.5
81	1	T2N0M0	3	2A	35	80	2.5	45	2.5	0	27.5	1	50	1.25	12.5	0.5
82	1	T2N0M0	3	2A	60	35	2	5	2	1	12.5	0.5	47.5	1	12.5	0.5
83	1	T2N0M0	2	2A	52	80	2	55	2	1	22.5	1.5	47.5	1.5	12.5	0.5
84	1	T2N0M0	2	2A	49	25	2	0	0	1	47.5	1.5	17.5	1.25	12.5	0.5
85	1	T2N0M0	2	2A	53	90	2.5	40	2	0	22.5	1.5	52.5	1.5	12.5	0.5
86	1	T2N0M0	2	2A	59	65	2.5	80	2.5	0	12.5	0.5	52.5	1.5	12.5	0.5
87	1	T2N0M0	2	2A	51	90	2.5	70	2	0	35	1.5	25	1	12.5	0.5
88	1	T2N0M0	3	2A	53	70	2.5	35	2	0	15	1.5	40	1.25	12.5	0.5
89	1	T2N0M0	3	2A	60	0	0	35	2	1	40	1.5	35	1.5	12.5	0.5
90	1	T1N1M0	2	2A	52	0	0	15	2	1	32.5	1.75	12.5	0.25	42.5	2
91	1	T1N1M0	2	2A	45	35	2	0	0	0	32.5	1.5	22.5	0.75	42.5	1.5
92	1	T1N1M0	2	2A	33	40	2	90	2.5	1	12.5	0.5	52.5	1.5	37.5	1.25
93	1	T1N1M0	3	2A	51	60	2.5	40	2	1	12.5	0.5	52.5	1.5	12.5	0.5
94	1	T1N1M0	3	2A	52	80	3	30	3	0	55	2	17.5	0.75	12.5	0.5
95	1	T1N1M0	3	2A	53	65	3	70	3	0	55	2	17.5	0.75	47.5	1.5
96	1	T1N1M0	2	2A	51	60	2	50	2	0	42.5	1.5	52.5	1.25	12.5	0.5
97	1	T1N1M0	2	2A	37	70	3	70	3	0	42.5	1.5	37.5	1	12.5	0.5
98	1	T1N1M0	1	2A	41	70	2.5	90	3	0	30	1.5	52.5	1.5	12.5	0.5
99	1	T1N1M0	3	2A	37	0	0	20	2	0	50	1.75	52.5	1.5	17.5	1.5
100	1	T1N1M0	3	2A	50	50	2	25	2.5	0	12.5	0.5	47.5	1.25	12.5	0.5
101	1	T1N1M0	2	2A	55	75	2	65	2	0	32.5	1.75	47.5	1.25	12.5	0.5
102	1	T2N1M0	3	2A	51	70	2.5	30	2.5	1	17.5	1.5	37.5	1.25	12.5	0.5
103	1	T2N1M0	2	2A	62	80	2.5	0	0	0	12.5	0.5	47.5	1.5	12.5	0.5
104	1	T2N1M0	2	2A	45	80	2.5	90	3	0	12.5	0.5	47.5	1	12.5	0.5
105	1	T2N1M0	2	2A	54	30	1.5	0	0	0	17.5	1.5	50	1.25	12.5	0.5
106	1	T2N1M0	1	2A	60	90	2.5	75	2.5	0	30	1.5	52.5	1.25	12.5	0.5
107	1	T2N1M0	1	2A	35	80	2.5	70	2	0	22.5	1.5	47.5	1.5	12.5	0.5
108	1	T2N1M0	2	2A	56	90	3	5	2.5	0	30	1.5	52.5	1.25	12.5	0.5
109	1	T2N0M0	2	2A	69	60	1.5	90	2.5	0	42.5	1.5	50	1.5	12.5	0.5
110	1	T2N0M0	2	2A	52	65	2	80	2.5	0	12.5	0.5	42.5	0.75	12.5	0.5
111	1	T2N0M0	2	2A	42	85	3	90	2.5	0	37.5	1.5	47.5	1.5	50	1.5
112	1	T2N0M0	3	2A	50	60	2	0	0	1	15	1.5	52.5	1.5	12.5	0.5
113	1	T2N0M0	3	2A	40	50	2	50	2	1	15	1.5	52.5	1.25	12.5	0.5
114	1	T2N0M0	3	2A	42	80	3	70	3	0	20	1.5	52.5	1.5	12.5	0.5

115	1	T2N1M0	2	2B	58	90	2.5	30	2	1	30	1.5	52.5	1.5	12.5	0.5
116	1	T2N1M0	2	2B	55	80	3	0	0	0	17.5	2	12.5	0.25	42.5	2
117	1	T2N1M0	3	2B	36	70	1.5	90	3	0	22.5	1	52.5	1.75	12.5	0.5
118	1	T2N1M0	3	2B	40	60	3	20	3	0	22.5	2	12.5	0.25	35	2
119	1	T2N1M0	3	2B	40	0	0	20	1	0	12.5	0.5	37.5	1	32.5	1.25
120	1	T2N1M0	2	2B	44	100	3	100	3	0	30	2	57.5	1.5	32.5	1.5
121	1	T2N1M0	3	2B	51	50	3	90	3	1	12.5	0.5	37.5	1	52.5	2
122	1	T2N1M0	3	2B	61	100	3	25	3	0	30	2	22.5	1.25	17.5	1
123	1	T2N1M0	3	2B	41	100	3	100	3	1	22.5	2	30	1	42.5	1.5
124	1	T2N1M0	2	2B	50	20	2	0	0	1	25	1.25	52.5	1.25	22.5	1
125	1	T2N1M0	2	2B	64	80	3	80	3	0	22.5	1.5	47.5	1.5	12.5	0.5
126	1	T2N1M0	2	2B	55	80	3	80	3	0	12.5	0.5	32.5	1	37.5	1.5
127	1	T2N1M0	2	2B	62	30	1	0	0	0	20	1.25	12.5	0.25	12.5	1.5
128	1	T2N1M0	3	2B	35	70	3	90	3	0	55	1.75	20	1.25	60	2
129	1	T2N1M0	3	2B	46	85	3	90	3	0	52.5	2	52.5	1	32.5	1.5
130	1	T2N1M0	2	2B	62	50	3	50	3	0	57.5	2	32.5	1.25	17.5	1
131	1	T2N1M0	2	2B	67	10	1.5	15	2	0	22.5	1.25	12.5	0.25	12.5	0.5
132	1	T2N1M0	2	2B	47	80	3	60	2	0	12.5	0.5	47.5	1.25	27.5	1
133	1	T2N1M0	2	2B	61	50	2.5	0	0	0	32.5	1	52.5	1.5	12.5	0.5
134	1	T2N1M0	3	2B	61	50	3	70	2	1	57.5	2	52.5	1.5	12.5	0.5
135	1	T2N1M0	2	2B	54	65	3	20	2	0	25	1.75	50	1.5	12.5	0.5
136	1	T2N1M0	1	2B	52	60	2.5	60	2	0	45	1.5	47.5	1.25	12.5	0.5
137	1	T2N1M0	3	2B	53	30	2	20	2	0	12.5	0.5	42.5	1	20	1.5
138	1	T2N1M0	3	2B	37	75	2.5	35	2.5	0	50	1.75	50	1.5	12.5	0.5
139	1	T2N1M0	2	2B	30	50	2	60	2	0	12.5	0.5	52.5	1.25	12.5	0.5
140	1	T2N1M0	3	2B	48	35	1.5	10	2	0	52.5	1.75	52.5	1.5	12.5	0.5
141	1	T2N1M0	2	2B	42	90	3	90	3	0	15	1.5	47.5	1.25	42.5	1.25
142	1	T2N1M0	2	2B	53	65	2.5	0	0	0	12.5	0.5	42.5	1	12.5	0.5
143	1	T2N1M0	2	2B	36	40	2	15	2	0	27.5	1.75	52.5	1.5	12.5	0.5
144	1	T2N1M0	2	2B	48	80	2	90	2.5	0	12.5	0.5	42.5	1	12.5	0.5
145	1	T2N1M0	2	2B	45	20	2	20	2.5	0	30	1.5	45	1.25	12.5	0.5
146	1	T2N1M0	1	2B	66	65	2	10	2	0	15	1.5	45	1	12.5	0.5
147	1	T2N1M0	2	2B	61	90	3	70	2	0	17.5	1.25	42.5	1.25	20	1
148	1	T2N1M0	1	2B	53	75	3	70	3	1	47.5	1.5	32.5	1	42.5	1.5
149	1	T2N1M0	2	2B	57	80	2.5	30	1.5	0	20	1	47.5	1	52.5	1.5
150	1	T2N1M0	3	2B	37	60	3	80	3	1	55	2	37.5	0.75	35	1
151	0	T1N0M0	3	1	61	100	3	100	3	0	57.5	2	52.5	1	57.5	2
152	0	T2N0M0	3	2A	54	100	3	100	3	0	60	2	42.5	1	12.5	0.5
153	0	T2N0M0	3	2A	51	0	0	20	1.5	1	55	2	47.5	1.25	37.5	1.5

154	0	T2N0M0	2	2A	41	40	2	100	3	0	22.5	1.25	60	1	35	1.25
155	0	T2N0M0	3	2A	27	0	0	25	1.5	1	57.5	2	12.5	0.25	55	1.5
156	0	T2N0M0	3	2A	33	0	0	30	3	1	57.5	2	57.5	1.75	60	2
157	0	T2N0M0	2	2A	82	35	2	0	0	1	52.5	2	57.5	1.75	37.5	1.5
158	0	T2N0M0	2	2A	47	80	2.5	60	2.5	0	20	1.5	52.5	1.5	12.5	0.5
159	0	T2N0M0	3	2A	51	100	3	10	1	1	52.5	2	12.5	0.25	42.5	1.25
160	0	T2N0M0	3	2A	49	80	2	100	3	0	47.5	2	32.5	1	25	1.25

Table 3A

Sl. No	Outcome	Sample No.	F%-M	FI-M	F%-C	FI-C	K%-M	KI-M	K%-C	KI-C	M%-C	MI-C	N%-C	NI-C	O%-M	OI-M	P%-N	PI-N	R%-M	RI-M	R%-C	RI-C
1	1	MMBVSSSMKPR/AAJH/0467/06	22.85714286	1.25	22.5	1.25	22.5	1.75	57.5	2	60	2	45	1.75	12.5	0.5	22.5	1	24	1.25	25	1.5
2	1	MMBVSSSMKPR/ABMH/4734/07	25.71428571	1.25	30	0.5	30	1.5	57.5	1.75	52.5	1.5	37.5	1.25	17.5	1	45	2	20	0.5	27.5	1.5
3	1	MMBVSSSMKPR/HLRG/1219/03	18.57142857	1.25	12.5	1	12.5	0.5	17.5	1	42.5	1.5	47.5	1.25	32.5	1.25	27.5	1.5	26	1	37.5	1.25
4	1	MMBVSSSMKPR/ACRG/2834/03	32.85714286	1	57.5	0.5	32.5	1.5	55	2	27.5	1.25	52.5	2	12.5	0.5	20	1.5	20	0.5	20	1.25
5	1	MMBVSSSMKPR/AVRG/1397/04	24.28571429	1	12.5	0.5	25	1.5	55	2	47.5	1.75	50	1.75	12.5	0.5	27.5	1.5	20	0.5	22.5	1
6	1	MMBVSSSMKPR/AEMH/6521/06	27.14285714	1.75	12.5	0.5	17.5	1	47.5	2	47.5	1.5	22.5	1.5	12.5	0.5	12.5	0.5	20	0.5	17.5	1
7	1	MMBVSSSMKPR/AFJH/0478/06	15.71428571	1	12.5	1	17.5	1.25	52.5	2	42.5	1.5	47.5	1.75	12.5	0.5	32.5	1.5	40	1.25	32.5	1
8	1	MMBVSSSMKPR/HTMX/0675/08	12.85714286	0.5	22.5	1.25	12.5	0.5	55	2	52.5	1.25	57.5	1.5	12.5	0.5	35	1.5	30	1	37.5	1.25
9	1	MMBVSSSMKPR/IRRG/5724/08	30	1.25	32.5	1.25	32.5	1.5	47.5	1.75	30	1	37.5	1.25	37.5	1.25	27.5	1	48	1.5	32.5	1.25
10	1	MMBVSSSMKPR/JMRG/1480/08	18.57142857	1.25	20	1.5	35	1.25	47.5	2	32.5	1.25	42.5	1.25	22.5	1	45	1.25	24	1	20	1
11	1	MMBVSSSMKPR/HCGA1/222/10	12.85714286	0.5	50	2	17.5	1	37.5	1	52.5	1.5	52.5	1.75	12.5	0.5	22.5	1.5	20	0.5	12.5	1.25
12	1	MMBVSSSMKPR/KIDC/0164/06	25.71428571	1.25	42.5	1.5	32.5	1.25	42.5	1.25	30	1.25	42.5	1.75	27.5	1.5	50	2	28	1	30	0.5
13	1	MMBVSSSMKPR/KJDC/0167/06	15.71428571	1.25	45	1.5	25	1.5	47.5	2	27.5	1.25	47.5	1.75	12.5	0.5	42.5	1.5	28	1	47.5	1
14	1	MMBVSSSMKPR/KNDC/0176/05	27.14285714	1.5	50	0.5	27.5	1.5	47.5	1.5	42.5	1.25	42.5	1.5	27.5	1.5	47.5	1.75	30	1	12.5	1.5
15	1	MMBVSSSMKPR/MH11/3187/09	12.85714286	0.5	12.5	1.5	12.5	0.5	42.5	1.5	37.5	1.5	52.5	1.75	60	2	57.5	2	20	0.5	52.5	0.5
16	1	MMBVSSSMKPR/HCGA4/5535/06	12.85714286	0.5	52.5	1.75	17.5	1.25	47.5	1.5	47.5	1.5	52.5	1.75	12.5	0.5	12.5	0.5	20	0.5	50	1.5
17	1	MMBVSSSMKPR/SP5/6544/08	12.85714286	0.5	50	1.75	17.5	1	37.5	1.25	47.5	1	52.5	1.75	22.5	1.25	22.5	1.5	24	1.25	47.5	1.5
18	1	MMBVSSSMKPR/SP6/5298/06	34.28571429	1.5	50	1.5	40	1.25	47.5	1.5	45	1.25	47.5	1.75	37.5	1.25	12.5	0.5	46	1.5	52.5	1.5
19	1	MMBVSSSMKPR/SP6/6116/06	12.85714286	0.5	52.5	1.75	20	0.75	47.5	1.25	47.5	1.25	52.5	1.75	12.5	0.5	40	1.25	36	1.25	52.5	1.75
20	1	MMBVSSSMKPR/SP8/6543/06	34.28571429	1.5	52.5	1.75	50	1.25	52.5	1.75	52.5	1.5	52.5	1.75	50	1.25	12.5	0.5	52	1.25	52.5	1.5
21	1	MMBVSSSMKPR/SP9/1761/97	15.71428571	1	52.5	1.75	20	1.25	47.5	1.5	50	1.5	52.5	1.75	20	1.25	12.5	0.5	20	0.5	52.5	1.75
22	1	MMBVSSSMKPR/SP9/2006/02	20	1	52.5	1.75	27.5	1.25	52.5	1.75	50	1.75	50	1.75	22.5	1.25	12.5	0.5	28	1.25	52.5	1.75
23	1	MMBVSSSMKPR/SP10/4338/05	15.71428571	1.25	52.5	0.5	27.5	1.25	52.5	1.5	50	1.5	52.5	1.75	20	1	12.5	0.5	24	1.25	47.5	1.5
24	1	MMBVSSSMKPR/SP13/0242/10	12.85714286	0.5	12.5	0.5	42.5	1.25	50	1.5	47.5	1.5	52.5	1.75	30	1	42.5	1.5	30	1	17.5	1.75
25	1	MMBVSSSMKPR/ADRG/1440/02	18.57142857	1	12.5	0.5	32.5	1.75	37.5	2	52.5	2	27.5	1	22.5	1	32.5	1.5	26	1	27.5	1

26	1	MMBVSSSMKPR/AGMH/2268/04	21.42857143	1.25	12.5	1.5	12.5	0.5	47.5	1.5	60	2	20	1.25	20	1.25	50	2	20	0.5	47.5	1.25
27	1	MMBVSSSMKPR/AHMH/2180/03	18.57142857	1.5	22.5	0.5	17.5	1.25	57.5	2	52.5	1.75	55	1.5	12.5	0.5	27.5	1.5	26	1.25	47.5	1.5
28	1	MMBVSSSMKPR/AJMH/1975/03	38.57142857	1.75	12.5	0.5	32.5	1.5	52.5	1.75	47.5	1.5	12.5	0.5	47.5	1.25	57.5	2	32	1.25	52.5	1.5
29	1	MMBVSSSMKPR/AKMH/1186/03	12.85714286	0.5	12.5	1.25	12.5	0.5	55	2	57.5	1.5	60	1.5	12.5	0.5	45	1.75	44	1.25	12.5	1.5
30	1	MMBVSSSMKPR/ALMH/4227/05	22.85714286	1.25	42.5	0.5	12.5	0.5	55	1.5	47.5	1.75	52.5	1.5	22.5	1.25	17.5	1.25	36	1.25	47.5	0.5
31	1	MMBVSSSMKPR/AMMH/2138/05	12.85714286	0.5	12.5	0.5	52.5	1.5	52.5	1.5	50	1.25	42.5	1.75	32.5	1.75	12.5	0.5	20	0.5	42.5	1.5
32	1	MMBVSSSMKPR/ANMH/6528/05	12.85714286	0.5	12.5	1.5	12.5	0.5	37.5	1.25	47.5	1.5	37.5	1.25	12.5	0.5	37.5	1.75	24	1.5	22.5	1.5
33	1	MMBVSSSMKPR/AOMH/1621/05	24.28571429	1	52.5	1.5	12.5	0.5	57.5	2	47.5	1.5	25	1	12.5	0.5	17.5	1.25	24	1.25	27.5	1
34	1	MMBVSSSMKPR/APMH/6408/05	12.85714286	0.5	20	0.5	12.5	0.5	47.5	2	57.5	1	12.5	0.5	45	1.75	12.5	0.5	20	0.5	17.5	1.5
35	1	MMBVSSSMKPR/AQMH/1408/06	22.85714286	1.25	12.5	1	35	1.5	37.5	1.5	22.5	1.5	30	1	25	1.25	47.5	1.5	36	1	12.5	1.25
36	1	MMBVSSSMKPR/ARMH/4622/06	12.85714286	0.5	52.5	1	32.5	1.5	55	1.5	47.5	1.25	47.5	1.75	45	1.5	50	1.75	32	1	25	0.5
37	1	MMBVSSSMKPR/ASRG/5174/03	20	1	32.5	1	12.5	0.5	37.5	1.25	42.5	1.25	47.5	1.5	52.5	1.5	12.5	0.5	40	1.5	27.5	1
38	1	MMBVSSSMKPR/ATMH/4074/01	17.14285714	1	17.5	1	17.5	1	47.5	1.75	52.5	1.75	30	1.25	12.5	0.5	20	1.25	20	0.5	22.5	1.5
39	1	MMBVSSSMKPR/AYRG/3670/02	12.85714286	0.5	30	1	12.5	0.5	60	2	50	2	32.5	1.5	17.5	1.25	12.5	0.5	20	0.5	45	1.25
40	1	MMBVSSSMKPR/AZRG/1472/02	32.85714286	1	47.5	1	22.5	1.25	50	1.75	47.5	1.75	47.5	2	12.5	0.5	12.5	0.5	36	1	42.5	1.5
41	1	MMBVSSSMKPR/BAJH/0102/07	28.57142857	1	37.5	0.5	12.5	0.5	27.5	1	47.5	1.5	37.5	1.5	52.5	1.25	42.5	2	38	1	42.5	1.5
42	1	MMBVSSSMKPR/HSMH/4789/07	17.14285714	1	12.5	0.5	22.5	1.25	50	2	32.5	1.5	37.5	1.5	12.5	0.5	47.5	2	20	0.5	17.5	1.25
43	1	MMBVSSSMKPR/HKRG/3754/03	12.85714286	0.5	12.5	1.75	12.5	0.5	45	1.5	57.5	1.5	47.5	1.25	22.5	1.25	22.5	1.25	24	1	52.5	1
44	1	MMBVSSSMKPR/IMRG/5141/08	12.85714286	0.5	42.5	1.5	20	1	60	2	47.5	1.25	57.5	2	17.5	1	27.5	1.25	32	1.5	57.5	2
45	1	MMBVSSSMKPR/IQRG/5751/08	37.14285714	2	42.5	1.5	12.5	0.5	27.5	1.25	57.5	1.25	42.5	1.25	27.5	1	50	1.5	20	0.5	32.5	2
46	1	MMBVSSSMKPR/JNRG/6963/08	18.57142857	1	42.5	1.5	25	1.25	50	2	45	1.25	57.5	2	30	0.75	42.5	1.25	32	1.25	47.5	1.25
47	1	MMBVSSSMKPR/JORG/6520/08	17.14285714	1.5	47.5	1.5	27.5	1.25	52.5	2	40	1.75	55	2	12.5	0.5	42.5	1.25	32	1.25	52.5	1.5
48	1	MMBVSSSMKPR/IXRG/1912/08	17.14285714	1	47.5	2	37.5	1.25	25	1.5	47.5	1.5	47.5	1.75	12.5	0.5	27.5	1	30	1.5	37.5	1.75
49	1	MMBVSSSMKPR/IHRG/1461/07	18.57142857	1	52.5	1.25	32.5	1.25	47.5	2	60	1.5	45	1	12.5	0.5	42.5	1	40	1.5	47.5	1.75
50	1	MMBVSSSMKPR/INRG/6074/08	15.71428571	1	27.5	1.75	12.5	0.5	55	2	52.5	1.5	47.5	1.5	12.5	0.5	25	1.25	26	1.5	27.5	1.5
51	1	MMBVSSSMKPR/JPRG/7119/08	18.57142857	1	47.5	1.5	35	1.25	52.5	2	45	1.5	50	1.75	45	1.25	37.5	1.25	28	1.25	37.5	1.5
52	1	MMBVSSSMKPR/IARG/1209/01	12.85714286	0.5	22.5	1.5	37.5	1.25	42.5	2	47.5	2	20	1	12.5	0.5	12.5	0.5	20	0.5	37.5	1.5

