In yet another aspect, the present disclosure refers to an *in-vitro* method for detecting cancer, the method comprising: a) enriching pluripotent stem cells from a whole blood sample, to obtain a mixture comprising the pluripotent stem cells; b) obtaining nucleic acid from the mixture of step (a); c) performing an assay with the nucleic acid for analysing expression level of at least one biomarker of pluripotent stem cell; and d) comparing the expression level of the at least one biomarker of pluripotent stem cell in the whole blood sample with an expression level of the at least one biomarker in a control sample, wherein an increase in the expression level of the at least one biomarker in the whole blood sample as compared to the expression level of the at least one biomarker in the control sample is at least 10 folds for detecting cancer, wherein the at least one biomarker of pluripotent stem cell is selected from the group consisting of Oct-4, Oct-4a, Sox-2, Nanog, p53, Sirt-1, Sirt-6, Sirt-3, NF-κB, NAD, RAS, ERC, erbB-2, ABL, subsets thereof, and combinations thereof andwherein the cancer is selected from the group consisting of breast cancer, liver cancer, ovarian cancer, lung cancer, leukaemia, prostate cancer, lymphoma, pancreatic cancer, cervical cancer, colon cancer, osteosarcoma, testicular cancer, thyroid cancer, gastric cancer, Ewing sarcoma, bladder cancer, and gastrointestinal stromal tumor.

[0010] In a fourth example of the present disclosure, there is provided an *in-vitro* method for predicting cancer, said method comprising: (a) obtaining a blood sample; (b) enriching pluripotent stem cells from the blood sample, to obtain a mixture comprising said pluripotent stem cells; (c) obtaining nucleic acid from the mixture of step (b); (d) performing an assay with the nucleic acid for analysing expression level of at least one biomarker of pluripotent stem cell; and (e) comparing the expression level of the at least one biomarker of pluripotent stem cell in the sample with an expression level of the at least one biomarker in a control sample, wherein an increase in the expression level of the at least one biomarker in the sample as compared to the expression level of the at least one biomarker in the control sample predicts cancer. In yet another aspect, the present disclosure refers to an *in-vitro* method for predicting cancer, the method comprising: a) enriching pluripotent stem cells from a whole blood sample, to obtain a mixture comprising the pluripotent stem cells; b) obtaining nucleic acid from the mixture of step (a); c) performing an assay with the nucleic acid for analysing expression level of at least one biomarker of pluripotent stem cell; d) comparing the expression level of the at least one biomarker of pluripotent stem cell in

the whole blood sample with an expression level of the at least one biomarker in a control sample, wherein an increase in the expression level of the at least one biomarker in the whole blood sample as compared to the expression level of the at least one biomarker in the control sample is at least 6 folds for predicting cancer, wherein the at least one biomarker of pluripotent stem cell is selected from the group consisting of Oct-4, Oct-4a, Sox-2, Nanog, p53, Sirt-1, Sirt-6, Sirt-3, NF-κB, NAD, RAS, ERC, erbB-2, ABL, subsets thereof, and combinations thereof and wherein the cancer is selected from the group consisting of breast cancer, liver cancer, ovarian cancer, lung cancer, leukaemia, prostate cancer, lymphoma, pancreatic cancer, cervical cancer, colon cancer, osteosarcoma, testicular cancer, thyroid cancer, gastric cancer, Ewing sarcoma, bladder cancer, and gastrointestinal stromal tumor.