53	1	MMBVSSSMKPR/JQRG/6998/08	18.57142857	1	32.5	1.5	22.5	1.25	52.5	2	42.5	1.25	57.5	2	27.5	0.75	55	1.5	32	1	30	1.25
54	1	MMBVSSSMKPR/HCGA1/5042/08	18.57142857	1.25	47.5	1.75	22.5	1	52.5	1.75	52.5	1.5	52.5	1.5	20	1.25	17.5	1.5	20	0.5	42.5	1
55	1	MMBVSSSMKPR/RG20/7272/08	18.57142857	1	47.5	0.5	42.5	1.25	52.5	1.75	52.5	1.75	52.5	1.75	37.5	1	57.5	1.25	30	1	42.5	1.5
56	1	MMBVSSSMKPR/MH10/826/06	12.85714286	0.5	12.5	1.25	12.5	0.5	50	1.5	42.5	1.75	42.5	1.5	50	2	47.5	2	20	0.5	17.5	1.5
57	1	MMBVSSSMKPR/MH12/6907/09	15.71428571	1.25	47.5	1.25	50	1.25	52.5	1.5	52.5	1.5	52.5	1.75	40	1.5	45	2	28	1.25	42.5	1
58	1	MMBVSSSMKPR/MH13/5276/09	21.42857143	1.25	22.5	1.5	47.5	1.25	52.5	1.5	52.5	1.5	52.5	2	22.5	1	45	2	20	0.5	52.5	1
59	1	MMBVSSSMKPR/MH13/2852/02	20	1.5	52.5	1.75	22.5	1.25	52.5	1.5	45	1.75	42.5	1.5	12.5	0.5	52.5	2	24	1	52.5	1.5
60	1	MMBVSSSMKPR/RG24/2672/09	17.14285714	1	55	1.5	22.5	1.25	55	1.75	47.5	1.25	52.5	1.5	12.5	0.5	12.5	0.5	28	1	47.5	1.75
61	1	MMBVSSSMKPR/RG24/786/09	27.14285714	1.25	50	1.5	27.5	1.5	55	1.75	50	1.5	52.5	1.5	22.5	1	12.5	0.5	40	1.25	52.5	1.5
62	1	MMBVSSSMKPR/RG24/3773/09	17.14285714	1	50	1.5	40	1.75	47.5	1.5	40	1.75	37.5	1.5	32.5	1.25	15	1.5	24	1	45	1.75
63	1	MMBVSSSMKPR/RG24/3821/09	18.57142857	1	52.5	1.75	25	1.25	55	1.75	32.5	1.25	45	1.5	12.5	0.5	12.5	0.5	24	1	47.5	1.25
64	1	MMBVSSSMKPR/RG25/1072/09	17.14285714	1	52.5	1.75	17.5	1.5	55	1.75	22.5	1.25	50	1.75	42.5	1.25	12.5	0.5	20	0.5	52.5	1.75
65	1	MMBVSSSMKPR/HCGA5/7545/07	30	1.25	52.5	1.75	52.5	1.25	52.5	1.75	42.5	1.25	52.5	1.75	22.5	1	20	1.25	48	1.25	52.5	1.5
66	1	MMBVSSSMKPR/SP2/2851/03	17.14285714	1	47.5	1.75	22.5	1	55	1.75	52.5	1.5	50	1.75	12.5	0.5	12.5	0.5	24	1.5	50	1.75
67	1	MMBVSSSMKPR/SP2/06011/08	15.71428571	1.5	55	1.75	17.5	1.25	55	1.75	52.5	1.5	52.5	1.5	12.5	0.5	12.5	0.5	26	1.25	50	1.5
68	1	MMBVSSSMKPR/SP2/5595E/04	32.85714286	1.5	50	1.75	47.5	1.25	47.5	1.25	47.5	1.5	42.5	1.5	32.5	1.25	12.5	0.5	40	1.5	50	1.75
69	1	MMBVSSSMKPR/SP3/12267/07	31.42857143	1.75	52.5	1.5	50	1.75	50	1.5	47.5	1.25	50	1.75	47.5	1.75	12.5	0.5	44	1.5	50	1.75
70	1	MMBVSSSMKPR/SP3/09935/08	34.28571429	1.5	50	1.75	52.5	1.75	52.5	1.75	45	1	50	1.75	47.5	1.5	12.5	0.5	50	1.5	50	1.75
71	1	MMBVSSSMKPR/SP4/04418/08	18.57142857	1.5	52.5	1.75	32.5	1.5	52.5	1.75	32.5	1.5	50	1.75	17.5	1	12.5	0.5	30	1.5	12.5	1.5
72	1	MMBVSSSMKPR/KFDC/0149/07	24.28571429	1.25	50	1.25	27.5	1.25	47.5	1.5	32.5	1.5	37.5	1.25	47.5	1.5	50	1.5	36	1	27.5	0.5
73	1	MMBVSSSMKPR/BDRG/5248/04	12.85714286	0.5	37.5	1.5	25	1.25	52.5	2	32.5	1.5	47.5	1.5	25	1.5	12.5	0.5	20	0.5	12.5	1.25
74	1	MMBVSSSMKPR/KODC/0178/05	17.14285714	1	37.5	1.75	27.5	1.25	47.5	1.5	17.5	1.5	12.5	0.5	12.5	0.5	12.5	0.5	20	0.5	52.5	0.5
75	1	MMBVSSSMKPR/SP5/2503/08	30	1.75	55	1.75	47.5	1.75	50	1.75	37.5	1.5	42.5	1.5	27.5	1	17.5	1.25	38	1.5	47.5	1.75
76	1	MMBVSSSMKPR/SP5/2049/09	34.28571429	1.75	50	1.75	52.5	1.75	52.5	1.75	45	1.25	50	1.75	30	1.25	12.5	0.5	40	1.5	45	1.75
77	1	MMBVSSSMKPR/SP5/2933/09	35.71428571	1.75	52.5	1.75	55	1.75	30	1.5	45	1.5	47.5	1.25	50	1.5	12.5	0.5	48	1.5	50	1.75
78	1	MMBVSSSMKPR/SP5/5414/09	28.57142857	1.5	50	1	25	1.5	40	0.75	52.5	1.5	45	1.5	50	1.5	22.5	1.25	30	1	50	1.5
79	1	MMBVSSSMKPR/SP5/6317/09	12.85714286	0.5	42.5	1.75	12.5	0.5	30	1	52.5	1.5	52.5	1.75	17.5	1	25	1.25	28	1.25	52.5	1.5

80	1	MMBVSSSMMKPR/SP5/5630/07	35.71428571	1.5	52.5	1.75	55	1.75	55	1.75	50	1.75	50	1.75	47.5	1.25	27.5	1.75	50	1.5	52.5	1.75
81	1	MMBVSSSMMKPR/SP6/4628/02	27.14285714	1.5	52.5	1.75	32.5	1.25	42.5	1.75	52.5	1.75	52.5	1.75	42.5	1.25	12.5	0.5	42	1.25	52.5	1.5
82	1	MMBVSSSMMKPR/SP6/215/05	12.85714286	0.5	52.5	1.25	17.5	1	52.5	1.75	52.5	1.5	50	1.75	47.5	1.25	12.5	0.5	20	0.5	52.5	1.75
83	1	MMBVSSSMMKPR/SP6/4283/08	27.14285714	1	47.5	1.5	52.5	1.5	52.5	1.5	52.5	1.5	52.5	1.75	42.5	1.25	40	1.25	44	1.5	50	1.75
84	1	MMBVSSSMMKPR/SP6/3004/09	32.85714286	1.5	47.5	1.75	47.5	1.5	47.5	1.5	52.5	1.75	37.5	1.25	42.5	1.25	12.5	0.5	44	1.5	52.5	1.75
85	1	MMBVSSSMMKPR/SP7/6675/07	32.85714286	1.25	52.5	1.75	47.5	1.25	52.5	1.5	52.5	1.75	52.5	1.5	47.5	1.25	17.5	1.25	48	1.25	52.5	1.5
86	1	MMBVSSSMMKPR/SP7/4924/06	15.71428571	1.25	52.5	1.75	17.5	1	50	1.5	47.5	1.5	52.5	1.75	17.5	1	40	1.5	20	0.5	50	1.75
87	1	MMBVSSSMMKPR/SP8/7537/09	17.14285714	1.25	50	1.75	27.5	1.25	52.5	1.75	37.5	1.25	37.5	1.75	17.5	1.25	22.5	1.5	28	1	47.5	1.75
88	1	MMBVSSSMMKPR/SP8/3347/09	28.57142857	1.25	52.5	1.5	42.5	1.25	50	1.5	52.5	1.5	50	1.75	40	1.25	27.5	1.5	42	1.5	52.5	1.5
89	1	MMBVSSSMMKPR/SP8/7252/08	20	1.5	50	0.5	47.5	1.25	52.5	1.75	52.5	1.5	52.5	1.75	42.5	1.25	17.5	1.25	28	1.25	17.5	1.75
90	1	MMBVSSSMMKPR/AURG/1691/04	34.28571429	2	12.5	0.5	25	1.25	37.5	1.25	12.5	0.5	42.5	1.75	32.5	1.25	32.5	1.5	24	1	12.5	1.25
91	1	MMBVSSSMMKPR/AWRG/3418/04	27.14285714	1	12.5	1.5	12.5	0.5	20	2	32.5	1	27.5	1.5	12.5	0.5	12.5	0.5	34	1.25	27.5	0.5
92	1	MMBVSSSMMKPR/HCGA1/6737/09	12.85714286	0.5	47.5	1.5	42.5	1	47.5	1	47.5	1.5	37.5	1.75	12.5	0.5	22.5	1.5	20	0.5	52.5	1.25
93	1	MMBVSSSMMKPR/HCGA3/5860/09	12.85714286	0.5	47.5	1	17.5	1.25	52.5	1.5	45	1.5	52.5	1.75	12.5	0.5	42.5	1.25	24	1.25	12.5	1.5
94	1	MMBVSSSMMKPR/BBMH/6814/07	24.28571429	1	37.5	0.5	27.5	1.75	50	2	42.5	2	37.5	1.5	30	1.5	37.5	2	26	1.25	22.5	0.5
95	1	MMBVSSSMMKPR/BEMH/3166/01	27.14285714	1.25	12.5	1.75	45	1.5	35	1.5	17.5	1	12.5	0.5	12.5	0.5	17.5	1	20	0.5	47.5	1.25
96	1	MMBVSSSMMKPR/RG25/2941/09	27.14285714	1	47.5	1.75	42.5	1.5	42.5	1.75	47.5	1.5	47.5	1.25	42.5	1.5	12.5	0.5	40	1	52.5	1.5
97	1	MMBVSSSMMKPR/SP1/1287/98	27.14285714	1.25	52.5	1.75	37.5	1.25	50	1.5	42.5	1.5	47.5	1.25	12.5	0.5	12.5	0.5	40	1.25	55	1.5
98	1	MMBVSSSMMKPR/SP2/00396/06	21.42857143	1.5	55	1.75	25	1.25	52.5	1.5	47.5	1.25	52.5	1.75	22.5	1	20	1.5	30	1.5	52.5	1.75
99	1	MMBVSSSMMKPR/SP2/5090/03	12.85714286	0.5	55	1.75	32.5	1.5	50	1.5	52.5	1.75	52.5	1.75	22.5	1	12.5	0.5	26	1.25	55	1.75
100	1	MMBVSSSMMKPR/SP3/00076/06	17.14285714	1.5	52.5	1.75	37.5	1.5	52.5	1.75	52.5	1.5	47.5	1.5	20	1.5	12.5	0.5	32	1.5	42.5	1.75
101	1	MMBVSSSMMKPR/SP5/5658/09	17.14285714	1.5	55	1.75	12.5	0.5	47.5	1.5	47.5	1.5	45	1.25	32.5	1.5	12.5	0.5	20	0.5	52.5	1.75
102	1	MMBVSSSMMKPR/SP9/1431/07	18.57142857	1.25	52.5	1.75	37.5	1	52.5	1.75	47.5	1.5	52.5	1.75	22.5	1.25	12.5	0.5	24	1.25	52.5	1.75
103	1	MMBVSSSMMKPR/SP9/00521/07	15.71428571	1	52.5	1.75	32.5	1.25	42.5	1.25	47.5	1.5	52.5	1.75	20	1.25	32.5	1.25	24	1	47.5	1.75
104	1	MMBVSSSMMKPR/SP9/919/99	18.57142857	1	52.5	1.25	25	1	52.5	1.5	52.5	1.5	50	1.5	12.5	0.5	15	1.5	32	1.25	52.5	1.75
105	1	MMBVSSSMMKPR/SP10/1693/03	15.71428571	1.5	52.5	1.5	22.5	1	47.5	1.5	42.5	1.5	52.5	1.75	40	1.5	40	1.5	20	0.5	50	1.25
106	1	MMBVSSSMMKPR/SP11/2802/01	32.85714286	1.25	47.5	1.5	45	1.25	50	1.5	52.5	1.5	52.5	1.75	22.5	1.5	52.5	1.5	48	1.25	50	1.5

107	1	MMBVSSSMMKPR/SP11/1002/05	24.28571429	1.25	47.5	1.25	37.5	1.25	42.5	1.5	52.5	1.75	47.5	1.5	42.5	1.25	42.5	1.5	36	1.25	47.5	1.5
108	1	MMBVSSSMMKPR/SP11/4945/09	18.57142857	1	47.5	1.5	45	1.25	50	1.75	50	1.5	52.5	1.75	37.5	1.25	42.5	1.5	40	1.25	50	1.75
109	1	MMBVSSSMMKPR/RG32/47/10	17.14285714	1	47.5	1.5	37.5	1.25	52.5	1.75	50	1.75	47.5	1.5	42.5	1.25	17.5	1.25	40	1.25	40	1.5
110	1	MMBVSSSMMKPR/RG32/7449/09	31.42857143	1.5	47.5	0.75	50	1.5	42.5	1.25	42.5	1.5	42.5	1.5	52.5	1.25	12.5	0.5	50	1.5	50	1.5
111	1	MMBVSSSMMKPR/SP12/0353/09	12.85714286	0.5	47.5	0.75	50	1.25	42.5	1.25	50	1.25	15	1.5	37.5	1.5	55	1.5	32	1.25	50	1.5
112	1	MMBVSSSMMKPR/SP12/2027/09	12.85714286	0.5	47.5	1.25	37.5	1.25	50	1.5	50	1.5	52.5	1.75	35	1.25	20	1.25	24	1	52.5	1.25
113	1	MMBVSSSMMKPR/SP12/1631/09	15.71428571	1.5	47.5	1.5	42.5	1.5	42.5	1.5	42.5	1.25	52.5	1.75	27.5	1.5	52.5	1.5	24	1	50	1.75
114	1	MMBVSSSMMKPR/RG34/1091/10	24.28571429	1.25	40	1.25	40	1.25	52.5	1.75	52.5	1.75	52.5	1.75	40	1.25	27.5	1.25	36	1.25	52.5	1.75
115	1	MMBVSSSMMKPR/SP13/6097/08	20	1.25	47.5	0.5	42.5	1.25	47.5	1.75	50	1	52.5	1.75	30	1.25	15	1.5	30	1.25	47.5	1.5
116	1	MMBVSSSMMKPR/BFMH/2540/04	12.85714286	0.5	12.5	1.5	35	1.5	57.5	1.5	57.5	1.5	25	1.25	12.5	0.5	20	1.25	26	1.25	47.5	1.5
117	1	MMBVSSSMMKPR/BGMH/3558/03	30	1.25	32.5	0.5	32.5	1.25	52.5	1.75	55	1.75	47.5	1.5	12.5	0.5	57.5	2	30	1.25	25	1.25
118	1	MMBVSSSMMKPR/BIMH/4596/05	17.14285714	1.25	12.5	1.5	50	1.5	27.5	1.25	37.5	1.25	20	1	30	1.25	12.5	0.5	24	1	37.5	1.25
119	1	MMBVSSSMMKPR/BJMH/1942/07	30	1.5	27.5	1.25	27.5	1.25	52.5	1.25	52.5	2	37.5	1.5	32.5	2	12.5	0.5	20	0.5	37.5	1.25
120	1	MMBVSSSMMKPR/BKMH/3435/06	17.14285714	1.25	32.5	1	32.5	1.5	52.5	1.5	12.5	0.5	47.5	1.5	12.5	0.5	22.5	2	20	0.5	20	1.25
121	1	MMBVSSSMMKPR/BLJH/2584/05	24.28571429	1.25	22.5	1.5	37.5	1.75	47.5	2	17.5	1	12.5	0.5	27.5	1.5	22.5	1	20	0.5	25	1
122	1	MMBVSSSMMKPR/BMMH/3591/08	12.85714286	0.5	52.5	1.25	25	1.25	52.5	1.75	32.5	1.5	30	1	50	2	47.5	2	20	0.5	42.5	1.5
123	1	MMBVSSSMMKPR/BNMH/3242/06	18.57142857	1.25	52.5	0.5	12.5	0.5	27.5	1.25	22.5	1.5	47.5	1.5	12.5	0.5	47.5	1.75	20	0.5	27.5	1.25
124	1	MMBVSSSMMKPR/BORG/0945/03	32.85714286	1	12.5	1.5	22.5	1.25	22.5	1	50	1.25	47.5	2	47.5	1.25	20	1.25	30	1	22.5	1
125	1	MMBVSSSMMKPR/BPRG/3398/03	18.57142857	1	40	0.5	12.5	0.5	47.5	2	52.5	1.25	52.5	1.5	20	1.25	12.5	0.5	20	0.5	27.5	1
126	1	MMBVSSSMMKPR/BQRG/4390/03	17.14285714	1	12.5	1.75	12.5	0.5	50	1.5	42.5	1.25	12.5	0.5	32.5	1.25	17.5	1.25	44	1.25	22.5	1.25
127	1	MMBVSSSMMKPR/BTRG/3606/03	35.71428571	2	32.5	0.5	25	1.25	52.5	2	40	1.5	32.5	1.25	37.5	1.25	12.5	0.5	28	1.25	12.5	1
128	1	MMBVSSSMMKPR/BUMH/6186/04	12.85714286	0.5	12.5	0.5	12.5	0.5	40	1.5	12.5	0.5	42.5	1.5	20	1.25	50	1.75	28	1	12.5	0.5
129	1	MMBVSSSMMKPR/BVMH/6080/07	12.85714286	0.5	12.5	1.5	40	1.5	55	1.25	47.5	1.5	42.5	1	30	1.25	17.5	1.25	20	0.5	42.5	0.5
130	1	MMBVSSSMMKPR/DMMX/3990/07	22.85714286	1.25	40	1.75	42.5	1.5	47.5	1.75	42.5	1.5	47.5	1.75	52.5	2	50	1.5	26	1.25	47.5	1.25
131	1	MMBVSSSMMKPR/ SP1/2238/01	15.71428571	1	52.5	1.5	25	1.25	52.5	1.75	42.5	1.25	45	1.25	42.5	1	12.5	0.5	30	1	42.5	1.5
132	1	MMBVSSSMMKPR/RG15/1464/08	12.85714286	0.5	47.5	1.75	22.5	1	52.5	1.5	52.5	1.75	52.5	1.75	12.5	0.5	47.5	1.5	20	0.5	52.5	1.5
133	1	MMBVSSSMMKPR/RG22/1931/09	17.14285714	1	52.5	1.5	22.5	1	52.5	1.5	47.5	1.5	52.5	1.75	12.5	0.5	12.5	0.5	20	0.5	37.5	1.75