[0011] In a fifth example of the present disclosure, there is provided an *in-vitro* method for monitoring response to cancer treatment, said method comprising: (a) obtaining a blood sample at a time point during an anti-cancer therapy; (b) enriching pluripotent stem cells from the blood sample, to obtain a mixture comprising said pluripotent stem cells; (c) obtaining nucleic acid from the mixture of step (b); (d) performing an assay with the nucleic acid for analysing expression level of at least one biomarker of pluripotent stem cell; and (e) comparing the expression level of the at least one biomarker of pluripotent stem cell with an expression level of the at least one biomarker of pluripotent stem cell in a reference sample to monitor the response to cancer treatment. In yet another aspect, the present disclosure refers to an *in-vitro* method for monitoring response to anti-cancer therapy, the method comprising: a) enriching pluripotent stem cells from a whole blood sample to obtain a mixture comprising the pluripotent stem cells, wherein the whole blood sample had been obtained at a first time point during an anti-cancer therapy; b) obtaining nucleic acid from the mixture of step (a); c) performing an assay with the nucleic acid for analysing expression level of at least one biomarker of pluripotent stem cell; and d) comparing the expression level of the at least one biomarker of pluripotent stem cell in the whole blood sample with an expression level of the at least one biomarker of pluripotent stem cell in a reference sample, thereby monitoring the response to anti-cancer therapy, wherein a decrease in the expression level of the at least one biomarker of pluripotent stem cell in the whole blood sample as compared to the expression level in the control sample is at least 2 folds for indicating a positive response to the anti-cancer therapy, wherein the control sample is at least one selected from the group consisting of: (i) a

whole blood sample obtained prior to administration of the anti-cancer therapy; (ii) a whole blood sample obtained after the first time point; and (iii) a whole blood sample obtained from a cancer-free subject, wherein the at least one biomarker of pluripotent stem cell is selected from the group consisting of Oct-4, Oct-4a, Sox-2, Nanog, p53, Sirt-1, Sirt-6, Sirt-3, NF-κB, NAD, RAS, ERC, erbB-2, ABL, subsets thereof, and combinations thereof, wherein the cancer is selected from the group consisting of breast cancer, liver cancer, ovarian cancer, lung cancer, leukaemia, prostate cancer, lymphoma, pancreatic cancer, cervical cancer, colon cancer, osteosarcoma, testicular cancer, thyroid cancer, gastric cancer, Ewing sarcoma, bladder cancer, and gastrointestinal stromal tumor.

[0012] In a sixth example of the present disclosure, there is provided an *in-vitro* method for detecting a positive response to cancer treatment, said method comprising: (a) obtaining a blood sample-I, before administration of an anti-cancer therapy; (b) obtaining a blood sample-II, after administration of the anti-cancer therapy; (c) enriching pluripotent stem cells from the blood sample-I to obtain a mixture-I comprising said pluripotent stem cells; (d) enriching pluripotent stem cells from the blood sample-II to obtain a mixture-II comprising said pluripotent stem cells; (e) obtaining nucleic acid-I from the mixture-I; (f) obtaining nucleic acid-II from the mixture-II; (g) independently performing an assay with the nucleic acid-I and the

biomarker of pluripotent stem cell; (e) comparing the expression level of the at least one biomarker of pluripotent stem cell in the sample with an expression level of the at least one biomarker in a control sample, wherein an increase in the expression level of the at least one biomarker in the sample as compared to the expression level of the at least one biomarker in the control sample detects presence of cancer; (f) performing sequence-based assays on the nucleic acid and analysing for mutation in at least one cancer-related marker, wherein presence of mutation in the at least one cancer-related marker indicates presence of a specific type of cancer based on the cancer-related marker analysed. In yet another example, the present disclosure refers to an *in-vitro* method for detecting cancer, said method comprising: a) enriching pluripotent stem cells from a blood sample, to obtain a mixture comprising said pluripotent stem cells; b) obtaining nucleic acid from the mixture of step (a); c) performing an assay with the nucleic acid for analysing expression level of at least one biomarker of pluripotent stem cell; d) comparing the expression level of the at least one biomarker of pluripotent stem cell in the sample with an expression level of the at least one biomarker in a control sample, wherein an increase in the expression level of the at least one biomarker in the sample as compared to the expression level of the at least one biomarker in the control sample is at least 10 folds for indicating presence of cancer; and e) performing sequence-based assays on the nucleic acid and analysing for mutation in at least one cancer-related marker, wherein presence of mutation in the at least one cancer-related marker indicates presence of a specific type of cancer based on the cancer-related marker analysed.