134	1	MMBVSSSMKPR/MH14/6324/08	27.14285714	1.25	47.5	1.5	52.5	1.5	42.5	1.25	52.5	1.5	52.5	1.75	17.5	1.25	50	2	38	1.5	52.5	1.75
135	1	MMBVSSSMKPR/ RG24/805/09	21.42857143	1	47.5	1.5	27.5	1.25	47.5	1.5	47.5	1.5	50	1.75	17.5	1	12.5	0.5	28	1	45	1.5
136	1	MMBVSSSMKPR/HCGA4/6374/08	21.42857143	1	47.5	1.5	47.5	1.25	52.5	1.5	52.5	1.5	52.5	1.5	25	1	12.5	0.5	44	1.25	50	1.5
137	1	MMBVSSSMKPR/SP1/3187/99	15.71428571	1	47.5	1.75	17.5	1	50	1.5	47.5	1.5	42.5	1.5	37.5	1	12.5	0.5	24	1	50	1.5
138	1	MMBVSSSMKPR/SP1/1543/00	27.14285714	1.25	47.5	1.75	47.5	1.5	50	1.75	47.5	1.25	27.5	1.5	12.5	0.5	12.5	0.5	44	1.5	52.5	1.5
139	1	MMBVSSSMKPR/SP2/10817/07	17.14285714	1	55	1.5	37.5	1.25	52.5	1.75	50	1.25	52.5	1.75	17.5	1	17.5	1.25	36	1.5	55	1.5
140	1	MMBVSSSMKPR/SP2/3424/03	24.28571429	1.5	45	1.75	47.5	1.5	47.5	1.25	52.5	1.5	50	1.5	12.5	0.5	12.5	0.5	34	1.25	47.5	1.75
141	1	MMBVSSSMKPR/SP2/489/02	15.71428571	1.25	47.5	1.75	27.5	1.25	42.5	1.25	42.5	1	50	1.5	12.5	0.5	35	1.25	26	1.25	42.5	1.75
142	1	MMBVSSSMKPR/SP3/5454/05	27.14285714	1.5	55	1.5	52.5	1.5	52.5	1.5	47.5	1.5	47.5	1.5	45	1.5	12.5	0.5	38	1.5	55	1.75
143	1	MMBVSSSMKPR/SP3/00070/06	15.71428571	1.25	52.5	1.75	17.5	1.25	52.5	1.75	52.5	1.75	52.5	1.75	12.5	0.5	12.5	0.5	24	1.5	50	2
144	1	MMBVSSSMKPR/SP4/11639/06	18.57142857	1.25	50	1.75	42.5	1.75	52.5	1.5	47.5	1.25	47.5	1	12.5	0.5	12.5	0.5	28	1.25	47.5	1.5
145	1	MMBVSSSMKPR/SP4/12823/07	12.85714286	0.5	47.5	1.75	17.5	1.25	47.5	1.5	50	1.5	52.5	1.75	12.5	0.5	12.5	0.5	24	1.25	55	1.5
146	1	MMBVSSSMKPR/SP4/14511/07	24.28571429	1.5	52.5	0.5	35	1.5	47.5	1.75	50	1.5	50	1.5	17.5	1	12.5	0.5	30	1.5	12.5	1.75
147	1	MMBVSSSMKPR/IIRG/4358/08	12.85714286	0.5	12.5	1.5	32.5	1.5	47.5	1.75	42.5	1.75	37.5	1.5	42.5	1.75	12.5	0.5	26	1	42.5	0.5
148	1	MMBVSSSMKPR/IVRG/1658/08	25.71428571	1.5	47.5	1.25	12.5	0.5	37.5	1.5	25	1	30	1	12.5	0.5	22.5	1	34	1.25	47.5	1.5
149	1	MMBVSSSMKPR/JRRG/6716/08	15.71428571	1	47.5	1.25	27.5	1.25	50	2	50	1.5	50	1.75	12.5	0.5	52.5	1.25	30	1	20	1.25
150	1	MMBVSSSMKPR/JSMH/7129/07	12.85714286	0.5	37.5	1.75	40	2	47.5	2	32.5	1.25	37.5	1.5	37.5	1.5	45	2	20	0.5	50	1.25
151	0	MMBVSSSMKPR/CPMH/1187/05	22.85714	1.25	47.5	0.5	45	1.5	57.5	2	42.5	1.75	12.5	0.5	45	1.75	47.5	2	48	1.25	17.5	1.5
152	0	MMBVSSSMKPR/CSMH/3038/04	35.71429	1.25	12.5	0.5	32.5	1.25	52.5	2	50	1.75	47.5	1.75	52.5	1.5	52.5	1.5	20	0.5	27.5	1
153	0	MMBVSSSMKPR/CTMH/2852/04	12.85714	0.5	12.5	1.5	37.5	1.75	55	1.75	52.5	1.75	52.5	1.75	27.5	1.25	12.5	0.5	52	1.25	50	1.25
154	0	MMBVSSSMKPR/CUMH/1591/03	17.14286	1.25	55	1.75	12.5	0.5	52.5	2	32.5	2	52.5	1.75	20	1.25	57.5	2	30	1	17.5	1
155	0	MMBVSSSMKPR/CWMH/3473/06	20	1.25	47.5	1.5	12.5	0.5	12.5	0.5	12.5	0.5	27.5	1	45	1.75	12.5	0.5	20	0.5	27.5	1
156	0	MMBVSSSMKPR/CXJH/3121/05	35.71429	1.25	47.5	1.5	27.5	1.75	32.5	2	47.5	1.75	50	2	12.5	0.5	12.5	0.5	34	1.25	42.5	1

157	0	MMBVSSSMMKPR/CYJH/0878/06	18.57143	1.25	52.5	1.5	32.5	1.75	55	2	12.5	0.5	37.5	1.25	12.5	0.5	45	2	24	1.75	52.5	1.5
158	0	MMBVSSSMMKPR/RG26/5002/09	34.28571	1.25	52.5	1.25	47.5	1.25	52.5	1.75	42.5	1.25	50	1.75	20	1.25	27.5	1.25	28	1.25	37.5	1.75
159	0	MMBVSSSMMKPR/DAMH/7095/09	34.28571	1.25	35	1.5	52.5	1.5	22.5	1.5	12.5	0.5	12.5	0.5	37.5	1.5	57.5	2	44	1.25	22.5	1.25
160	0	MMBVSSSMMKPR/DBMH/9616/08	24.28571	1.5	52.5	1	30	1.5	35	1.5	25	1.5	22.5	1	57.5	1.75	42.5	1.25	24	1.25	22.5	1

Table 3B

SL No	Outcome	Sample No.	U%-M	UI-M	U%-C	UI-C	V%-M	VI-M	V%-C	VI-C	W%-M	WI-M	W%-C	WI-C	ZA1%-M	ZA1I-M	ZA1%-C	ZA1I-C	ZB%-C
1	1	MMBVSSSMMKPR/AAJH/0467/06	42.5	1.5	56.36363636	2	60	2	10	0.25	52.5	2	50	2	47.5	1.75	37.5	1.5	37.5
2	1	MMBVSSSMMKPR/ABMH/4734/07	42.5	1.75	49.09090909	2	60	2	10	0.25	60	2	7.5	0.5	47.5	1.5	42.5	1.5	37.5
3	1	MMBVSSSMMKPR/HLRG/1219/03	27.5	1.25	38.18181818	2	15	0.5	20	1.25	47.5	1.25	47.5	1.75	50	1.75	37.5	1.25	42.5
4	1	MMBVSSSMMKPR/ACRG/2834/03	27.5	1.5	52.72727273	1.75	55	1.5	10	0.25	52.5	1.75	42.5	1.5	17.5	1	42.5	1.5	57.5
5	1	MMBVSSSMMKPR/AVRG/1397/04	22.5	1.5	54.54545455	2	22.5	1.25	25	1.25	27.5	1.25	50	1.75	22.5	1	42.5	1.25	52.5
6	1	MMBVSSSMMKPR/AEMH/6521/06	12.5	0.5	47.27272727	1.5	30	1.25	10	0.25	22.5	1.25	27.5	1.75	32.5	1.75	12.5	0.5	37.5
7	1	MMBVSSSMMKPR/AFJH/0478/06	32.5	1.25	50.90909091	1.75	55	2	10	0.25	52.5	1.5	12.5	1.5	12.5	0.5	12.5	0.5	47.5
8	1	MMBVSSSMMKPR/HTMX/0675/08	17.5	1	34.54545455	1.5	40	1.5	40	1.25	25	1.25	37.5	1.75	47.5	1.75	37.5	1.5	47.5
9	1	MMBVSSSMMKPR/IRRG/5724/08	47.5	1.5	41.81818182	1.75	50	1.5	45	1.25	45	1	37.5	1.75	47.5	1.5	37.5	1	52.5
10	1	MMBVSSSMMKPR/JMRG/1480/08	22.5	1	49.09090909	1.75	60	1.75	47.5	1	52.5	2	42.5	2	22.5	1.25	50	1.75	42.5
11	1	MMBVSSSMMKPR/HCGA1/222/10	17.5	1.25	49.09090909	1.25	50	1.5	40	1.25	47.5	1.25	22.5	1.25	42.5	1.75	12.5	0.5	47.5
12	1	MMBVSSSMMKPR/KIDC/0164/06	32.5	1	52.72727273	1.75	55	2	10	0.25	45	1.5	32.5	1.5	47.5	2	12.5	0.5	47.5
13	1	MMBVSSSMMKPR/KJDC/0167/06	22.5	1.25	49.09090909	1.25	55	2	35	1.25	52.5	2	37.5	2	45	1.75	12.5	0.5	50
14	1	MMBVSSSMMKPR/KNDC/0176/05	32.5	1	49.09090909	1.25	45	2	35	1.75	47.5	1.5	42.5	1.75	55	2	12.5	0.5	47.5
15	1	MMBVSSSMMKPR/MH11/3187/09	42.5	1.5	50.90909091	1.5	50	1.25	40	1	42.5	1.5	42.5	1.75	47.5	1.5	12.5	0.5	47.5

16	1	MMBVSSSMMKPR/HCGA4/5535/06	12.5	0.5	49.09090909	1.5	15	0.5	10	0.25	47.5	1.5	47.5	1.5	17.5	1.5	17.5	1	52.5
17	1	MMBVSSSMMKPR/SP5/6544/08	12.5	0.5	49.09090909	1.5	15	0.5	10	0.25	25	1.5	45	1.5	12.5	0.5	47.5	1.25	47.5
18	1	MMBVSSSMMKPR/SP6/5298/06	37.5	1.25	52.72727273	1.75	55	1.75	50	1.5	50	1.5	45	1.75	50	1.5	50	1.5	45
19	1	MMBVSSSMMKPR/SP6/6116/06	27.5	1	49.09090909	1.5	52.5	1.5	50	1.5	50	1.5	47.5	1.75	50	1.75	50	1.75	52.5
20	1	MMBVSSSMMKPR/SP8/6543/06	52.5	1.5	52.72727273	1.75	55	1.5	45	1.5	52.5	1.75	47.5	1.75	52.5	1.75	52.5	1.75	52.5
21	1	MMBVSSSMMKPR/SP9/1761/97	37.5	1.5	52.72727273	1.75	32.5	1.5	45	1.5	32.5	1	47.5	1.75	37.5	1.5	40	1.25	52.5
22	1	MMBVSSSMMKPR/SP9/2006/02	27.5	1.25	49.09090909	1.75	42.5	1.75	45	1.5	47.5	1.75	45	1.75	50	1.75	42.5	1	47.5
23	1	MMBVSSSMMKPR/SP10/4338/05	12.5	0.5	49.09090909	1.25	47.5	1.75	47.5	1.5	52.5	1.5	47.5	1.75	52.5	1.5	47.5	1.75	47.5
24	1	MMBVSSSMMKPR/SP13/0242/10	47.5	1.25	52.72727273	1.75	55	1.5	50	1.25	50	1.5	42.5	1.25	52.5	1.5	47.5	1.5	47.5
25	1	MMBVSSSMMKPR/ADRG/1440/02	32.5	1.5	49.09090909	1.75	40	1.5	10	0.25	27.5	1	7.5	0.5	42.5	1	12.5	0.5	42.5
26	1	MMBVSSSMMKPR/AGMH/2268/04	12.5	0.5	50.90909091	2	55	2	10	0.25	50	2	7.5	0.5	42.5	1.75	32.5	1.5	52.5
27	1	MMBVSSSMMKPR/AHMH/2180/03	32.5	1.25	49.09090909	1.75	55	2	55	1.75	57.5	2	27.5	1.25	52.5	1.75	20	1.25	50
28	1	MMBVSSSMMKPR/AJMH/1975/03	37.5	1.25	52.72727273	1.25	60	2	10	0.25	55	2	7.5	0.5	57.5	2	12.5	0.5	37.5
29	1	MMBVSSSMMKPR/AKMH/1186/03	12.5	0.5	56.36363636	1.5	60	2	37.5	1.5	60	2	7.5	0.5	27.5	1	52.5	1.75	57.5
30	1	MMBVSSSMMKPR/ALMH/4227/05	20	1.25	38.18181818	1.25	37.5	1.5	10	0.25	45	1.5	7.5	0.5	52.5	2	12.5	0.5	42.5
31	1	MMBVSSSMMKPR/AMMH/2138/05	22.5	1.5	27.27272727	1.25	60	2	10	0.25	57.5	2	7.5	0.5	47.5	1.75	12.5	0.5	37.5
32	1	MMBVSSSMMKPR/ANMH/6528/05	22.5	1.5	52.72727273	2	60	2	55	1.75	52.5	2	22.5	2	12.5	0.5	37.5	1.5	42.5
33	1	MMBVSSSMMKPR/AOMH/1621/05	37.5	2	34.54545455	1.5	55	2	55	1.5	52.5	1.75	42.5	2	27.5	1.5	27.5	1	30
34	1	MMBVSSSMMKPR/APMH/6408/05	42.5	2	52.72727273	2	57.5	2	10	0.25	55	2	47.5	1.75	42.5	1.75	32.5	1.75	37.5
35	1	MMBVSSSMMKPR/AQMH/1408/06	47.5	2	52.72727273	2	60	2	10	0.25	57.5	2	22.5	1.25	50	1.75	12.5	0.5	25
36	1	MMBVSSSMMKPR/ARMH/4622/06	27.5	1.25	49.09090909	1.5	15	0.5	20	1.25	42.5	1.5	32.5	1	60	2	12.5	0.5	55
37	1	MMBVSSSMMKPR/ASRG/5174/03	20	1.75	41.81818182	1.5	35	1.25	50	1.25	27.5	1.25	17.5	1.25	32.5	1.25	37.5	1.5	47.5
38	1	MMBVSSSMMKPR/ATMH/4074/01	30	1.25	49.09090909	2	15	0.5	40	1.75	37.5	1.5	47.5	1.75	42.5	1.5	12.5	0.5	27.5
39	1	MMBVSSSMMKPR/AYRG/3670/02	12.5	0.5	52.72727273	1.5	15	0.5	45	1.5	12.5	0.5	42.5	1.75	17.5	1.25	42.5	1.5	52.5
40	1	MMBVSSSMMKPR/AZRG/1472/02	20	1.25	50.90909091	1.5	22.5	1.25	25	1.25	47.5	1.5	42.5	1.75	12.5	0.5	47.5	1.25	52.5
41	1	MMBVSSSMMKPR/BAJH/0102/07	40	1.75	50.90909091	2	45	1.5	20	1.25	47.5	1.25	42.5	1.25	47.5	1.75	37.5	2	42.5
42	1	MMBVSSSMMKPR/HSMH/4789/07	27.5	1	49.09090909	1.5	15	0.5	52.5	1.75	22.5	1	37.5	1.5	47.5	2	12.5	0.5	32.5

43	1	MMBVSSSMMKPR/HKRG/3754/03	12.5	0.5	54.54545455	1.5	15	0.5	42.5	1.25	12.5	0.5	37.5	1.5	27.5	1.25	42.5	1.25	47.5
44	1	MMBVSSSMMKPR/IMRG/5141/08	12.5	0.5	47.27272727	2	15	0.5	10	0.25	22.5	1.5	37.5	1.5	27.5	1	52.5	1.75	47.5
45	1	MMBVSSSMMKPR/IQRG/5751/08	12.5	0.5	52.72727273	2	15	0.5	10	0.25	32.5	1.5	47.5	1.75	37.5	1.5	42.5	1.25	27.5
46	1	MMBVSSSMMKPR/JNRG/6963/08	32.5	1.25	49.09090909	1.75	25	1.25	45	1.5	32.5	1	27.5	1.25	42.5	1.5	37.5	1.75	47.5
47	1	MMBVSSSMMKPR/JORG/6520/08	27.5	1.25	54.54545455	2	52.5	1.75	52.5	1.25	52.5	2	42.5	1.5	47.5	1.75	42.5	1.75	42.5
48	1	MMBVSSSMMKPR/IXRG/1912/08	12.5	0.5	58.18181818	2	45	1.5	37.5	1.25	27.5	1.25	37.5	1.75	27.5	1.5	42.5	1.5	57.5
49	1	MMBVSSSMMKPR/IHRG/1461/07	37.5	1	52.72727273	2	55	2	20	1.25	47.5	2	32.5	1.75	57.5	2	12.5	0.5	47.5
50	1	MMBVSSSMMKPR/INRG/6074/08	12.5	0.5	50.90909091	2	15	0.5	10	0.25	42.5	1.5	22.5	1.25	12.5	0.5	52.5	2	55
51	1	MMBVSSSMMKPR/JPRG/7119/08	12.5	0.5	34.54545455	1	55	1.5	10	0.25	52.5	1.75	42.5	2	52.5	1.75	42.5	1.75	27.5
52	1	MMBVSSSMMKPR/IARG/1209/01	37.5	1	38.18181818	1.5	45	1.5	20	1.5	42.5	1.75	7.5	0.5	35	1.25	37.5	1.25	27.5
53	1	MMBVSSSMMKPR/IQRG/6998/08	25	1	54.54545455	1.75	57.5	1.75	22.5	1.25	55	2	42.5	2	52.5	1.75	47.5	1.5	37.5
54	1	MMBVSSSMMKPR/HCGA1/5042/08	17.5	1	52.72727273	1	40	1.5	27.5	0.75	52.5	1.75	22.5	1.5	22.5	1	37.5	1	42.5
55	1	MMBVSSSMMKPR/RG20/7272/08	37.5	1.25	52.72727273	1.75	50	1.5	45	1.25	47.5	1.5	42.5	1.5	27.5	1	47.5	1.5	52.5
56	1	MMBVSSSMMKPR/MH10/826/06	12.5	0.5	32.72727273	1.5	50	1.75	45	1.5	47.5	1.5	35	1.25	45	1.5	17.5	1.25	27.5
57	1	MMBVSSSMMKPR/MH12/6907/09	37.5	1.25	52.72727273	1.5	45	1.5	45	1.5	45	1.25	32.5	1	42.5	1.5	37.5	1.25	52.5
58	1	MMBVSSSMMKPR/MH13/5276/09	47.5	1.5	52.72727273	1.5	40	1.5	50	1.5	37.5	1.5	32.5	1.5	12.5	0.5	37.5	1.25	47.5
59	1	MMBVSSSMMKPR/MH13/2852/02	32.5	1.5	52.72727273	1.5	57.5	1.75	52.5	1.25	55	1.75	50	1.5	50	1.5	37.5	1.25	42.5
60	1	MMBVSSSMMKPR/RG24/2672/09	17.5	1	52.72727273	1.75	20	1	50	1.25	17.5	1	37.5	1.25	12.5	0.5	37.5	0.75	52.5
61	1	MMBVSSSMMKPR/RG24/786/09	32.5	1.25	49.09090909	1.5	40	1.25	35	1	47.5	1.5	42.5	1.5	42.5	1.25	22.5	1	42.5
62	1	MMBVSSSMMKPR/RG24/3773/09	32.5	1.5	52.72727273	1.5	55	1.5	50	1.25	50	1.75	45	1.5	47.5	1.5	47.5	1.5	47.5
63	1	MMBVSSSMMKPR/RG24/3821/09	20	1.25	52.72727273	1.75	25	1.5	47.5	1.25	42.5	1.5	37.5	1.5	37.5	1.5	25	1	32.5
64	1	MMBVSSSMMKPR/RG25/1072/09	27.5	1	49.09090909	1.25	15	0.5	20	0.75	27.5	1	37.5	1.25	12.5	0.5	25	1	52.5
65	1	MMBVSSSMMKPR/HCGA5/7545/07	47.5	1.25	50.90909091	1.5	50	1.5	40	1	52.5	1.5	47.5	1.5	52.5	1.5	47.5	1.25	52.5
66	1	MMBVSSSMMKPR/SP2/2851/03	17.5	1.25	49.09090909	1.5	30	1.75	52.5	1.5	55	1.75	50	1.75	22.5	1	50	1.5	47.5
67	1	MMBVSSSMMKPR/SP2/06011/08	17.5	1	52.72727273	1.75	27.5	1.5	52.5	1.5	27.5	1.5	50	1.75	25	1.25	50	1.5	52.5
68	1	MMBVSSSMMKPR/SP2/5595E/04	42.5	1.5	52.72727273	1.75	52.5	1.75	47.5	1.5	50	1.5	42.5	1.5	50	1.5	50	1.75	47.5
69	1	MMBVSSSMMKPR/SP3/12267/07	42.5	1.5	50.90909091	1.75	45	1.5	42.5	1.25	50	1.75	42.5	1.5	52.5	1.75	37.5	1.5	52.5