[0014] In an eighth example of the present disclosure, there is provided a use of a pluripotent stem cell biomarker selected from a group consisting of Oct-4, Sox-2, Nanog, p53, NFκB, Sirt-1, Sirt-6, Sirt-3, NAD, RAS, ERC, erbB-2, ABL, subsets thereof, and combinations thereof, for detecting cancer from a blood sample. In yet another example, the present disclosure refers to use of a pluripotent stem cell biomarker selected from a group consisting of Oct-4, Sox-2, Nanog, p53, NFκB, Sirt-1, Sirt-6,

Sirt-3, NAD, RAS, ERC, erbB-2, ABL, subsets thereof, and combinations thereof, for either detecting cancer, or predicting cancer, or for grading stage of cancer, or for monitoring progression of anti-cancer therapy from a blood sample. In another aspect, the present disclosure refers to a use of a pluripotent stem cell biomarker selected from a group consisting of Oct-4, Oct-4a, Sox-2, Nanog, p53, NFκB, Sirt-1, Sirt-6, Sirt-3, NF-κB, NAD, RAS, ERC, erbB-2, ABL, and combinations thereof, for detecting cancer, wherein the cancer is selected from the group consisting of breast cancer, liver cancer, ovarian cancer, lung cancer, leukaemia, prostate cancer, lymphoma, pancreatic cancer, cervical cancer, colon cancer, osteosarcoma, testicular cancer, thyroid cancer, gastric cancer, Ewing sarcoma, bladder cancer, and gastrointestinal stromal tumor. In another aspect, the present disclosure refers to a use of a pluripotent stem cell biomarker selected from the group consisting of Oct-4, Oct-4a, Sox-2, Nanog, p53, NFκB, Sirt-1, Sirt-6, Sirt-3, NF-κB, NAD, RAS, ERC, erbB-2, ABL, and combinations thereof, for predicting cancer, wherein the cancer is selected from the group consisting of breast cancer, liver cancer, ovarian cancer, lung cancer, leukaemia, prostate cancer, lymphoma, pancreatic cancer, cervical cancer, colon cancer, osteosarcoma, testicular cancer, thyroid cancer, gastric cancer, Ewing sarcoma, bladder cancer, and gastrointestinal stromal tumor. In yet another aspect, the present disclosure refers to a use of a pluripotent stem cell biomarker selected from a group consisting of Oct-4, Oct-4a, Sox-2, Nanog, p53, NFκB, Sirt-1, Sirt-6, Sirt-3, NF-κB, NAD, RAS, ERC, erbB-2, ABL, and combinations thereof, for monitoring progression of anti-cancer therapy, wherein the cancer is selected from the group consisting of breast cancer, liver cancer, ovarian cancer, lung cancer, leukaemia, prostate cancer, lymphoma, pancreatic cancer, cervical cancer, colon cancer, osteosarcoma, testicular cancer, thyroid cancer, gastric cancer, Ewing sarcoma, bladder cancer, and gastrointestinal stromal tumor.

[0015] In a ninth example of the present disclosure, there is provided a use of a pluripotent stem cell biomarker selected from a group consisting of Oct-4, Sox-2,

I/We Claim:

1. An *in-vitro* method for detecting cancer, the method comprising:

    a) enriching pluripotent stem cells from a whole blood sample, to obtain a mixture comprising the pluripotent stem cells;
    b) obtaining nucleic acid from the mixture of step (a);
    c) performing an assay with the nucleic acid for analysing expression level of at least one biomarker of pluripotent stem cell; and
    d) comparing the expression level of the at least one biomarker of pluripotent stem cell in the whole blood sample with an expression level of the at least one biomarker in a control sample,

wherein an increase in the expression level of the at least one biomarker in the whole blood sample as compared to the expression level of the at least one biomarker in the control sample is at least 10 folds for detecting cancer,

wherein the at least one biomarker of pluripotent stem cell is selected from the group consisting of Oct-4, Oct-4a, Sox-2, Nanog, p53, Sirt-1, Sirt-6, Sirt-3, NF-κB, NAD, RAS, ERC, erbB-2, ABL, subsets thereof, and combinations thereof, and

wherein the cancer is selected from the group consisting of breast cancer, liver cancer, ovarian cancer, lung cancer, leukaemia, prostate cancer, lymphoma, pancreatic cancer, cervical cancer, colon cancer, osteosarcoma, testicular cancer, thyroid cancer, gastric cancer, Ewing sarcoma, bladder cancer, and gastrointestinal stromal tumor.

2. An *in-vitro* method for predicting cancer, the method comprising:

    a) enriching pluripotent stem cells from a whole blood sample, to obtain a mixture comprising the pluripotent stem cells;
    b) obtaining nucleic acid from the mixture of step (a);
    c) performing an assay with the nucleic acid for analysing expression level of at least one biomarker of pluripotent stem cell; and
    d) comparing the expression level of the at least one biomarker of pluripotent stem cell in the whole blood sample with an expression level of the at least one biomarker in a control sample,

wherein an increase in the expression level of the at least one biomarker in the whole blood sample as compared to the expression level of the at least one biomarker in the control sample is at least 6 folds for predicting cancer,

wherein the at least one biomarker of pluripotent stem cell is selected from the group consisting of Oct-4, Oct-4a, Sox-2, Nanog, p53, Sirt-1, Sirt-6, Sirt-3, NF-κB, NAD, RAS, ERC, erbB-2, ABL, subsets thereof, and combinations thereof, and

wherein the cancer is selected from the group consisting of breast cancer, liver cancer, ovarian cancer, lung cancer, leukaemia, prostate cancer, lymphoma, pancreatic cancer, cervical cancer, colon cancer, osteosarcoma, testicular cancer, thyroid cancer, gastric cancer, Ewing sarcoma, bladder cancer, and gastrointestinal stromal tumor.

3. The method as claimed in any one of the claims 1 or 2, wherein the increase in the expression level of the at least one biomarker of pluripotent stem cell in the whole blood sample is in a range of 10-20 folds, or 20-30 folds, or 30-40 folds, or 40-50 folds as compared to the expression level in the control sample.

4. An *in-vitro* method for monitoring response to anti-cancer therapy, the method comprising:

    a) enriching pluripotent stem cells from a whole blood sample to obtain a mixture comprising the pluripotent stem cells, wherein the whole blood sample had been obtained at a first time point during an anti-cancer therapy;
    b) obtaining nucleic acid from the mixture of step (a);
    c) performing an assay with the nucleic acid for analysing expression level of at least one biomarker of pluripotent stem cell; and
    d) comparing the expression level of the at least one biomarker of pluripotent stem cell in the whole blood sample with an expression level of the at least one biomarker of pluripotent stem cell in a reference sample, thereby monitoring the response to anti-cancer therapy,

wherein a decrease in the expression level of the at least one biomarker of pluripotent stem cell in the whole blood sample as compared to the expression level in the control sample is at least 2 folds for indicating a positive response to the anti-cancer therapy,

wherein the control sample is at least one selected from the group consisting of: (i) a whole blood sample obtained prior to administration of the anti-cancer therapy; (ii) a whole

blood sample obtained after the first time point; and (iii) a whole blood sample obtained from a cancer-free subject,

wherein the at least one biomarker of pluripotent stem cell is selected from the group consisting of Oct-4, Oct-4a, Sox-2, Nanog, p53, Sirt-1, Sirt-6, Sirt-3, NF-κB, NAD, RAS, ERC, erbB-2, ABL, subsets thereof, and combinations thereof, and

wherein the cancer is selected from the group consisting of breast cancer, liver cancer, ovarian cancer, lung cancer, leukaemia, prostate cancer, lymphoma, pancreatic cancer, cervical cancer, colon cancer, osteosarcoma, testicular cancer, thyroid cancer, gastric cancer, Ewing sarcoma, bladder cancer, and gastrointestinal stromal tumor.