70	1	MMBVSSSMMKPR/SP3/09935/08	45	1.5	50.90909091	1.75	57.5	1.75	35	1.25	55	1.75	42.5	1.5	52.5	1.75	47.5	1.5	52.5
71	1	MMBVSSSMMKPR/SP4/04418/08	25	1.5	52.72727273	1.75	27.5	1.25	47.5	1.5	32.5	1.25	50	2	37.5	1.5	42.5	1.5	52.5
72	1	MMBVSSSMMKPR/KFDC/0149/07	32.5	1.25	41.81818182	1.5	47.5	1.75	10	0.25	45	1.5	27.5	1.5	50	2	12.5	0.5	27.5
73	1	MMBVSSSMMKPR/BDRG/5248/04	12.5	0.5	50.90909091	1.25	15	0.5	40	1.25	22.5	1	42.5	1.75	37.5	1.75	47.5	2	40
74	1	MMBVSSSMMKPR/KODC/0178/05	22.5	1	41.81818182	1.5	25	1.5	25	1.25	12.5	0.5	20	1.5	37.5	2	12.5	0.5	22.5
75	1	MMBVSSSMMKPR/SP5/2503/08	17.5	1	52.72727273	1.5	55	1.75	45	1.25	55	1.75	50	1.75	55	1.75	55	1.75	52.5
76	1	MMBVSSSMMKPR/SP5/2049/09	52.5	1.5	54.54545455	1.75	55	1.75	50	1.5	55	1.75	50	1.75	55	1.75	50	1.5	45
77	1	MMBVSSSMMKPR/SP5/2933/09	52.5	1.5	50.90909091	1.5	50	1.5	25	1.25	52.5	1.75	45	1.5	55	1.75	42.5	1.5	52.5
78	1	MMBVSSSMMKPR/SP5/5414/09	12.5	0.5	50.90909091	1.5	52.5	1.5	45	1.25	50	1.75	42.5	1.5	52.5	1.75	47.5	1.75	47.5
79	1	MMBVSSSMMKPR/SP5/6317/09	12.5	0.5	50.90909091	1.5	25	1.5	50	1.5	40	1.5	45	1.75	52.5	1.75	47.5	1.75	50
80	1	MMBVSSSMMKPR/SP5/5630/07	52.5	1.5	52.72727273	1.75	55	1.75	50	1.5	55	1.75	50	1.75	55	1.75	27.5	1.5	52.5
81	1	MMBVSSSMMKPR/SP6/4628/02	40	1.25	50.90909091	1.5	50	1.75	47.5	1.5	50	1.5	45	1.5	40	1.5	50	1.5	52.5
82	1	MMBVSSSMMKPR/SP6/215/05	12.5	0.5	52.72727273	1.75	22.5	1.5	50	1.5	27.5	1.5	47.5	1.75	25	1.5	50	1.5	52.5
83	1	MMBVSSSMMKPR/SP6/4283/08	22.5	1	52.72727273	1.25	45	1.5	50	1.5	50	1.5	45	1.5	52.5	1.75	52.5	1.5	52.5
84	1	MMBVSSSMMKPR/SP6/3004/09	47.5	1.5	50.90909091	1.5	55	1.75	50	1.5	50	1.75	40	1.5	50	1.75	50	1.75	32.5
85	1	MMBVSSSMMKPR/SP7/6675/07	47.5	1.25	52.72727273	1.75	55	1.5	47.5	1.25	52.5	1.5	45	1.75	52.5	1.5	50	1.5	52.5
86	1	MMBVSSSMMKPR/SP7/4924/06	22.5	1.25	50.90909091	1.5	47.5	1.5	50	1.5	47.5	1.5	47.5	1.75	25	1.5	47.5	1.25	47.5
87	1	MMBVSSSMMKPR/SP8/7537/09	12.5	0.5	49.09090909	1.25	32.5	1.5	35	1	35	1.5	37.5	1.5	20	1.5	47.5	1.5	47.5
88	1	MMBVSSSMMKPR/SP8/3347/09	45	1.5	50.90909091	1.5	52.5	1.5	47.5	1.25	47.5	1.75	42.5	1.5	47.5	1.5	50	1.5	45
89	1	MMBVSSSMMKPR/SP8/7252/08	35	1.5	52.72727273	1.75	55	1.5	50	1.5	42.5	1.5	45	1.75	50	1.5	50	1.5	50
90	1	MMBVSSSMMKPR/AURG/1691/04	22.5	1	43.63636364	1.5	40	1.25	22.5	1.25	32.5	1	15	1.75	42.5	1.75	37.5	1.5	42.5
91	1	MMBVSSSMMKPR/AWRG/3418/04	27.5	1.5	49.09090909	1.5	25	1.25	10	0.25	27.5	1.5	7.5	0.5	27.5	1.25	47.5	1.75	47.5
92	1	MMBVSSSMMKPR/HCGA1/6737/09	12.5	0.5	52.72727273	1.75	35	1.5	40	1	50	1.75	17.5	1	42.5	1.5	25	1	52.5
93	1	MMBVSSSMMKPR/HCGA3/5860/09	22.5	1.25	52.72727273	1.5	55	1.75	50	1.25	42.5	1.5	32.5	1.25	47.5	1.5	42.5	1.5	52.5
94	1	MMBVSSSMMKPR/BBMH/6814/07	17.5	1	49.09090909	1.75	35	1.5	40	1.5	22.5	1	20	1	52.5	1	12.5	0.5	52.5
95	1	MMBVSSSMMKPR/BEMH/3166/01	25	1.5	49.09090909	1.5	50	1.25	20	1.25	47.5	1.5	7.5	0.5	57.5	2	12.5	0.5	17.5
96	1	MMBVSSSMMKPR/RG25/2941/09	37.5	1.25	52.72727273	1.5	20	1.25	10	0.25	52.5	1.5	47.5	1.5	12.5	0.5	47.5	1.5	52.5

97	1	MMBVSSSMMKPR/SP1/1287/98	27.5	1.25	52.72727273	1.75	47.5	1.5	45	1.25	50	1.5	45	1.75	52.5	1.5	52.5	1.75	17.5
98	1	MMBVSSSMMKPR/SP2/00396/06	42.5	1.5	52.72727273	2	57.5	1.75	52.5	1.5	52.5	1.75	47.5	1.75	57.5	1.75	42.5	1.25	52.5
99	1	MMBVSSSMMKPR/SP2/5090/03	22.5	1	52.72727273	1.5	45	1.75	52.5	1.5	22.5	1.5	47.5	1.75	42.5	1.75	42.5	1.5	52.5
100	1	MMBVSSSMMKPR/SP3/00076/06	42.5	1.25	52.72727273	1.75	55	1.5	45	1.25	55	1.75	45	1.5	42.5	1.5	52.5	1.75	55
101	1	MMBVSSSMMKPR/SP5/5658/09	12.5	0.5	54.54545455	1.75	40	1.5	50	1.5	42.5	1.5	50	1.75	45	1.5	42.5	1.5	52.5
102	1	MMBVSSSMMKPR/SP9/1431/07	32.5	1.25	49.09090909	1.5	27.5	1.5	50	1.5	35	1.5	45	1.75	37.5	1.5	37.5	1	47.5
103	1	MMBVSSSMMKPR/SP9/00521/07	37.5	1.25	49.09090909	1.75	50	1.75	45	1.5	50	1.75	45	1.75	52.5	1.75	25	1.5	52.5
104	1	MMBVSSSMMKPR/SP9/919/99	42.5	1.25	52.72727273	1.75	15	0.5	10	0.25	17.5	1.5	47.5	1.75	17.5	1.25	52.5	1.5	52.5
105	1	MMBVSSSMMKPR/SP10/1693/03	47.5	1.25	49.09090909	1.25	55	1.75	50	1.5	52.5	1.75	47.5	1.75	52.5	1.75	47.5	1.25	45
106	1	MMBVSSSMMKPR/SP11/2802/01	52.5	1.5	50.90909091	1.75	52.5	1.5	42.5	1.25	52.5	1.5	45	1.5	52.5	1.5	40	1.5	52.5
107	1	MMBVSSSMMKPR/SP11/1002/05	47.5	1.25	45.45454545	1.5	45	1.5	37.5	1.25	52.5	1.5	42.5	1.5	45	1.5	42.5	1.5	50
108	1	MMBVSSSMMKPR/SP11/4945/09	42.5	1.25	49.09090909	1.5	50	1.5	45	1	47.5	1.5	42.5	1.5	45	1.5	42.5	1.5	37.5
109	1	MMBVSSSMMKPR/RG32/47/10	42.5	1.25	50.90909091	1.5	52.5	1.75	42.5	1.25	37.5	1	45	1.5	50	1.5	45	1.25	47.5
110	1	MMBVSSSMMKPR/RG32/7449/09	50	1.5	40	1.5	52.5	1.75	22.5	1	40	1.5	35	1.5	52.5	1.5	45	1.25	37.5
111	1	MMBVSSSMMKPR/SP12/0353/09	50	1.25	52.72727273	1.5	55	1.5	50	1.25	52.5	1.5	32.5	1.5	57.5	1.75	20	1.5	12.5
112	1	MMBVSSSMMKPR/SP12/2027/09	47.5	1.25	52.72727273	1.75	45	1.5	45	1.25	50	1.5	45	1.75	42.5	1.5	42.5	1.25	47.5
113	1	MMBVSSSMMKPR/SP12/1631/09	47.5	1.5	52.72727273	1.75	60	1.75	55	1.5	52.5	1.75	47.5	1.75	57.5	1.75	37.5	1.5	37.5
114	1	MMBVSSSMMKPR/RG34/1091/10	42.5	1.25	52.72727273	1.75	40	1.25	40	1.25	57.5	1.5	52.5	1.75	47.5	1.5	47.5	1.5	50
115	1	MMBVSSSMMKPR/SP13/6097/08	42.5	1.25	52.72727273	1.5	55	1.5	50	1.25	52.5	1.5	45	1.75	52.5	1.5	47.5	1.5	50
116	1	MMBVSSSMMKPR/BFMH/2540/04	17.5	1.25	32.72727273	1.25	27.5	2	10	0.25	37.5	1.5	7.5	0.5	55	2	42.5	1.25	27.5
117	1	MMBVSSSMMKPR/BGMH/3558/03	12.5	0.5	56.36363636	1.25	62.5	2	27.5	1.25	60	2	20	1.5	42.5	1.75	27.5	1.25	47.5
118	1	MMBVSSSMMKPR/BIMH/4596/05	37.5	1.5	34.54545455	1.5	57.5	2	10	0.25	42.5	2	7.5	0.5	47.5	1.75	37.5	1.75	32.5
119	1	MMBVSSSMMKPR/BJMH/1942/07	20	1.5	41.81818182	1.25	50	2	10	0.25	52.5	2	7.5	0.5	52.5	2	12.5	0.5	42.5
120	1	MMBVSSSMMKPR/BKMH/3435/06	47.5	2	56.36363636	2	40	1.5	50	1.75	57.5	2	47.5	2	32.5	1	12.5	0.5	42.5
121	1	MMBVSSSMMKPR/BLJH/2584/05	37.5	1.5	56.36363636	2	40	1.5	35	1.75	52.5	1.75	42.5	1.75	12.5	0.5	37.5	1.5	42.5
122	1	MMBVSSSMMKPR/BMMH/3591/08	37.5	1.75	49.09090909	2	60	2	10	0.25	60	2	20	1.75	50	1.75	12.5	0.5	40
123	1	MMBVSSSMMKPR/BNMH/3242/06	42.5	1.75	50.90909091	1.5	60	2	25	1.75	60	2	15	1.5	52.5	1.75	37.5	1.5	42.5

124	1	MMBVSSSMMKPR/BORG/0945/03	30	1.25	50.90909091	2	45	1	10	0.25	47.5	1.75	42.5	1.75	47.5	1.25	52.5	1.75	52.5
125	1	MMBVSSSMMKPR/BPRG/3398/03	37.5	1.25	52.72727273	2	20	1	10	0.25	25	1.5	42.5	1.25	25	1	47.5	1.75	47.5
126	1	MMBVSSSMMKPR/BQRG/4390/03	42.5	1.5	49.09090909	1.5	30	1.25	10	0.25	37.5	1.5	37.5	1.75	42.5	1.5	27.5	1.25	50
127	1	MMBVSSSMMKPR/BTRG/3606/03	35	1.5	52.72727273	2	30	1	25	0.75	40	1.5	22.5	1.5	32.5	1.25	42.5	1.75	57.5
128	1	MMBVSSSMMKPR/BUMH/6186/04	42.5	1.25	41.81818182	1.5	15	0.5	10	0.25	32.5	1.5	27.5	1.75	42.5	1.25	25	1.25	25
129	1	MMBVSSSMMKPR/BVMH/6080/07	25	1	49.09090909	1.25	40	1	40	1.5	32.5	1.5	47.5	1.75	57.5	2	12.5	0.5	52.5
130	1	MMBVSSSMMKPR/DMMX/3990/07	20	1.25	52.72727273	1.5	60	2	20	1.75	60	2	15	1.75	52.5	2	12.5	0.5	47.5
131	1	MMBVSSSMMKPR/ SP1/2238/01	27.5	1.25	52.72727273	1.5	15	0.5	10	0.25	20	1.25	37.5	1.5	25	1.25	50	1.5	47.5
132	1	MMBVSSSMMKPR/RG15/1464/08	25	1.25	49.09090909	1.25	50	1.5	45	1.25	47.5	1.75	17.5	1	47.5	1.75	27.5	1.75	47.5
133	1	MMBVSSSMMKPR/RG22/1931/09	22.5	1	52.72727273	1.5	27.5	1.25	45	1.5	27.5	1.25	42.5	1.25	17.5	1	42.5	1.5	42.5
134	1	MMBVSSSMMKPR/MH14/6324/08	37.5	1	45.45454545	1.25	60	2	25	1.25	47.5	2	7.5	0.5	12.5	0.5	12.5	0.5	47.5
135	1	MMBVSSSMMKPR/ RG24/805/09	20	1	52.72727273	1.75	35	1	50	1.5	52.5	1.5	47.5	1.75	32.5	1	25	1.25	52.5
136	1	MMBVSSSMMKPR/HCGA4/6374/08	52.5	1.5	52.72727273	1.5	55	1.5	50	1.25	50	1.5	47.5	1.5	37.5	1.25	32.5	1	52.5
137	1	MMBVSSSMMKPR/SP1/3187/99	20	1	49.09090909	1.5	55	1.75	50	1.5	32.5	1.25	47.5	1.75	20	1	45	1.5	37.5
138	1	MMBVSSSMMKPR/SP1/1543/00	32.5	1.25	52.72727273	1.5	45	1	25	0.75	47.5	1.5	45	1.75	52.5	1.75	52.5	1.75	52.5
139	1	MMBVSSSMMKPR/SP2/10817/07	30	1	45.45454545	1.5	57.5	1.75	52.5	1.5	52.5	1.75	47.5	1.75	55	1.75	50	1.5	47.5
140	1	MMBVSSSMMKPR/SP2/3424/03	22.5	1.25	52.72727273	1.5	30	1.5	45	1.5	50	1.5	47.5	1.75	42.5	1.5	55	1.75	42.5
141	1	MMBVSSSMMKPR/SP2/489/02	12.5	0.5	47.27272727	1.25	50	1.5	42.5	1	42.5	1.5	42.5	1.25	30	1.5	32.5	1.5	37.5
142	1	MMBVSSSMMKPR/SP3/5454/05	50	1.75	50.90909091	1.75	52.5	1.5	40	1.25	47.5	1.5	37.5	1.5	50	1.75	50	1.5	52.5
143	1	MMBVSSSMMKPR/SP3/00070/06	25	1.5	50.90909091	1.75	20	1.5	42.5	1	47.5	1.75	42.5	1.5	47.5	1.5	50	1.75	52.5
144	1	MMBVSSSMMKPR/SP4/11639/06	45	1.25	52.72727273	1.5	37.5	1.5	42.5	1.5	50	1.75	45	1.5	45	1.75	47.5	1.25	50
145	1	MMBVSSSMMKPR/SP4/12823/07	17.5	1.25	52.72727273	1.5	25	1.5	35	1.25	27.5	1.25	42.5	1.75	25	1.5	42.5	1.25	50
146	1	MMBVSSSMMKPR/SP4/14511/07	30	1.5	50.90909091	1.5	35	1.25	50	1.5	37.5	1.75	47.5	1.5	42.5	1.75	45	1.75	37.5
147	1	MMBVSSSMMKPR/IIRG/4358/08	42.5	1.25	49.09090909	1.5	35	1.25	40	1.25	47.5	1.5	37.5	1.5	47.5	2	52.5	1.5	47.5
148	1	MMBVSSSMMKPR/TVRG/1658/08	42.5	1.25	50.90909091	1.5	15	0.5	15	1.25	52.5	1.75	27.5	1.25	60	2	12.5	0.5	52.5
149	1	MMBVSSSMMKPR/JRRG/6716/08	22.5	1	52.72727273	1.75	22.5	1.25	47.5	1.75	42.5	1.5	32.5	1.5	17.5	1.5	52.5	1.75	47.5
150	1	MMBVSSSMMKPR/JSMH/7129/07	25	1.25	50.90909091	1.5	47.5	1.75	37.5	1.5	52.5	1.75	32.5	1.5	52.5	2	45	1.5	37.5