5. The method as claimed in any one of the claims 1, 2, or 4, wherein obtaining the nucleic acid from the mixture is by any one method selected from group consisting of: (a) guanidinium thiocyanate-phenol-chloroform nucleic acid extraction; (b) cesium chloride gradient centrifugation method; (c) cetyltrimethylammonium bromide nucleic acid extraction; (d) alkaline extraction; (e) resin-based extraction; and (f) solid phase nucleic acid extraction, and

wherein performing the assay with the nucleic acid for analysing the expression level of the at least one biomarker comprises a technique selected from the group consisting of: quantitative PCR, flow cytometry, and Next Generation Sequencing (NGS).

6. The method as claimed in any one of the claims 1, 2, or 4, wherein the control sample is obtained from a cancer-free subject.

7. The method as claimed in any one of the claims 1, 2, or 4, wherein the enriching of the pluripotent stem cells from the whole blood sample comprises:

    a) contacting the whole blood sample with a neutral buffer in a ratio range of 1:1 to 1:20, to obtain a first sample mixture;
    b) contacting at least one salt solution to the first sample mixture in a ratio range of 1:2 to 1:10, to obtain a second sample mixture; and
    c) processing the second sample mixture to obtain enriched pluripotent stem cells.

8. The method as claimed in claim 7, wherein the processing of the second sample mixture comprises at least one method selected from the group consisting of: (a) extraction process; (b) washing process; (c) centrifugation process, and combinations thereof.

9. The method as claimed in any one of the claims 1, 2, or 4, wherein the method is independent of invasive techniques.

10. Use of a pluripotent stem cell biomarker selected from the group consisting of Oct-4, Oct-4a, Sox-2, Nanog, p53, NFκB, Sirt-1, Sirt-6, Sirt-3, NF-κB, NAD, RAS, ERC, erbB-2, ABL, and combinations thereof, for detecting cancer,

wherein the cancer is selected from the group consisting of breast cancer, liver cancer, ovarian cancer, lung cancer, leukaemia, prostate cancer, lymphoma, pancreatic cancer, cervical cancer, colon cancer, osteosarcoma, testicular cancer, thyroid cancer, gastric cancer, Ewing sarcoma, bladder cancer, and gastrointestinal stromal tumor.

11. Use of a pluripotent stem cell biomarker selected from the group consisting of Oct-4, Oct-4a, Sox-2, Nanog, p53, NFκB, Sirt-1, Sirt-6, Sirt-3, NF-κB, NAD, RAS, ERC, erbB-2, ABL, and combinations thereof, for predicting cancer,

wherein the cancer is selected from the group consisting of breast cancer, liver cancer, ovarian cancer, lung cancer, leukaemia, prostate cancer, lymphoma, pancreatic cancer, cervical cancer, colon cancer, osteosarcoma, testicular cancer, thyroid cancer, gastric cancer, Ewing sarcoma, bladder cancer, and gastrointestinal stromal tumor.

12. Use of a pluripotent stem cell biomarker selected from the group consisting of Oct-4, Oct-4a, Sox-2, Nanog, p53, NFκB, Sirt-1, Sirt-6, Sirt-3, NF-κB, NAD, RAS, ERC, erbB-2, ABL, and combinations thereof, for monitoring progression of anti-cancer therapy,

wherein the cancer is selected from the group consisting of breast cancer, liver cancer, ovarian cancer, lung cancer, leukaemia, prostate cancer, lymphoma, pancreatic cancer, cervical cancer, colon cancer, osteosarcoma, testicular cancer, thyroid cancer, gastric cancer, Ewing sarcoma, bladder cancer, and gastrointestinal stromal tumor.