151	0	MMBVSSSMMKPR/CPMH/1187/05	27.5	1.25	23.63636	0.5	55	1.5	45	1.5	57.5	2	7.5	0.5	52.5	2	12.5	0.5	37.5
152	0	MMBVSSSMMKPR/CSMH/3038/04	17.5	1.5	52.72727	1.5	32.5	1.5	45	1.5	50	1.5	7.5	0.5	52.5	1.75	47.5	1	42.5
153	0	MMBVSSSMMKPR/CTMH/2852/04	30	1.5	56.36364	1.75	42.5	1.75	45	1.5	60	2	20	1.75	52.5	1.75	12.5	0.5	22.5
154	0	MMBVSSSMMKPR/CUMH/1591/03	12.5	0.5	45.45455	1.5	47.5	1.75	47.5	1.5	52.5	1.5	7.5	0.5	12.5	0.5	22.5	1	37.5
155	0	MMBVSSSMMKPR/CWMH/3473/06	17.5	1.25	23.63636	0.5	55	1.5	50	1.25	52.5	2	7.5	0.5	52.5	2	32.5	2	42.5
156	0	MMBVSSSMMKPR/CXJH/3121/05	45	1.25	36.36364	1.25	40	1.5	10	0.25	60	2	7.5	0.5	52.5	1.5	12.5	0.5	42.5
157	0	MMBVSSSMMKPR/CYJH/0878/06	12.5	0.5	56.36364	2	55	2	10	0.25	32.5	1.75	7.5	0.5	12.5	0.5	12.5	0.5	32.5
158	0	MMBVSSSMMKPR/RG26/5002/09	52.5	1.25	52.72727	1.75	55	2	55	1.75	52.5	1.75	47.5	1.5	52.5	1.75	52.5	1.5	52.5
159	0	MMBVSSSMMKPR/DAMH/7095/09	50	1.5	47.27273	1.25	60	2	10	0.25	60	2	15	1.5	47.5	2	37.5	1.75	22.5
160	0	MMBVSSSMMKPR/DBMH/9616/08	32.5	1.25	50.90909	2	60	2	37.5	1.5	50	1.75	32.5	1.5	57.5	2	57.5	1.25	47.5

Table 3C

Sl. No.	Outcome	Sample No.	ZC%-M	ZCI-M	ZC%-C	ZCI-C	ZD%-C	ZDI-C	ZF2%-N	ZF2I-N
1	1	MMBVSSSMMKPR/AAJH/0467/06	33.33333333	0.666666667	76.36363636	2.5	83.91608392	3.333333333	74.59016393	2.666666667
2	1	MMBVSSSMMKPR/ABMH/4734/07	33.33333333	0.666666667	87.27272727	3.333333333	78.67132867	2.666666667	85.24590164	4
3	1	MMBVSSSMMKPR/HLRG/1219/03	33.33333333	0.666666667	32.72727273	2.5	83.91608392	2.666666667	63.93442623	4
4	1	MMBVSSSMMKPR/ACRG/2834/03	40	1.166666667	65.45454545	2.5	41.95804196	2	101.2295082	4
5	1	MMBVSSSMMKPR/AVRG/1397/04	33.33333333	0.666666667	87.27272727	3.333333333	83.91608392	4	26.63934426	2.666666667

6	1	MMBVSSSMMKPR/AEMH/6521/06	50	1.333333333	0	0.833333333	73.42657343	2.666666667	74.59016393	4
7	1	MMBVSSSMMKPR/AFJH/0478/06	33.33333333	0.666666667	76.36363636	2.5	94.40559441	4	0	0
8	1	MMBVSSSMMKPR/HTMX/0675/08	33.33333333	0.666666667	76.36363636	2.5	57.69230769	2.666666667	85.24590164	2.666666667
9	1	MMBVSSSMMKPR/IRRG/5724/08	46.66666667	1	87.27272727	3.333333333	52.44755245	3.333333333	10.6557377	2.666666667
10	1	MMBVSSSMMKPR/JMRG/1480/08	45	1.166666667	98.18181818	3.333333333	73.42657343	3.333333333	63.93442623	2.666666667
11	1	MMBVSSSMMKPR/HCGA1/222/10	33.33333333	0.666666667	76.36363636	2.5	62.93706294	2	10.6557377	2
12	1	MMBVSSSMMKPR/KIDC/0164/06	43.33333333	1.166666667	76.36363636	2.5	52.44755245	2	26.63934426	3.333333333
13	1	MMBVSSSMMKPR/KJDC/0167/06	40	1	76.36363636	2.916666667	73.42657343	2	10.6557377	2
14	1	MMBVSSSMMKPR/KNDC/0176/05	50	1.166666667	76.36363636	2.916666667	52.44755245	2.666666667	10.6557377	2.666666667
15	1	MMBVSSSMMKPR/MH11/3187/09	41.66666667	1.333333333	87.27272727	3.333333333	73.42657343	2	21.31147541	2
16	1	MMBVSSSMMKPR/HCGA4/5535/06	33.33333333	0.666666667	87.27272727	2.916666667	83.91608392	3.333333333	0	0
17	1	MMBVSSSMMKPR/SP5/6544/08	33.33333333	0.666666667	76.36363636	2.5	73.42657343	2.666666667	26.63934426	2.666666667
18	1	MMBVSSSMMKPR/SP6/5298/06	53.33333333	1	76.36363636	2.083333333	73.42657343	3.333333333	21.31147541	2
19	1	MMBVSSSMMKPR/SP6/6116/06	40	1	76.36363636	2.5	83.91608392	3.333333333	79.91803279	3.333333333
20	1	MMBVSSSMMKPR/SP8/6543/06	56.66666667	1.333333333	87.27272727	2.5	83.91608392	2.666666667	21.31147541	2
21	1	MMBVSSSMMKPR/SP9/1761/97	36.66666667	1	87.27272727	2.916666667	78.67132867	3.333333333	0	0
22	1	MMBVSSSMMKPR/SP9/2006/02	38.33333333	1.166666667	81.81818182	2.916666667	83.91608392	3.333333333	10.6557377	2.666666667
23	1	MMBVSSSMMKPR/SP10/4338/05	38.33333333	1.166666667	81.81818182	2.916666667	83.91608392	3.333333333	5.327868852	2.666666667
24	1	MMBVSSSMMKPR/SP13/0242/10	45	1.166666667	87.27272727	2.916666667	83.91608392	2.666666667	63.93442623	4
25	1	MMBVSSSMMKPR/ADRG/1440/02	40	1.166666667	54.54545455	2.5	52.44755245	2.666666667	95.90163934	3.333333333
26	1	MMBVSSSMMKPR/AGMH/2268/04	33.33333333	0.666666667	65.45454545	2.916666667	20.97902098	1.333333333	10.6557377	2.666666667
27	1	MMBVSSSMMKPR/AHMH/2180/03	33.33333333	0.666666667	43.63636364	3.333333333	83.91608392	2.666666667	31.96721311	3.333333333
28	1	MMBVSSSMMKPR/AJMH/1975/03	33.33333333	0.666666667	87.27272727	3.333333333	94.40559441	4	21.31147541	2.666666667
29	1	MMBVSSSMMKPR/AKMH/1186/03	33.33333333	0.666666667	87.27272727	3.333333333	94.40559441	4	15.98360656	2.666666667
30	1	MMBVSSSMMKPR/ALMH/4227/05	45	1.166666667	65.45454545	3.333333333	62.93706294	1.333333333	0	0
31	1	MMBVSSSMMKPR/AMMH/2138/05	41.66666667	1	87.27272727	2.916666667	73.42657343	4	74.59016393	2.666666667
32	1	MMBVSSSMMKPR/ANMH/6528/05	33.33333333	0.666666667	87.27272727	3.333333333	83.91608392	4	31.96721311	2.666666667

33	1	MMBVSSSMKPR/AOMH/1621/05	33.33333333	0.666666667	54.54545455	2.916666667	73.42657343	3.333333333	0	0
34	1	MMBVSSSMKPR/APMH/6408/05	33.33333333	0.666666667	87.27272727	3.333333333	73.42657343	3.333333333	15.98360656	2.666666667
35	1	MMBVSSSMKPR/AQMH/1408/06	33.33333333	0.666666667	10.90909091	1.666666667	83.91608392	3.333333333	74.59016393	2.666666667
36	1	MMBVSSSMKPR/ARMH/4622/06	41.66666667	1	76.36363636	2.916666667	83.91608392	4	79.91803279	2.666666667
37	1	MMBVSSSMKPR/ASRG/5174/03	36.66666667	1	65.45454545	2.5	78.67132867	4	26.63934426	2.666666667
38	1	MMBVSSSMKPR/ATMH/4074/01	33.33333333	0.666666667	65.45454545	3.333333333	62.93706294	2.666666667	85.24590164	4
39	1	MMBVSSSMKPR/AYRG/3670/02	33.33333333	0.666666667	98.18181818	3.333333333	73.42657343	2.666666667	0	0
40	1	MMBVSSSMKPR/AZRG/1472/02	48.33333333	1.166666667	87.27272727	2.916666667	73.42657343	3.333333333	0	0
41	1	MMBVSSSMKPR/BAJH/0102/07	56.66666667	1.5	87.27272727	2.916666667	83.91608392	4	79.91803279	3.333333333
42	1	MMBVSSSMKPR/HSMH/4789/07	33.33333333	0.666666667	65.45454545	2.083333333	73.42657343	4	95.90163934	3.333333333
43	1	MMBVSSSMKPR/HKRG/3754/03	36.66666667	1	87.27272727	2.5	68.18181818	2.666666667	15.98360656	1.333333333
44	1	MMBVSSSMKPR/IMRG/5141/08	33.33333333	0.666666667	98.18181818	3.333333333	104.8951049	4	31.96721311	2.666666667
45	1	MMBVSSSMKPR/IQRG/5751/08	33.33333333	0.666666667	76.36363636	2.5	83.91608392	2.666666667	74.59016393	4
46	1	MMBVSSSMKPR/JNRG/6963/08	45	1.166666667	98.18181818	3.333333333	94.40559441	1.333333333	53.27868852	2
47	1	MMBVSSSMKPR/JORG/6520/08	46.66666667	1.5	87.27272727	3.333333333	94.40559441	4	31.96721311	2.666666667
48	1	MMBVSSSMKPR/IXRG/1912/08	43.33333333	1.166666667	76.36363636	3.333333333	94.40559441	4	0	0
49	1	MMBVSSSMKPR/IHRG/1461/07	33.33333333	0.666666667	87.27272727	2.916666667	83.91608392	4	10.6557377	1.333333333
50	1	MMBVSSSMKPR/INRG/6074/08	33.33333333	0.666666667	65.45454545	2.916666667	73.42657343	4	21.31147541	1.333333333
51	1	MMBVSSSMKPR/JPRG/7119/08	36.66666667	1	76.36363636	2.5	83.91608392	3.333333333	31.96721311	1.333333333
52	1	MMBVSSSMKPR/IARG/1209/01	33.33333333	0.666666667	76.36363636	2.5	78.67132867	3.333333333	95.90163934	3.333333333
53	1	MMBVSSSMKPR/JQRG/6998/08	46.66666667	1	92.72727273	3.333333333	78.67132867	2.666666667	58.60655738	3.333333333
54	1	MMBVSSSMKPR/HCGA1/5042/08	36.66666667	1	87.27272727	2.5	83.91608392	3.333333333	10.6557377	2
55	1	MMBVSSSMKPR/RG20/7272/08	38.33333333	1.166666667	87.27272727	2.5	83.91608392	2.666666667	0	0
56	1	MMBVSSSMKPR/MH10/826/06	36.66666667	1	87.27272727	2.916666667	41.95804196	2	69.26229508	3.333333333
57	1	MMBVSSSMKPR/MH12/6907/09	40	1.166666667	87.27272727	2.916666667	73.42657343	3.333333333	15.98360656	2
58	1	MMBVSSSMKPR/MH13/5276/09	33.33333333	0.666666667	87.27272727	2.916666667	83.91608392	2.666666667	0	0
59	1	MMBVSSSMKPR/MH13/2852/02	38.33333333	1.166666667	87.27272727	2.083333333	83.91608392	2	95.90163934	3.333333333

60	1	MMBVSSSMKPR/RG24/2672/09	43.33333333	1	76.36363636	1.666666667	68.18181818	2.666666667	0	0
61	1	MMBVSSSMKPR/RG24/786/09	53.33333333	1.166666667	65.45454545	2.083333333	62.93706294	2.666666667	0	0
62	1	MMBVSSSMKPR/RG24/3773/09	33.33333333	0.666666667	76.36363636	2.5	83.91608392	2	79.91803279	3.333333333
63	1	MMBVSSSMKPR/RG24/3821/09	43.33333333	1	76.36363636	1.666666667	52.44755245	2	10.6557377	3.333333333
64	1	MMBVSSSMKPR/RG25/1072/09	38.33333333	1.166666667	65.45454545	2.083333333	83.91608392	2.666666667	0	0
65	1	MMBVSSSMKPR/HCGA5/7545/07	55	1	87.27272727	2.916666667	83.91608392	3.333333333	74.59016393	3.333333333
66	1	MMBVSSSMKPR/SP2/2851/03	36.66666667	1.166666667	92.72727273	2.916666667	83.91608392	3.333333333	0	0
67	1	MMBVSSSMKPR/SP2/06011/08	36.66666667	1.166666667	92.72727273	2.916666667	83.91608392	3.333333333	0	0
68	1	MMBVSSSMKPR/SP2/5595E/04	33.33333333	0.666666667	81.81818182	2.5	83.91608392	3.333333333	31.96721311	3.333333333
69	1	MMBVSSSMKPR/SP3/12267/07	50	1.333333333	81.81818182	2.916666667	78.67132867	2.666666667	53.27868852	2.666666667
70	1	MMBVSSSMKPR/SP3/09935/08	58.33333333	1.333333333	87.27272727	2.916666667	73.42657343	2.666666667	0	0
71	1	MMBVSSSMKPR/SP4/04418/08	33.33333333	0.666666667	65.45454545	2.5	89.16083916	3.333333333	0	0
72	1	MMBVSSSMKPR/KFDC/0149/07	50	1.166666667	65.45454545	2.916666667	52.44755245	2	42.62295082	2.666666667
73	1	MMBVSSSMKPR/BDRG/5248/04	33.33333333	0.666666667	70.90909091	2.916666667	78.67132867	3.333333333	0	0
74	1	MMBVSSSMKPR/KODC/0178/05	33.33333333	0.666666667	76.36363636	2.5	41.95804196	2.666666667	74.59016393	2.666666667
75	1	MMBVSSSMKPR/SP5/2503/08	43.33333333	1.166666667	87.27272727	2.5	83.91608392	2	0	0
76	1	MMBVSSSMKPR/SP5/2049/09	53.33333333	1.166666667	76.36363636	2.5	73.42657343	2.666666667	0	0
77	1	MMBVSSSMKPR/SP5/2933/09	50	1	32.72727273	2.083333333	52.44755245	2	21.31147541	2.666666667
78	1	MMBVSSSMKPR/SP5/5414/09	43.33333333	1	76.36363636	2.083333333	73.42657343	2.666666667	42.62295082	2.666666667
79	1	MMBVSSSMKPR/SP5/6317/09	33.33333333	0.666666667	81.81818182	2.083333333	83.91608392	3.333333333	69.26229508	2.666666667
80	1	MMBVSSSMKPR/SP5/5630/07	43.33333333	1.166666667	87.27272727	2.5	73.42657343	2.666666667	90.57377049	4
81	1	MMBVSSSMKPR/SP6/4628/02	45	1.166666667	81.81818182	2.5	83.91608392	3.333333333	37.29508197	2.666666667
82	1	MMBVSSSMKPR/SP6/215/05	41.66666667	1	87.27272727	2.5	83.91608392	3.333333333	0	0
83	1	MMBVSSSMKPR/SP6/4283/08	53.33333333	1	76.36363636	2.083333333	83.91608392	3.333333333	85.24590164	3.333333333
84	1	MMBVSSSMKPR/SP6/3004/09	50	1.166666667	65.45454545	2.5	68.18181818	3.333333333	26.63934426	1.333333333
85	1	MMBVSSSMKPR/SP7/6675/07	55	1.166666667	87.27272727	2.5	83.91608392	2.666666667	31.96721311	2
86	1	MMBVSSSMKPR/SP7/4924/06	33.33333333	0.666666667	87.27272727	2.916666667	83.91608392	3.333333333	0	0

87	1	MMBVSSSMKPR/SP8/7537/09	38.33333333	1.166666667	65.45454545	2.5	68.18181818	2.666666667	31.96721311	3.333333333
88	1	MMBVSSSMKPR/SP8/3347/09	53.33333333	1.333333333	87.27272727	2.916666667	73.42657343	3.333333333	95.90163934	3.333333333
89	1	MMBVSSSMKPR/SP8/7252/08	43.33333333	1.166666667	81.81818182	2.916666667	78.67132867	2.666666667	63.93442623	2.666666667
90	1	MMBVSSSMKPR/AURG/1691/04	43.33333333	1	76.36363636	2.916666667	73.42657343	3.333333333	53.27868852	2.666666667
91	1	MMBVSSSMKPR/AWRG/3418/04	36.66666667	1.166666667	87.27272727	2.916666667	73.42657343	2.666666667	0	0
92	1	MMBVSSSMKPR/HCGA1/6737/09	46.66666667	1.166666667	87.27272727	2.5	83.91608392	2	0	0
93	1	MMBVSSSMKPR/HCGA3/5860/09	36.66666667	1.166666667	92.72727273	2.5	73.42657343	3.333333333	63.93442623	4
94	1	MMBVSSSMKPR/BBMH/6814/07	33.33333333	0.666666667	43.63636364	1.666666667	73.42657343	2	21.31147541	3.333333333
95	1	MMBVSSSMKPR/BEMH/3166/01	53.33333333	1	76.36363636	2.083333333	15.73426573	2	85.24590164	4
96	1	MMBVSSSMKPR/RG25/2941/09	53.33333333	1.166666667	76.36363636	2.5	83.91608392	3.333333333	95.90163934	4
97	1	MMBVSSSMKPR/SP1/1287/98	45	1.333333333	87.27272727	2.916666667	68.18181818	3.333333333	53.27868852	3.333333333
98	1	MMBVSSSMKPR/SP2/00396/06	36.66666667	1.333333333	92.72727273	2.916666667	83.91608392	3.333333333	42.62295082	4
99	1	MMBVSSSMKPR/SP2/5090/03	36.66666667	1.166666667	76.36363636	2.5	83.91608392	3.333333333	53.27868852	2.666666667
100	1	MMBVSSSMKPR/SP3/00076/06	45	1.333333333	87.27272727	2.916666667	83.91608392	3.333333333	0	0
101	1	MMBVSSSMKPR/SP5/5658/09	46.66666667	1.166666667	87.27272727	2.916666667	68.18181818	2.666666667	15.98360656	2.666666667
102	1	MMBVSSSMKPR/SP9/1431/07	40	1.166666667	76.36363636	2.5	83.91608392	3.333333333	0	0
103	1	MMBVSSSMKPR/SP9/00521/07	40	1	76.36363636	2.5	83.91608392	3.333333333	42.62295082	2.666666667
104	1	MMBVSSSMKPR/SP9/919/99	41.66666667	1.166666667	87.27272727	2.916666667	83.91608392	3.333333333	85.24590164	2.666666667
105	1	MMBVSSSMKPR/SP10/1693/03	36.66666667	1	87.27272727	2.5	83.91608392	2.666666667	85.24590164	3.333333333
106	1	MMBVSSSMKPR/SP11/2802/01	56.66666667	1.166666667	87.27272727	2.5	83.91608392	3.333333333	95.90163934	3.333333333
107	1	MMBVSSSMKPR/SP11/1002/05	46.66666667	1.166666667	76.36363636	2.5	73.42657343	3.333333333	95.90163934	3.333333333
108	1	MMBVSSSMKPR/SP11/4945/09	51.66666667	1.166666667	87.27272727	2.916666667	83.91608392	3.333333333	74.59016393	2
109	1	MMBVSSSMKPR/RG32/47/10	46.66666667	1	87.27272727	2.5	68.18181818	2.666666667	0	0
110	1	MMBVSSSMKPR/RG32/7449/09	56.66666667	1.333333333	70.90909091	2.916666667	62.93706294	2	5.327868852	4
111	1	MMBVSSSMKPR/SP12/0353/09	53.33333333	1.166666667	76.36363636	2.916666667	10.48951049	1.333333333	79.91803279	2.666666667
112	1	MMBVSSSMKPR/SP12/2027/09	41.66666667	1.166666667	87.27272727	2.916666667	83.91608392	2.666666667	0	0
113	1	MMBVSSSMKPR/SP12/1631/09	40	1.166666667	87.27272727	2.916666667	78.67132867	1.333333333	95.90163934	2.666666667

114	1	MMBVSSSMKPR/RG34/1091/10	43.33333333	1.166666667	87.27272727	2.916666667	83.91608392	3.333333333	63.93442623	4
115	1	MMBVSSSMKPR/SP13/6097/08	41.66666667	1	87.27272727	2.916666667	83.91608392	3.333333333	74.59016393	2.666666667
116	1	MMBVSSSMKPR/BFMH/2540/04	33.33333333	0.666666667	87.27272727	2.083333333	62.93706294	2.666666667	85.24590164	2.666666667
117	1	MMBVSSSMKPR/BGMH/3558/03	33.33333333	0.666666667	87.27272727	3.333333333	31.46853147	2	85.24590164	2.666666667
118	1	MMBVSSSMKPR/BIMH/4596/05	50	1.166666667	43.63636364	2.916666667	52.44755245	2.666666667	37.29508197	2
119	1	MMBVSSSMKPR/BJMH/1942/07	33.33333333	0.666666667	54.54545455	2.5	73.42657343	3.333333333	63.93442623	3.333333333
120	1	MMBVSSSMKPR/BKMH/3435/06	43.33333333	1.166666667	87.27272727	3.333333333	89.16083916	4	42.62295082	2.666666667
121	1	MMBVSSSMKPR/BLJH/2584/05	33.33333333	0.666666667	65.45454545	2.5	83.91608392	4	0	0
122	1	MMBVSSSMKPR/BMMH/3591/08	33.33333333	0.666666667	81.81818182	3.333333333	62.93706294	2.666666667	95.90163934	3.333333333
123	1	MMBVSSSMKPR/BNMH/3242/06	33.33333333	0.666666667	87.27272727	2.5	83.91608392	4	31.96721311	2
124	1	MMBVSSSMKPR/BORG/0945/03	50	1.166666667	87.27272727	2.916666667	83.91608392	3.333333333	26.63934426	1.333333333
125	1	MMBVSSSMKPR/BPRG/3398/03	33.33333333	0.666666667	65.45454545	2.916666667	78.67132867	3.333333333	10.6557377	2.666666667
126	1	MMBVSSSMKPR/BQRG/4390/03	33.33333333	0.666666667	103.6363636	3.333333333	73.42657343	2.666666667	37.29508197	2
127	1	MMBVSSSMKPR/BTRG/3606/03	36.66666667	1.166666667	65.45454545	2.5	73.42657343	2	10.6557377	1.333333333
128	1	MMBVSSSMKPR/BUMH/6186/04	41.66666667	1.166666667	87.27272727	2.916666667	0	0	0	0
129	1	MMBVSSSMKPR/BVMH/6080/07	33.33333333	0.666666667	81.81818182	2.5	52.44755245	2	53.27868852	2.666666667
130	1	MMBVSSSMKPR/DMMX/3990/07	38.33333333	1	87.27272727	2.916666667	62.93706294	2.666666667	31.96721311	2.666666667
131	1	MMBVSSSMKPR/ SP1/2238/01	36.66666667	1.166666667	87.27272727	2.916666667	41.95804196	2.666666667	0	0
132	1	MMBVSSSMKPR/RG15/1464/08	33.33333333	0.666666667	87.27272727	2.5	83.91608392	2.666666667	42.62295082	1.333333333
133	1	MMBVSSSMKPR/RG22/1931/09	38.33333333	1	87.27272727	2.5	83.91608392	2.666666667	0	0
134	1	MMBVSSSMKPR/MH14/6324/08	33.33333333	0.666666667	87.27272727	2.916666667	73.42657343	2.666666667	85.24590164	2
135	1	MMBVSSSMKPR/ RG24/805/09	56.66666667	1.166666667	76.36363636	2.5	73.42657343	2.666666667	0	0
136	1	MMBVSSSMKPR/HCGA4/6374/08	41.66666667	1	87.27272727	2.5	83.91608392	3.333333333	0	0
137	1	MMBVSSSMKPR/SP1/3187/99	36.66666667	1	87.27272727	2.916666667	73.42657343	2.666666667	79.91803279	4
138	1	MMBVSSSMKPR/SP1/1543/00	46.66666667	1.166666667	87.27272727	2.5	62.93706294	3.333333333	42.62295082	2.666666667
139	1	MMBVSSSMKPR/SP2/10817/07	45	1.166666667	87.27272727	2.916666667	83.91608392	3.333333333	63.93442623	2.666666667
140	1	MMBVSSSMKPR/SP2/3424/03	43.33333333	1.166666667	81.81818182	2.5	83.91608392	3.333333333	0	0

141	1	MMBVSSSMMKPR/SP2/489/02	33.33333333	0.666666667	54.54545455	2.083333333	83.91608392	3.333333333	85.24590164	3.333333333
142	1	MMBVSSSMMKPR/SP3/5454/05	46.66666667	1.333333333	76.36363636	2.5	78.67132867	3.333333333	0	0
143	1	MMBVSSSMMKPR/SP3/00070/06	33.33333333	0.666666667	87.27272727	2.5	83.91608392	3.333333333	0	0
144	1	MMBVSSSMMKPR/SP4/11639/06	45	1.166666667	81.81818182	2.083333333	78.67132867	3.333333333	21.31147541	2
145	1	MMBVSSSMMKPR/SP4/12823/07	36.66666667	1.166666667	81.81818182	2.916666667	83.91608392	3.333333333	15.98360656	2
146	1	MMBVSSSMMKPR/SP4/14511/07	36.66666667	1.166666667	87.27272727	2.916666667	89.16083916	3.333333333	0	0
147	1	MMBVSSSMMKPR/IRG/4358/08	38.33333333	1.166666667	65.45454545	2.916666667	73.42657343	4	0	0
148	1	MMBVSSSMMKPR/TVRG/1658/08	33.33333333	0.666666667	0	0.833333333	89.16083916	4	85.24590164	4
149	1	MMBVSSSMMKPR/JRRG/6716/08	46.66666667	1	87.27272727	3.333333333	78.67132867	3.333333333	0	0
150	1	MMBVSSSMMKPR/JSMH/7129/07	46.66666667	1	76.36363636	2.5	83.91608392	3.333333333	0	0
151	0	MMBVSSSMMKPR/CPMH/1187/05	53.33333333	1.166666667	87.27272727	2.916666667	78.67132867	2.666666667	95.90163934	4
152	0	MMBVSSSMMKPR/CSMH/3038/04	33.33333333	0.666666667	76.36363636	2.916666667	36.71328671	2	74.59016393	4
153	0	MMBVSSSMMKPR/CTMH/2852/04	36.66666667	1.166666667	87.27272727	2.916666667	68.18181818	4	95.90163934	3.333333333
154	0	MMBVSSSMMKPR/CUMH/1591/03	40	1	43.63636364	2.5	83.91608392	4	0	0
155	0	MMBVSSSMMKPR/CWMH/3473/06	38.33333333	1	54.54545455	2.083333333	36.71328671	2.666666667	26.63934426	2.666666667
156	0	MMBVSSSMMKPR/CXJH/3121/05	36.66666667	1	87.27272727	2.916666667	73.42657343	2.666666667	95.90163934	3.333333333
157	0	MMBVSSSMMKPR/CYJH/0878/06	33.33333333	0.666666667	65.45454545	2.5	73.42657343	3.333333333	0	0
158	0	MMBVSSSMMKPR/RG26/5002/09	40	1.333333333	87.27272727	2.916666667	73.42657343	3.333333333	42.62295082	2.666666667
159	0	MMBVSSSMMKPR/DAMH/7095/09	46.66666667	1	43.63636364	1.666666667	10.48951049	1.333333333	63.93442623	4
160	0	MMBVSSSMMKPR/DBMH/9616/08	33.33333333	0.666666667	87.27272727	2.5	73.42657343	2.666666667	74.59016393	2.666666667

Table 3D

Once the combination of 5 biomarkers is selected, based on the data obtained by retrospective study of 298 patient samples (training set), scores of these 5 biomarkers are coupled with the three clinical parameters (tumor size, grade and node status) to construct/develop the CanAssist-Breast algorithm/algorithm of the present disclosure which provides a CanAssist Breast relapse score which helps in stratifying patients as low risk or high risk of recurrence within 5 years from diagnosis. The relapse score is computed on a scale of 1-100 and scores of 15.5 and below are classified as low risk, and above 15.5 are classified as high risk. The risk of recurrence is considered high if the probability of recurrence is greater than about 9% and low if it is less than or equal to about 9%.

Example 2: Validation studies of 5 biomarker and 3 clinical parameter combination of the present disclosure and correlation of CanAssist Breast relapse score with recurrence in early stage ER+/PR+ and Her2- breast cancer patients

The prognostic test developed in example 1 is validated on a validation sample set of 700 early stage ER+/PR+ and Her2- breast cancer patients. A representative set of the complete validation set is provided herewith by way of table no. 4, wherein IHC measurements are provided for 299 data samples.

Sl. No	Age	Grade	TNM	A%-M	W%-C	U%-C	R%-M	F%-M	WI-C	Outcome	DFS	TTP	Chemo Details	Can Assist Breast Score
1	53	1	T1N0M0	37.5	22.5	38.2	48	32.86	1.3	Recurrence		35	Chemo Naive	45.6
2	66	2	T1N0M0	57.5	45	50.9	48	34.29	1.8	Recurrence		60	Chemo Naive	15.6
3	72	2	T2N0M0	50	47.5	52.7	44	35.71	1.5	Recurrence		44	Chemo Naive	19.4
4	42	2	T2N0M0	52.5	47.5	52.7	42	32.86	1.8	Recurrence		52	Chemo Naive	11.5
5	43	3	T1N0M0	52.5	42.5	50.9	40	27.14	1.5	Recurrence		55	Chemo Naive	20.8
6	69	3	T2N0M0	15	40	38.2	34	21.43	1.5	Recurrence		43	Chemo Naive	13.9
7	40	3	T2N0M0	42.5	37.5	49.1	44	27.14	1.8	Recurrence		46	Chemo Naive	24.1
8	52	2	T2N1M0	17.5	42.5	49.1	44	30.00	1.3	Recurrence		53	Chemo Naive	23.8
9	44	2	T2N0M0	52.5	48.75	51.8	31	20.71	1.5	No Recurrence	76		Chemo Naive	8.3
10	62	1	T2N0M0	52.5	50	52.7	38	20.71	1.8	No Recurrence	80		Chemo Naive	8.3
11	62	2	T1N0M0	28.75	43.75	49.1	35	22.14	1.6	No Recurrence	65		Chemo Naive	2.5
12	61	1	T1N0M0	27.5	43.75	49.1	50	32.86	1.6	No Recurrence	64		Chemo Naive	8.1
13	41	2	T2N0M0	15	45	52.7	29	12.86	1.6	No Recurrence	68		Chemo Naive	9
14	59	2	T1N0M0	50	46.25	50.9	29	18.57	1.8	No Recurrence	61		Chemo Naive	5.5

15	59	3	T2N2M0	12.5	38.75	50.9	25	15.00	1.4	No Recurrence	74	Chemo Naive	7.1
16	71	3	T2N1M0	22.5	42.5	52.7	30	17.86	1.4	No Recurrence	75	Chemo Naive	7.5
17	59	2	T1N0M0	32.5	45	50.9	36	19.29	1.8	No Recurrence	74	Chemo Naive	4
18	65	3	T2N0M0	12.5	43.75	50.0	24	14.29	1.8	No Recurrence	88	Chemo Naive	6.7
19	57	2	T2N0M0	35	46.25	51.8	45	25.00	1.5	No Recurrence	137	Chemo Naive	9.8
20	67	2	T1N0M0	36.25	42.5	50.0	41	15.71	1.4	No Recurrence	69	Chemo Naive	11.5
21	43	2	T1N0M0	22.5	32.5	51.8	27	18.57	1.1	No Recurrence	66	Chemo Naive	4
22	74	1	T2N0M0	21.25	40	47.3	28	15.71	1.5	No Recurrence	65	Chemo Naive	5.6
23	59	2	T1N0M0	43.75	47.5	52.7	37	24.29	1.8	No Recurrence	78	Chemo Naive	3.7
24	42	2	T1N0M0	17.5	30	40.0	23	12.86	1.5	No Recurrence	71	Chemo Naive	3.4
25	72	3	T2N0M0	37.5	40	47.3	26	14.29	1.5	No Recurrence	103	Chemo Naive	5.4
26	56	2	T2N0M0	12.5	46.25	52.7	28	19.29	1.6	No Recurrence	60	Chemo Naive	5.9
27	72	2	T1N0M0	42.5	46.25	51.8	40	27.14	1.8	No Recurrence	60	Chemo Naive	3.7
28	51	2	T2N0M0	50	47.5	53.6	22	12.86	1.8	No Recurrence	60	Chemo Naive	13.1

29	57	3	T2N0M0	35	47.5	52.7	37	22.86	1.5	No Recurrence	85	Chemo Naive	10.3
30	72	2	T2N1M0	52.5	45	52.7	40	25.71	1.6	No Recurrence	93	Chemo Naive	15
31	50	2	T2N0M0	22.5	40	51.8	46	17.86	1.5	No Recurrence	109	Chemo Naive	12.4
32	75	2	T3N1M0	18.75	42.5	52.7	24	15.71	1.3	No Recurrence	130	Chemo Naive	10.9
33	73	1	T1N0M0	20	41.25	49.1	25	12.86	1.5	No Recurrence	79	Chemo Naive	12.7
34	64	3	T2N0M0	12.5	45	51.8	25	14.29	1.9	No Recurrence	68	Chemo Naive	9.1
35	75	2	T2N2M0	25	48.75	53.6	24	15.71	1.8	No Recurrence	86	Chemo Naive	12.4
36	66	1	T1N0M0	18.75	41.25	51.8	28	20.71	1.6	No Recurrence	69	Chemo Naive	7.7
37	64	2	T2N0M0	37.5	50	52.7	26	16.43	1.6	No Recurrence	86	Chemo Naive	6.8
38	57	1	T1N1M0	32.5	43.75	49.1	24	16.43	1.4	No Recurrence	77	Chemo Naive	10.5
39	73	2	T2N1M0	13.75	45	53.6	36	20.71	1.8	No Recurrence	83	Chemo Naive	8.4
40	67	3	T1N0M0	27.5	42.5	53.6	28	15.00	1.6	No Recurrence	60	Chemo Naive	8.4
41	69	2	T2N0M0	46.25	46.25	52.7	26	15.71	1.5	No Recurrence	63	Chemo Naive	7.8
42	57	2	T1N0M0	12.5	42.5	52.7	20	12.86	1.6	No Recurrence	63	Chemo Naive	15

43	70	2	T1N0M0	40	46.25	52.7	22	15.00	1.5	No Recurrence	63	Chemo Naive	9
44	63	3	T1N0M0	50	42.5	54.5	31	17.14	1.5	No Recurrence	69	Chemo Naive	13
45	51	3	T2N0M0	52.5	37.5	50.9	20	14.29	1.4	No Recurrence	71	Chemo Naive	11.1
46	71	2	T2N0M0	45	46.25	47.3	20	14.29	1.4	No Recurrence	76	Chemo Naive	6.7
47	60	3	T2N2M0	50	37.5	50.9	20	12.86	1.4	No Recurrence	60	Chemo Naive	9.8
48	72	1	T2N0M0	25	45	53.6	31	21.43	1.9	No Recurrence	67	Chemo Naive	6.9
49	56	1	T1N0M0	51.25	46.25	52.7	38	21.43	1.6	No Recurrence	67	Chemo Naive	7.4
50	71	3	T1N0M0	22.5	48.75	53.6	29	17.14	1.6	No Recurrence	61	Chemo Naive	9.8
51	70	2	T2N0M0	51.25	45	52.7	37	23.57	1.5	No Recurrence	65	Chemo Naive	10.1
52	74	2	T2N1M0	45	48.75	53.6	42	32.86	1.6	No Recurrence	72	Chemo Naive	16.1
53	69	2	T2N0M0	37.5	46.25	53.6	24	21.43	1.5	No Recurrence	76	Chemo Naive	5.2
54	71	3	T2N0M0	40	35	50.9	32	20.00	1.4	No Recurrence	65	Chemo Naive	11.7
55	53	3	T2N0M0	42.5	46.25	51.8	33	21.43	1.5	No Recurrence	70	Chemo Naive	10
56	70	2	T2N0M0	37.5	47.5	50.0	28	22.86	1.8	No Recurrence	64	Chemo Naive	3

57	57	2	T2N0M0	48.75	42.5	54.5	32	21.43	1.4	No Recurrence	64	Chemo Naive	9.9
58	68	3	T2N0M0	43.75	42.5	50.0	25	15.00	1.5	No Recurrence	84	Chemo Naive	7.4
59	50	2	T1N0M0	12.5	42.5	51.8	33	18.57	1.4	No Recurrence	81	Chemo Naive	7.6
60	50	2	T1N0M0	40	50	54.5	33	25.00	1.8	No Recurrence	133	Chemo Naive	4.1
61	53	2	T1N0M0	17.5	37.5	49.1	44	26.43	1.4	No Recurrence	86	Chemo Naive	10.1
62	65	1	T1N0M0	28.75	47.5	53.6	39	19.29	1.6	No Recurrence	62	Chemo Naive	8.7
63	55	2	T1N0M0	37.5	43.75	51.8	28	17.14	1.6	No Recurrence	66	Chemo Naive	4.8
64	61	1	T2N0M0	31.25	46.25	51.8	30	17.14	1.4	No Recurrence	66	Chemo Naive	7.6
65	48	3	T2N0M0	25	45	52.7	22	12.86	1.1	No Recurrence	79	Chemo Naive	7.7
66	53	2	T1N0M0	36.25	45	50.0	22	17.14	1.6	No Recurrence	82	Chemo Naive	5.3
67	40	3	T2N0M0	15	36.25	54.5	22	16.43	1.5	No Recurrence	84	Chemo Naive	4.4
68	66	2	T1N0M0	47.5	40	50.9	42	27.14	1.3	No Recurrence	135	Chemo Naive	17.4
69	48	3	T2N0M0	21.25	48.75	54.5	30	17.14	1.8	No Recurrence	81	Chemo Naive	7.8
70	46	2	T2N0M0	40	48.75	51.8	29	15.71	1.8	No Recurrence	89	Chemo Naive	6.4

71	59	3	T2N0M0	16.25	47.5	52.7	29	18.57	1.6	No Recurrence	89	Chemo Naive	6.2
72	60	3	T2N0M0	15	48.75	53.6	30	25.71	1.6	No Recurrence	84	Chemo Naive	6.8
73	68	1	T1N0M0	12.5	43.75	43.6	20	20.71	1.5	No Recurrence	98	Chemo Naive	10.8
74	59	3	T2N1M0	18.75	45	52.7	39	29.29	1.6	No Recurrence	86	Chemo Naive	16
75	62	3	T1N0M0	15	48.75	53.6	31	15.71	1.8	No Recurrence	78	Chemo Naive	13
76	58	2	T2N0M0	16.25	47.5	53.6	29	21.43	1.5	No Recurrence	91	Chemo Naive	5.2
77	62	3	T1N0M0	26.25	47.5	51.8	27	20.00	1.6	No Recurrence	60	Chemo Naive	6.4
78	55	3	T1N0M0	12.5	46.25	52.7	23	14.29	1.8	No Recurrence	92	Chemo Naive	13.9
79	50	2	T2N0M0	18.75	46.25	54.5	23	19.29	1.6	No Recurrence	78	Chemo Naive	7.1
80	56	3	T1N0M0	41.25	43.75	51.8	35	28.57	1.4	No Recurrence	61	Chemo Naive	14.2
81	54	3	T1N0M0	42.5	46.25	52.7	28	14.29	1.5	No Recurrence	91	Chemo Naive	10.6
82	57	3	T2N0M0	28.75	47.5	52.7	22	12.86	1.5	No Recurrence	99	Chemo Naive	7.9
83	61	2	T1N0M0	21.25	36.25	51.8	29	16.43	1.3	No Recurrence	60	Chemo Naive	5.2
84	60	3	T1N1M0	20	40	50.9	28	20.00	1.4	No Recurrence	87	Chemo Naive	8.3

85	65	3	T2N0M0	30	47.5	53.6	30	20.00	1.8	No Recurrence	67	Chemo Naive	5.8
86	43	2	T1N0M0	48.75	47.5	52.7	32	20.00	1.6	No Recurrence	60	Chemo Naive	5.9
87	65	2	T2N0M0	37.5	37.5	41.8	29	16.43	1.3	No Recurrence	61	Chemo Naive	6.2
88	67	3	T1N0M0	51.25	47.5	52.7	35	24.29	1.5	No Recurrence	62	Chemo Naive	13.2
89	62	2	T2N0M0	26.25	42.5	52.7	31	23.57	1.6	No Recurrence	60	Chemo Naive	2.3
90	52	1	T3N0M0	16.25	43.75	52.7	30	19.29	1.5	No Recurrence	63	Chemo Naive	16.1
91	57	2	T2N0M0	22.5	47.5	40.0	28	22.86	1.6	No Recurrence	64	Chemo Naive	5.7
92	63	2	T1N0M0	41.25	41.25	48.2	30	18.57	1.6	No Recurrence	81	Chemo Naive	3
93	49	2	T1N0M0	12.5	25	47.3	24	14.29	1.0	No Recurrence	68	Chemo Naive	1.9
94	68	2	T1N0M0	43.75	36.25	53.6	35	22.14	1.3	No Recurrence	72	Chemo Naive	10.6
95	56	1	T1N0M0	17.5	47.5	52.7	27	15.71	1.6	No Recurrence	63	Chemo Naive	16.5
96	63	2	T2N0M0	22.5	41.25	52.7	36	26.43	1.5	No Recurrence	60	Chemo Naive	4.1
97	70	2	T1N0M0	40	35	52.7	35	24.29	1.3	No Recurrence	76	Chemo Naive	9.2
98	68	1	T2N0M0	55	42.5	54.5	26	23.57	1.5	No Recurrence	105	Chemo Naive	11.2

99	59	1	T1N0M0	50	41.25	49.1	35	18.57	1.4	No Recurrence	99	Chemo Naive	8.9
100	40	3	T1N0M0	38.75	45	49.1	36	23.57	1.6	No Recurrence	70	Chemo Naive	8.2
101	56	1	T2N0M0	12.5	47.5	52.7	30	21.43	1.8	No Recurrence	68	Chemo Naive	9.9
102	62	2	T2N1M0	26.25	40	54.5	33	20.00	1.5	No Recurrence	69	Chemo Naive	6.3
103	61	3	T2N0M0	43.75	45	50.9	33	23.57	1.6	No Recurrence	92	Chemo Naive	9.7
104	68	2	T2N1M0	47.5	45	50.9	33	24.29	1.4	No Recurrence	94	Chemo Naive	11.8
105	53	2	T1N0M0	27.5	36.25	52.7	31	20.00	1.4	No Recurrence	91	Chemo Naive	3.9
106	45	3	T1N0M0	16.25	45	52.7	31	20.71	1.4	No Recurrence	88	Chemo Naive	8.9
107	50	2	T2N1M0	30	42.5	53.6	25	16.43	1.4	No Recurrence	84	Chemo Naive	5.2
108	42	3	T2N0M0	15	48.75	52.7	24	16.43	1.6	No Recurrence	61	Chemo Naive	7.8
109	53	3	T2N0M0	13.75	47.5	53.6	36	20.00	1.5	No Recurrence	94	Chemo Naive	9.2
110	55	2	T1N0M0	45	42.5	50.0	41	29.29	1.6	No Recurrence	98	Chemo Naive	6.9
111	48	3	T2N0M0	12.5	48.75	54.5	26	15.00	1.5	No Recurrence	74	Chemo Naive	10
112	31	3	T1N0M0	40	43.75	53.6	31	19.29	1.3	No Recurrence	73	Chemo Naive	12.3

113	53	3	T1N0M0	12.5	42.5	45.5	30	20.71	1.5	No Recurrence	67	Chemo Naive	6.3
114	65	2	T1N1M0	12.5	40	44.5	37	21.43	1.3	No Recurrence	64	Chemo Naive	14.1
115	40	3	T1N0M0	31.25	40	51.8	35	24.29	1.3	No Recurrence	72	Chemo Naive	12.5
116	69	3	T2N0M0	17.5	42.5	47.3	36	15.00	1.5	No Recurrence	71	Chemo Naive	8.9
117	74	3	T2N0M0	36.25	35	47.3	30	17.86	1.3	No Recurrence	72	Chemo Naive	9.4
118	62	2	T2N0M0	32.5	40	52.7	32	21.43	1.3	No Recurrence	85	Chemo Naive	5.7
119	62	2	T1N0M0	12.5	42.5	50.9	28	16.43	1.6	No Recurrence	95	Chemo Naive	7.8
120	55	2	T1N0M0	42.5	47.5	52.7	36	21.43	1.5	No Recurrence	66	Chemo Naive	6
121	52	1	T2N0M0	40	40	51.8	42	17.14	1.4	No Recurrence	60	Chemo Naive	12
122	56	3	T2N1M0	13.75	46.25	52.7	30	22.86	1.5	No Recurrence	110	Chemo Naive	8.5
123	63	2	T2N0M0	28.75	47.5	52.7	34	20.00	1.5	No Recurrence	78	Chemo Naive	4.5
124	58	1	T1N0M0	35	47.5	47.3	26	17.14	1.6	No Recurrence	82	Chemo Naive	8.4
125	59	2	T1N0M0	43.75	43.75	45.5	32	22.14	1.5	No Recurrence	110	Chemo Naive	4.3
126	44	2	T1N0M0	16.25	37.5	50.9	26	15.00	1.3	No Recurrence	67	Chemo Naive	5.7

127	54	2	T2N0M0	25	42.5	49.1	35	23.57	1.5	No Recurrence	65		Chemo Naive	3
128	58	1	T1N0M0	28.75	45	47.3	30	16.43	1.6	No Recurrence	60		Chemo Naive	7.7
129	61	2	T1N0M0	57.5	42.5	52.7	22	24.29	1.5	No Recurrence	61		Chemo Naive	9.4
130	66	1	T1N0M0	50	47.5	49.1	30	22.86	1.6	No Recurrence	71		Chemo Naive	5.8
131	63	2	T1N0M0	12.5	42.5	46.4	24	12.86	1.5	No Recurrence	66		Chemo Naive	8.7
132	52	2	T1N0M0	12.5	43.75	52.7	20	12.86	1.3	No Recurrence	71		Chemo Naive	13.9
133	65	2	T1N0M0	50	47.5	54.5	32	17.14	1.5	No Recurrence	62		Chemo Naive	9.9
134	49	1	T1N0M0	40	30	50.0	20	12.86	1.3	No Recurrence	63		Chemo Naive	9
135	72	2	T2N0M0	50	42.5	52.7	34	14.29	1.8	No Recurrence	63		Chemo Naive	9.9
136	54	2	T2N1M0	18.75	46.25	50.9	32	17.14	1.4	No Recurrence	63		Chemo Naive	7.4
137	68	1	T1N0M0	51.25	38.75	50.9	26	20.00	1.1	No Recurrence	62		Chemo Naive	11
138	64	2	T1N0M0	45	45	54.5	20	15.00	1.5	No Recurrence	65		Chemo Naive	11.6
139	47	2	T1N0M0	36.25	41.25	48.2	22	18.57	1.5	No Recurrence	63		Chemo Naive	2.7
140	57	3	T1N0M0	25	42.5	45.5	20	12.86	1.5	No Recurrence	67		Chemo Naive	6

141	62	2	T1N0M0	13.75	35	54.5	34	18.57	1.4	No Recurrence	68		Chemo Naive	7.8
142	72	3	T1N0M0	27.5	33.75	43.6	28	15.71	1.3	No Recurrence	68		Chemo Naive	6
143	67	3	T1N0M0	12.5	46.25	54.5	31	25.00	1.6	No Recurrence	61		Chemo Naive	9.3
144	50	3	T2N0M0	52.5	43.75	49.1	29	14.29	1.4	No Recurrence	70		Chemo Naive	14.2
145	26	2	T2N0M0	50	45	50.9	35	22.86	1.5	No Recurrence	72		Chemo Naive	8.4
146	59	3	T1N0M0	50	32.5	49.1	31	19.29	1.3	No Recurrence	68		Chemo Naive	16.9
147	69	2	T1N0M0	52.5	37.5	50.0	42	31.43	1.8	No Recurrence	62		Chemo Naive	11.5
148	72	2	T1N0M0	48.75	43.75	53.6	32	14.29	1.4	No Recurrence	65		Chemo Naive	11.8
149	66	2	T2N0M0	37.5	32.5	47.3	30	25.00	1.3	No Recurrence	60		Chemo Naive	7.2
150	62	2	T1N0M0	33.75	45	52.7	20	17.14	1.5	No Recurrence	60		Chemo Naive	7.7
151	43	2	T1N0M0	30	42.5	51.8	31	25.00	1.4	No Recurrence	60		Chemo Naive	3.6
152	61	2	T1N0M0	48.75	43.75	51.8	24	15.71	1.4	No Recurrence	68		Chemo Naive	8.4
153	65	1	T1N0M0	27.5	33.75	52.7	22	12.86	1.3	No Recurrence	62		Chemo Naive	11.5
154	60	3	T2N2M0	37.5	47.5	52.7	28	28.57	1.8	Recurrence		12	Chemo Treated	16.7

155	41	3	T3N0M0	12.5	45	50.9	42	22.86	1.3	Recurrence		37	Chemo Treated	30.1
156	47	2	T2N2M0	50	37.5	45.5	50	35.71	1.3	Recurrence		45	Chemo Treated	100
157	62	2	T2N2M0	15	42.5	49.1	40	27.14	1.3	Recurrence		54	Chemo Treated	27.2
158	50	3	T2N2M0	15	42.5	47.3	40	31.43	1.5	Recurrence		40	Chemo Treated	39.4
159	50	2	T2N1M0	12.5	42.5	49.1	44	12.86	1.5	Recurrence		50	Chemo Treated	19.8
160	48	2	T2N1M0	12.5	45	52.7	40	12.86	1.8	Recurrence		26	Chemo Treated	15.8
161	45	2	T2N0M0	52.5	37.5	52.7	50	32.86	1.5	Recurrence		18	Chemo Treated	35.5
162	57	1	T1N1M0	12.5	47.5	50.9	40	21.43	1.5	Recurrence		21	Chemo Treated	16.2
163	57	2	T2N2M0	12.5	42.5	52.7	40	21.43	1.5	Recurrence		27	Chemo Treated	19.4
164	36	2	T2N1M0	30	45	50.9	46	21.43	1.5	Recurrence		45	Chemo Treated	16.8
165	52	3	T2N1M0	35	42.5	52.7	42	27.14	1.5	Recurrence		35	Chemo Treated	25.4
166	57	2	T1N2M0	45	45	52.7	30	15.71	1.3	Recurrence		49	Chemo Treated	18.9
167	46	2	T3N3M0	42.5	47.5	52.7	48	30.00	1.8	Recurrence		20	Chemo Treated	60.8
168	48	2	T1N2M0	12.5	47.5	52.7	40	17.14	1.8	Recurrence		9	Chemo Treated	27.2

169	55	2	T2N1M0	16.25	47.5	53.6	32	17.14	1.8	No Recurrence	84	Chemo Treated	9.2
170	29	3	T2N0M0	43.75	45	50.0	32	25.71	1.5	No Recurrence	87	Chemo Treated	11.8
171	47	3	T2N0M0	41.25	43.75	50.0	42	26.43	1.6	No Recurrence	96	Chemo Treated	17.7
172	51	3	T2N0M0	15	47.5	53.6	31	19.29	1.6	No Recurrence	87	Chemo Treated	6.9
173	56	2	T1N0M0	46.25	40	50.9	28	12.86	1.3	No Recurrence	87	Chemo Treated	9.8
174	49	2	T2N0M0	32.5	42.5	52.7	40	22.86	1.5	No Recurrence	89	Chemo Treated	6.6
175	49	2	T2N0M0	30	50	54.5	24	34.29	1.9	No Recurrence	83	Chemo Treated	9.5
176	48	2	T2N2M0	28.75	45	54.5	28	15.00	1.6	No Recurrence	83	Chemo Treated	10.7
177	74	2	T2N0M0	48.75	48.75	52.7	28	20.71	1.9	No Recurrence	60	Chemo Treated	6.5
178	65	3	T2N1M0	15	43.75	50.0	36	24.29	1.4	No Recurrence	60	Chemo Treated	13.9
179	55	2	T2N1M0	12.5	33.75	50.0	41	22.86	1.3	No Recurrence	64	Chemo Treated	15.6
180	61	2	T2N1M0	12.5	43.75	49.1	28	16.43	1.5	No Recurrence	68	Chemo Treated	5.9
181	47	1	T1N0M0	26.25	45	53.6	22	18.57	1.6	No Recurrence	61	Chemo Treated	13.3
182	37	2	T1N0M0	33.75	35	47.3	27	17.86	1.4	No Recurrence	68	Chemo Treated	1.8

183	52	2	T1N0M0	35	45	50.9	37	25.00	1.6	No Recurrence	60		Chemo Treated	3
184	47	2	T1N0M0	42.5	46.25	52.7	29	19.29	1.5	No Recurrence	60		Chemo Treated	5.7
185	68	3	T2N0M0	55	42.5	50.9	24	18.57	1.5	No Recurrence	66		Chemo Treated	12.4
186	37	2	T2N0M0	20	42.5	52.7	20	24.29	1.5	No Recurrence	64		Chemo Treated	4.2
187	48	3	T2N0M0	23.75	46.25	52.7	27	17.14	1.5	No Recurrence	61		Chemo Treated	5.6
188	50	1	T2N0M0	22.5	40	37.3	24	20.00	1.5	No Recurrence	121		Chemo Treated	7.8
189	60	3	T2N0M0	37.5	32.5	50.9	33	24.29	1.8	No Recurrence	60		Chemo Treated	9.7
190	65	2	T2N0M0	13.75	17.5	41.8	26	17.14	1.0	No Recurrence	63		Chemo Treated	0
191	53	2	T2N0M0	40	52.5	52.7	20	17.86	1.6	No Recurrence	69		Chemo Treated	9.6
192	62	2	T2N0M0	22.5	45	50.9	26	18.57	1.5	No Recurrence	62		Chemo Treated	3.1
193	61	2	T2N0M0	16.25	41.25	46.4	20	12.86	1.4	No Recurrence	74		Chemo Treated	3.6
194	68	3	T2N0M0	22.5	43.75	50.9	34	20.00	1.5	No Recurrence	60		Chemo Treated	6.3
195	47	2	T1N1M0	31.25	48.75	52.7	28	17.86	1.8	No Recurrence	94		Chemo Treated	9.4
196	60	3	T2N0M0	15	47.5	50.9	24	15.71	1.6	No Recurrence	75		Chemo Treated	6.6

197	49	2	T2N0M0	22.5	47.5	52.7	24	16.43	1.6	No Recurrence	72	Chemo Treated	6.7
198	42	2	T2N0M0	25	45	50.9	26	12.86	1.6	No Recurrence	60	Chemo Treated	6.4
199	39	2	T2N1M0	20	45	51.8	27	16.43	1.5	No Recurrence	71	Chemo Treated	5.6
200	61	2	T2N1M0	12.5	46.25	52.7	29	19.29	1.5	No Recurrence	60	Chemo Treated	7.4
201	48	3	T2N1M0	12.5	47.5	52.7	27	18.57	1.9	No Recurrence	64	Chemo Treated	9.2
202	49	2	T2N1M0	12.5	37.5	52.7	28	14.29	1.4	No Recurrence	71	Chemo Treated	5.8
203	56	3	T2N1M0	12.5	32.5	41.8	26	24.29	1.0	No Recurrence	60	Chemo Treated	9.7
204	59	2	T2N1M0	42.5	37.5	45.5	30	18.57	1.3	No Recurrence	67	Chemo Treated	9.1
205	61	2	T2N1M0	42.5	42.5	52.7	34	15.71	1.5	No Recurrence	82	Chemo Treated	9.4
206	47	2	T2N1M0	12.5	42.5	52.7	40	24.29	1.5	No Recurrence	93	Chemo Treated	11.1
207	45	2	T2N1M0	22.5	45	52.7	20	12.86	1.6	No Recurrence	79	Chemo Treated	8.8
208	61	3	T2N1M0	12.5	42.5	51.8	36	17.86	1.4	No Recurrence	71	Chemo Treated	12.7
209	67	3	T2N1M0	12.5	45	54.5	24	17.14	1.8	No Recurrence	118	Chemo Treated	8.6
210	57	2	T2N1M0	17.5	47.5	41.8	22	15.71	1.5	No Recurrence	72	Chemo Treated	7.4

211	56	2	T2N1M0	42.5	22.5	38.2	20	17.14	1.5	No Recurrence	61	Chemo Treated	7.1
212	76	3	T2N2M0	18.75	47.5	47.3	22	18.57	1.8	No Recurrence	78	Chemo Treated	10.6
213	40	2	T3N1M0	25	37.5	50.9	32	22.86	1.5	No Recurrence	127	Chemo Treated	15.3
214	70	2	T2N2M0	12.5	45	50.9	30	16.43	1.8	No Recurrence	127	Chemo Treated	13.3
215	47	3	T2N2M0	23.75	42.5	41.8	22	17.14	1.5	No Recurrence	64	Chemo Treated	9.6
216	48	3	T2N2M0	20	45	50.9	26	12.86	1.6	No Recurrence	85	Chemo Treated	10.1
217	58	3	T2N2M0	12.5	45	53.6	24	16.43	1.6	No Recurrence	62	Chemo Treated	10.7
218	55	3	T2N0M0	31.25	47.5	49.1	24	12.86	1.6	No Recurrence	61	Chemo Treated	6.5
219	40	3	T2N0M0	38.75	42.5	50.0	25	17.14	1.5	No Recurrence	60	Chemo Treated	5.5
220	34	2	T2N0M0	12.5	46.25	51.8	24	12.86	1.8	No Recurrence	60	Chemo Treated	11.5
221	57	3	T2N0M0	15	45	50.0	22	27.14	1.5	No Recurrence	60	Chemo Treated	5.5
222	73	2	T2N0M0	20	46.25	50.9	34	17.86	1.6	No Recurrence	64	Chemo Treated	4.5
223	53	2	T2N0M0	37.5	45	50.0	27	17.86	1.5	No Recurrence	64	Chemo Treated	3.6
224	55	3	T2N0M0	21.25	47.5	53.6	20	12.86	1.8	No Recurrence	62	Chemo Treated	10.8

225	60	3	T2N0M0	25	43.75	53.6	20	17.86	1.8	No Recurrence	65	Chemo Treated	6.4
226	63	3	T2N0M0	18.75	47.5	52.7	23	14.29	1.8	No Recurrence	60	Chemo Treated	8.6
227	58	2	T2N0M0	38.75	43.75	50.0	39	24.29	1.5	No Recurrence	61	Chemo Treated	7
228	55	2	T1N0M0	21.25	43.75	53.6	23	14.29	1.4	No Recurrence	62	Chemo Treated	10.4
229	60	3	T3N0M0	12.5	41.25	53.6	34	17.14	1.5	No Recurrence	60	Chemo Treated	16.6
230	66	3	T2N0M0	16.25	50	53.6	26	15.71	1.6	No Recurrence	61	Chemo Treated	8.9
231	41	3	T2N0M0	17.5	47.5	50.9	28	17.14	1.6	No Recurrence	60	Chemo Treated	5.7
232	43	3	T2N0M0	12.5	47.5	52.7	26	15.71	1.6	No Recurrence	60	Chemo Treated	7.9
233	47	2	T1N0M0	46.25	27.5	49.1	20	20.00	1.1	No Recurrence	83	Chemo Treated	5.5
234	62	2	T1N0M0	12.5	40	49.1	28	27.86	1.5	No Recurrence	81	Chemo Treated	3
235	57	2	T2N0M0	55	48.75	51.8	43	31.43	1.6	No Recurrence	63	Chemo Treated	14.2
236	52	3	T2N0M0	47.5	47.5	53.6	25	22.14	1.6	No Recurrence	86	Chemo Treated	9.6
237	85	2	T2N0M0	12.5	48.75	54.5	30	16.43	1.8	No Recurrence	60	Chemo Treated	10.2
238	64	3	T2N0M0	41.25	43.75	51.8	31	20.00	1.8	No Recurrence	77	Chemo Treated	7

239	67	2	T3N0M0	20	37.5	52.7	26	18.57	1.3	No Recurrence	84	Chemo Treated	11.2
240	61	2	T1N0M0	15	43.75	51.8	36	18.57	1.6	No Recurrence	64	Chemo Treated	7.2
241	55	2	T2N0M0	40	47.5	52.7	36	22.86	1.6	No Recurrence	84	Chemo Treated	4.6
242	66	3	T2N0M0	35	42.5	51.8	35	25.00	1.5	No Recurrence	84	Chemo Treated	10.2
243	39	3	T2N0M0	12.5	30	50.9	24	16.43	1.1	No Recurrence	63	Chemo Treated	1.7
244	53	2	T2N0M0	46.25	40	48.2	36	14.29	1.4	No Recurrence	62	Chemo Treated	11.7
245	54	2	T2N0M0	23.75	46.25	52.7	24	21.43	1.3	No Recurrence	61	Chemo Treated	4.8
246	58	2	T1N0M0	36.25	48.75	53.6	32	27.14	1.8	No Recurrence	72	Chemo Treated	3.2
247	40	3	T1N0M0	36.25	46.25	50.9	39	28.57	1.9	No Recurrence	86	Chemo Treated	7.8
248	67	2	T1N0M0	27.5	47.5	52.7	28	15.71	1.8	No Recurrence	99	Chemo Treated	8.5
249	61	3	T2N0M0	16.25	41.25	51.8	35	23.57	1.4	No Recurrence	61	Chemo Treated	8.1
250	45	1	T3N3M0	22.5	42.5	52.72727273	26	21.42857143	1.5	Recurrence	54	Chemo Treated	24
251	69	2	T4N1M0	20	47.5	52.72727273	44	24.28571429	1.5	Recurrence	42	Chemo Treated	57.5
252	61	3	T4N1M0	47.5	45	52.72727273	36	21.42857143	1.5	Recurrence	21	Chemo Treated	70.6

253	55	3	T2N2M0	22.5	47.5	52.72727273	46	27.14285714	1.5	Recurrence		59	Chemo Treated	38.9
254	44	2	T3N1M0	45	47.5	52.72727273	44	31.42857143	1.5	Recurrence		12	Chemo Treated	42.3
255	64	2	T1N0M0	14.16666667	45	47.27272727	36	18.57142857	1.166666667	No Recurrence	60		Chemo naïve	9.6
256	63	2	T2N2M0	22.5	43.75	51.81818182	30	20	1.625	No Recurrence	75		Chemo Treated	9.3
257	48	1	T1N1M0	30	42.5	47.27272727	33	28.57142857	1.625	No Recurrence	60		Chemo Treated	6.7
258	50	2	T2N1M0	32.5	45	50	36	18.57142857	1.5	No Recurrence	83		Chemo Treated	7.7
259	41	2	T2N2M0	16.25	45	50.90909091	26	16.42857143	1.375	No Recurrence	62		Chemo Treated	9.5
260	60	2	T2N0M0	16.25	45	51.81818182	32	18.57142857	1.5	No Recurrence	64		Chemo Treated	4.5
261	49	3	T2N0M0	20	27.5	52.72727273	32	21.42857143	1.375	No Recurrence	65		Chemo Treated	7
262	50	2	T2N0M0	52.5	46.25	52.72727273	37	22.14285714	1.5	No Recurrence	73		Chemo Treated	10.4
263	49	2	T2N0M0	22.5	47.5	54.54545455	27	15.71428571	1.75	No Recurrence	62		Chemo Treated	8.4
264	50	3	T2N1M0	27.5	47.5	51.81818182	32	21.42857143	1.625	No Recurrence	69		Chemo Treated	7.9
265	55	2	T2N2M0	16.25	45	49.09090909	28	14.28571429	1.625	No Recurrence	61		Chemo Treated	11.5
266	57	2	T2N0M0	37.5	40	53.63636364	32	12.85714286	1.375	No Recurrence	67		Chemo Treated	8.9

267	41	2	T2N0M0	45	47.5	52.72727273	45	20	1.5	No Recurrence	84		Chemo Treated	13.2
268	48	1	T2N0M0	15	43.75	54.54545455	35	16.42857143	1.25	No Recurrence	75		Chemo Treated	12.5
269	63	3	T2N0M0	22.5	46.25	54.54545455	30	15	1.625	No Recurrence	76		Chemo Treated	8
270	65	2	T2N0M0	32.5	46.25	54.54545455	38	23.57142857	1.625	No Recurrence	72		Chemo Treated	4.8
271	55	2	T2N0M0	27.5	46.25	52.72727273	34	22.85714286	1.5	No Recurrence	62		Chemo Treated	3.7
272	61	2	T2N0M0	41.25	45	52.72727273	33	25.71428571	1.375	No Recurrence	60		Chemo Treated	7
273	67	2	T2N0M0	45	47.5	52.72727273	34	27.14285714	1.625	No Recurrence	61		Chemo Treated	5.6
274	74	2	T2N1M0	20	46.25	51.81818182	35	30	1.625	No Recurrence	62		Chemo Treated	8.1
275	66	2	T1N0M0	15	47.5	54.54545455	35	28.57142857	1.625	No Recurrence	61		Chemo Treated	6.3
276	61	2	T2N0M0	36.25	50	52.72727273	35	25.71428571	1.875	No Recurrence	60		Chemo Treated	3
277	35	2	T2N0M0	40	42.5	50.90909091	40	25.71428571	1.5	No Recurrence	63		Chemo Treated	8.4
278	57	2	T2N1M0	15	46.25	51.81818182	38	23.57142857	1.5	No Recurrence	66		Chemo Treated	9.5
279	34	3	T2N0M0	20	46.25	52.72727273	39	27.14285714	1.625	No Recurrence	62		Chemo Treated	9.1
280	41	2	T2N0M0	50	47.5	49.09090909	39	25.71428571	1.5	No Recurrence	73		Chemo Treated	10.8

281	55	2	T2N0M0	43.75	46.25	51.81818182	40	27.14285714	1.625	No Recurrence	68		Chemo Treated	7.1
282	55	2	T1N0M0	43.75	46.25	51.81818182	40	27.14285714	1.625	No Recurrence	60		Chemo Treated	8.5
283	63	2	T2N1M0	27.5	42.5	52.72727273	36	21.42857143	1.5	No Recurrence	60		Chemo Treated	7.2
284	49	2	T2N0M0	17.5	47.5	52.72727273	40	15.71428571	1.75	No Recurrence	82		Chemo Treated	9.1
285	65	2	T2N1M0	25	45	52.72727273	40	25.71428571	1.5	No Recurrence	67		Chemo Treated	10.4
286	40	2	T2N0M0	33.33333334	45	53.93939394	37.33333333	24.28571429	1.333333334	No Recurrence	94		Chemo Treated	7.7
287	43	1	T1N0M0	15.83333333	43.33333334	53.33333333	30	18.09523809	1.25	No Recurrence	101		Chemo Treated	12.6
288	44	3	T2N2M0	12.5	46.25	51.81818182	24	14.28571429	1.625	No Recurrence	69		Chemo Treated	11.3
289	59	2	T1N1M0	15	46.25	52.72727273	28	16.42857143	1.625	No Recurrence	62		Chemo Treated	13.2
290	73	2	T2N1M0	35	45	52.72727273	34	18.57142857	1.625	No Recurrence	68		Chemo Treated	6.5
291	61	2	T2N1M0	26.25	47.5	52.72727273	31	34.28571429	1.625	No Recurrence	91		Chemo Treated	10.4
292	37	2	T2N1M0	40	47.5	52.72727273	33	21.42857143	1.75	No Recurrence	62		Chemo Treated	5.9
293	55	2	T2N1M0	12.5	40	49.09090909	30	19.28571429	1.5	No Recurrence	69		Chemo Treated	4.4
294	37	2	T2N0M0	41.25	37.5	52.72727273	26	15.71428571	1.5	No Recurrence	91		Chemo Treated	5.2

295	67	2	T2N0M0	32.5	47.5	52.72727273	36	22.85714286	1.5	No Recurrence	61		Chemo Treated	4.6
296	38	2	T2N0M0	25	42.5	52.72727273	30	23.57142857	1.625	No Recurrence	85		Chemo Treated	2.3
297	49	2	T1N0M0	31.25	42.5	50.90909091	31	22.85714286	1.625	No Recurrence	92		Chemo Treated	2
298	65	2	T2N2M0	23.75	36.25	47.27272727	25	17.85714286	1.375	No Recurrence	66		Chemo Treated	4.5
299	40	2	T2N0M0	12.5	32.5	50	30	35.71428571	1.375	No Recurrence	67		Chemo Treated	8.5

Table 4

The samples employed for validation studies are subjected to exact same inclusion criteria as provided in example 1 except that Stages used were I, II and IIIA (thus excluding IIIB and IIIC), and each sample is scored for percentage of tumors stained (0-100) and staining intensity (0-3) for the 5 markers - CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4. The protocol followed for IHC measurements remain identical to that provided in example 1. The results from grading along with three clinical parameters are fed into the proprietary statistical CanAssist Breast algorithm for obtaining a prediction score (CanAssist Breast relapse score) for stratifying patients into high risk or low risk of breast cancer recurrence

The prediction score for each sample is compared with the respective patient's medical history with respect to relapse of the disease within 5 years to understand the accuracy of the present method. The results showed that the method of the present disclosure provides a 95% NPV which signifies high predictive capability when compared with the respective patient's medical history data available.

Example 3: Synergistic interplay of markers within the 5 marker combination of the present disclosure

The 5 biomarker combination along with the three clinical parameters of the tumor of the present disclosure is a synergistic combination of markers, which play an important role in prognosis of early stage ER+/PR+ and Her2- breast cancer. Though the individual expression of some of the markers in two samples may be identical, the recurrence profile need not necessarily be the same. It is the interplay of these markers which when assessed by way of the CanAssist Breast algorithm, provides the accurate results for a sample. The validation sample set provided in example 2 above provides good data points to understand the significance of the combination of markers, vis-à-vis individual markers.

As can be seen from table no. 5 provided below (derived from validation sample data of table no. 4), even when one (scenarios 1, 3, 8 and 9), two (scenarios 4, 5, 6 and 7) or three markers (scenarios 2 and 10) between two different samples have similar IHC staining grades, the overall outcome is not necessarily the same. Therefore, no single marker can

determine prognosis, and it is the specific combination of 5 biomarkers that is critical for accurate prognostication.

Scenario	Sl. No.	Age	A%-M	W%-C	U%-C	R%-M	F%-M	WI-C	CanAssist Score	Outcome
1	8	52	17.5	42.5	49.1	44	30.00	1.3	23.8	Recurred
	24	42	17.5	30	40.0	23	12.86	1.5	3.4	Not recurred
2	7	40	42.5	37.5	49.1	44	27.14	1.8	24.1	Recurred
	27	72	42.5	46.25	51.8	40	27.14	1.8	3.7	Not recurred
3	5	43	52.5	42.5	50.9	40	27.14	1.5	20.8	Recurred
	14	59	50	46.25	50.9	29	18.57	1.8	5.5	Not recurred
4	5	43	52.5	42.5	50.9	40	27.14	1.5	20.8	Recurred
	27	72	42.5	46.25	51.8	40	27.14	1.8	3.7	Not recurred
5	3	72	50	47.5	52.7	44	35.71	1.5	19.4	Recurred
	28	51	50	47.5	53.6	22	12.86	1.8	13.1	Not recurred
6	155	41	12.5	45	50.9	42	22.86	1.3	30.1	Recurred
	15	59	12.5	38.75	50.9	25	15.00	1.4	7.1	Not recurred
7	156	47	50	37.5	45.5	50	35.71	1.3	100	Recurred
	47	60	50	37.5	50.9	20	12.86	1.4	9.8	Not recurred
8	159	50	12.5	42.5	49.1	44	12.86	1.5	19.8	Recurred
	47	60	50	37.5	50.9	20	12.86	1.4	9.8	Not recurred
9	154	60	37.5	47.5	52.7	28	28.57	1.8	16.7	Recurred
	22	74	21.25	40	47.3	28	15.71	1.5	5.6	Not recurred
	2	66	57.5	45	50.9	48	34.29	1.8	15.6	Recurred

10	17	59	32.5	45	50.9	36	19.29	1.8	4	Not recurred
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Table 5

Example 4: Prognostic test of the instant disclosure v/s prior known means of prognostication

Risk stratification of patients into high/low risk of breast cancer recurrence in the prior art is carried out by analyzing patient samples for presence or absence of hormone receptor status and clinical Stage of the disease. Eg: If a Her2-, early stage breast cancer patient's sample shows any of the combination of receptor expression including ER⁺/PR⁺ or ER⁺/PR⁻ or ER⁻/PR⁺ then the said patient is considered at low risk for recurrence compared to a patient not expressing both ER and PR receptors but such a patient is still prescribed to have chemotherapy treatment. However, chemotherapy is not beneficial in majority (~80%) of such ER⁺ and/ PR⁺, Her2- early stage breast cancer patients in terms of preventing recurrence and often leads to reduction in quality of life (Figure 1).

On the contrary, the prognostic test of the instant disclosure is performed on these Her2-, early stage breast cancer patients with ER⁺ and /or PR⁺ disease, which includes assessing expression of a 5 marker combination comprising (CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4). The prognostic test of the instant disclosure does not proceed if the hormone receptor status is found negative for both the markers ER or PR. The prognostic test of the instant disclosure is performed by carrying out an IHC based assay for expression of said 5 biomarker combination, followed by grading the expression of the biomarkers on the basis of parameters including percentage of staining and intensity of staining. The data from said grading along with status of clinical prognostic parameters is inputted into a proprietary statistical algorithm or module for obtaining a prediction score. This score helps in deciphering if the patient falls under the high risk category or low risk category. Accordingly, a low risk patient is advised to take optimum therapy as per the clinician's decision (Figure 1) thus leading to improved quality of life.

Therefore, if a patient sample was analyzed by the prior known method, said patient would be classified only based on hormone receptor status, and most often advised to take aggressive chemotherapy which may not be beneficial and will reduce quality of life. However, on the contrary as the instant prognostic test would take into consideration the
5 5 biomarker combination expression which are specific to tumor biology involved in recurrence and compute a relapse score which is assessed based on biomarker data and clinical prognostic factors, said information could render the same patient sample into low risk and be advised treatment accordingly. Thus, the doctors employing the prognostic test of the instant disclosure can very accurately assess the patient samples and stratify
10 them effectively into high risk or low risk for cancer recurrence and devise a suitable and optimum treatment module.

Advantages of the method and the biomarker combination of the present disclosure:

- 15 1. The method of the present disclosure uses biomarkers from pathways other than hormone regulation and proliferation pathways thereby enhancing its predictive potential.
2. Importantly, the prognostic test is developed and validated on Node negative and Node positive patients from tumor stages I-III A and this makes it a broad
20 based test with wider applicability and enhanced utility worldwide. Other prognostic tests available in the art have mostly been developed in Stage I node negative patients and have reduced applicability in node positive patients.
3. The method of the present disclosure is not only prognostic, but also
25 chemopredictive (i.e, can decide benefit of chemotherapy to patients), unlike other methods in the art, some of which are only prognostic. Hence, the prognostic test of the instant disclosure can help reduce unwanted chemotherapy and prescribe additional targeted therapy via a central lab facility.
- 30 4. The method of the present disclosure uses biomarker combination hitherto unknown to have prognostic application in Breast Cancer. Further, these

marker combination(s) are also selected for their potential to be targeted for developing new drugs to treat Breast Cancer in the future. No earlier known method has considered this factor in their test development protocol. This is possible because the biomarkers employed by the present disclosure are membrane associated and hence can be targeted to make new drugs.

5 5. All other prognostic methods developed so far are expensive and not widely used in geographies outside the Western world. However, the method of the present disclosure is the first test to be affordable in India and worldwide, thereby enhancing its utility and reach.

10 6. The prognostic and predictive test of the present disclosure can be a companion test for new drugs to come in the market.

7. The method of prognosis or the prognostic test of the instant disclosure is robust and a simple IHC based test with high NPV when compared to any other prognostic tests available in the prior art for breast cancer detection and prognosis.

15 8. The test of the present disclosure is developed on patients of Stage I, II and IIIA. The reason IIIA is included is there are a group of these patients also shown to do well without chemotherapy. On the contrary, the methods of the prior art have been developed on patient samples from stage I breast cancer but however, validated on Stage II breast cancer and node positive patients. This means that since these models are not built on that stage II data set, they are not as robust and applicable on the Stage II cancers as training and validation should always preferably be done on cohorts with identical inclusion criteria.

25 Although the disclosure and exemplification has been provided by way of illustrations and examples for the purpose of clarity and understanding, it is apparent to a person skilled in the art that various changes and modifications can be practiced without departing from the spirit or scope of the disclosure. Accordingly, the foregoing descriptions and examples should not be construed as limiting the scope of the present disclosure.

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The description of the embodiments of the present disclosure reveals the general nature of the embodiments that are readily suitable for modification and/or adaptation for various applications by applying the current knowledge. Such specific embodiments of the disclosure, without departing from the generic concept, and, therefore, such adaptations
5 and modifications should and are intended to be comprehended and considered within the meaning and range of equivalents of the disclosed embodiments.

It is also to be understood that the phrases or terms employed herein are for the purpose of description and not intended to be of any limitation. Throughout the present disclosure,
10 the word “comprise”, or variations such as “comprises” or “comprising” wherever used, are to be understood to imply the inclusion of a stated element, integer or step, or group of elements, integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

15 Where a numerical limit or range is stated herein, the endpoints are included. Also, values and sub-ranges within a numerical limit or range are specifically included as if explicitly written out.

With respect to the use of any plural and/or singular terms in the present disclosure, those
20 of skill in the art can translate from the plural to the singular and/or from the singular to the plural as is considered appropriate to the context and/or application. The various singular/plural permutations may be expressly set forth herein for the sake of clarity.

Any discussion of documents, acts, materials, devices, articles and the like that has been
25 included in this specification is solely for the purpose of providing a context for the present disclosure. It is not to be taken as an admission that any or all of these matters form a part of the prior art base or are common general knowledge in the field relevant to the present disclosure, as it existed anywhere before the priority date of this application.

30 The contents of all references, patents, and published patent applications cited throughout this application are incorporated herein by reference for all purposes.

We Claim:

1. A method for measuring biomarker expression and assessing clinical parameters for use in prognosis of breast cancer or predicting the likelihood of recurrence of breast cancer in a subject, comprising:

measuring expression of five biomarkers by assaying a biological sample with a respective antibody against each of said five biomarkers, wherein:
the biological sample is obtained from a subject having ER+/PR+ and Her2- breast cancer or after removal of the breast cancer; and
the five biomarkers are CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4; and
assessing the clinical parameters node status, tumor grade, and tumor size of the subject, wherein the node status includes tumor node positive (N1) and tumor node negative (N0), the tumor grade includes Grades 1, 2 and 3, and the tumor size includes T1, T2, or T3.
2. The method as claimed in claim 1, wherein the breast cancer is stage I, II or IIIA hormone receptor positive, Her-2-neu receptor negative invasive ductal carcinoma, or invasive lobular carcinoma of the breast.
3. The method as claimed in claim 1-2, wherein the biological sample has been obtained from a subject after surgical removal of the breast cancer.
4. The method as claimed in claim 1, wherein said measuring expression comprises immunohistochemistry (IHC) and wherein the IHC is morphometric IHC; and wherein expression of the five biomarkers is measured on basis of percentage of cells stained and staining intensity of cells.
5. The method as claimed in claim 1, wherein said measuring expression comprises immunohistochemistry (IHC) and wherein the tumor sample obtained from the subject is collected, fixed and sectioned prior to the IHC; and wherein the IHC is performed by adding primary antibodies and secondary antibodies conjugated with a detectable label or enzyme or molecule, and detecting a color or fluorescence from the detectable label.

6. A combination of antibodies, consisting of antibodies specific for five biomarkers CD44, ABCC11, N-cadherin, Pan-cadherin and ABCC4.
7. In vitro use of the combination of antibodies as claimed in claim 6 for prognosis of breast cancer or predicting the likelihood of recurrence of breast cancer in a subject.