

## CLAIMS:

1. An *in-vitro* method for detecting a medical condition in a subject, said method comprising:

- a) enriching very small embryonic like stem cells from a blood sample, to  
5 obtain a mixture comprising said very small embryonic like 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  
Oct4A in the very small embryonic like stem cells from the blood sample;  
and
- 10 d) comparing the expression level of Oct4A in the very small embryonic like  
stem cells from the blood sample with an expression level of Oct4A in a  
control sample,

wherein an increase in the range of 1.1-3 folds in the expression level of  
Oct4A in the very small embryonic like stem cells from the blood sample as  
15 compared to the expression level of Oct4A in the control sample detects an  
inflammatory status indicative of the presence of a medical condition in the  
subject, wherein the method is an *in-vitro* method, and wherein the medical  
condition is selected from the group consisting of multiple sclerosis, kidney  
disorders, skin disease, liver disease, lung disease, cardiovascular diseases,  
20 osteoarthritis, viral disease, and diabetes.

2. An *in-vitro* method for predicting onset of cancer in a subject, said method comprising:

- a) enriching very small embryonic like stem cells from s blood sample, to  
obtain a mixture comprising said very small embryonic like stem cells;
- 25 b) obtaining nucleic acid from the mixture of step (a);
- c) performing an assay with the nucleic acid for analysing expression level of  
Oct4A in the very small embryonic like stem cells; and

d) comparing the expression level of Oct4A in the very small embryonic like stem cells from the blood sample with an expression level of Oct4A in a control sample,

wherein an increase in the range of 3-5 folds in the expression level of Oct4A in the very small embryonic like stem cells from the blood sample as compared to the expression level of Oct4A in the control sample predicts the onset of cancer in the subject, and wherein the method is an *in-vitro* method.

3. An *in-vitro* method for detecting the presence of cancer in a subject, said method comprising:

a) enriching very small embryonic like stem cells from a blood sample, to obtain a mixture comprising said very small embryonic like 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 Oct4A in the very small embryonic like stem cells; and

d) comparing the expression level of Oct4A in the very small embryonic like stem cells from the blood sample with an expression level of Oct4A in a control sample,

wherein an increase of at least 5 folds in the expression level of Oct4A in the very small embryonic like stem cells from the blood sample as compared to the expression level of Oct4A in the control sample detects the presence of cancer in the subject, and wherein the method is an *in-vitro* method.

4. The method as claimed in any one of the claims 1-3, wherein the method further comprises analysing the nucleic acid by performing sequence-based assays.

5. The method as claimed in any one of the claims 2 or 3, wherein analysing the nucleic acid by sequence-based assays detects the type of cancer.

6. The method as claimed in claim 3, wherein the increase in the expression level of Oct4A in the very small embryonic like stem cells from the sample is in the range

of 5-10, 10-15 folds, 15-20 folds, or 20-25 folds as compared to the expression level of Oct4A in the control.

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

- 5           a) enriching very small embryonic like stem cells from a blood sample from one time point during an anti-cancer therapy to obtain a mixture comprising said very small embryonic like 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 Oct4A in the very small embryonic like stem cells from the blood sample;
- 10           and
- d) comparing the expression level of Oct4A in the very small embryonic like stem cells from the blood sample with an expression level of Oct4A in very small embryonic like stem cells in a reference that monitors the response to anti-cancer therapy, , and wherein the method is an *in-vitro* method.
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8. The method as claimed in claim 7, wherein the reference is at least one selected from a group consisting of: (a) a blood sample obtained prior to administration of anti-cancer therapy; (b) a blood sample obtained at a previous time point as compared to the time point mentioned in step (a) of claim 7; (c) a blood sample obtained at a subsequent time point as compared to the time point mentioned in step (a) of claim 7; and (d) a blood sample obtained from a cancer-free subject.
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9. The method as claimed in claim 7, wherein a decrease in the expression level of Oct4A in very small embryonic like stem cells in the blood sample as compared to the expression level in the reference indicates a positive response to the anti-cancer therapy, and wherein the reference is at least one selected from the group consisting of: (a) a blood sample obtained prior to administration of anti-cancer therapy; (b) a blood sample obtained at a previous time point as compared to the time point
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mentioned in step (a) of claim 7; and (c) a blood sample obtained from a cancer-free subject.

10. An *in-vitro* method for detecting a positive response to anti-cancer therapy, said method comprising:

- a) enriching very small embryonic like stem cells from a blood sample-I from before administration of an anti-cancer therapy to obtain a mixture-I comprising said very small embryonic like stem cells;
- b) enriching very small embryonic like stem cells from a blood sample-II from after administration of the anti-cancer therapy to obtain a mixture-II comprising said very small embryonic like stem cells;
- c) obtaining nucleic acid-I from the mixture-I;
- d) obtaining nucleic acid-II from the mixture-II;
- e) independently performing an assay with the nucleic acid-I and the nucleic acid-II for analysing expression level of Oct4A; and
- f) comparing the expression levels of Oct4A from the nucleic acid-II with the expression level of Oct4A from the nucleic acid-I,

wherein a decrease in the expression level of Oct4A from the nucleic acid-II as compared to the expression level of Oct4A from the nucleic acid-I detects a positive response to the cancer treatment, and wherein the method is an *in-vitro* method.

11. The method as claimed in any one of the claims 1-3, 7, or 10, wherein obtaining the nucleic acid from the mixture is by any one method selected from a 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.

12. The method as claimed in any one of the claims 1-3, 7 or 10, wherein performing an assay with the nucleic acid for analysing the expression of Oct4A is done by a

technique selected from a group consisting of quantitative PCR, flow cytometry, and Next Generation Sequencing (NGS).

13. The method as claimed in any one of the claims 1-3, wherein the control is the expression level of Oct4A in very small embryonic like stem cells obtained from a healthy subject or a cancer-free subject.

14. The method as claimed in any one of the claims 1-3, 7 or 10, wherein the enriching of the very small embryonic like stem cells from a blood sample comprises:

a) contacting the blood sample with a neutral buffer in a ratio range of 1:1 to 1:20, to obtain a first mixture;

b) centrifuging the first mixture, to obtain a second mixture comprising red blood cells (RBC) fraction; and

c) processing the second mixture to obtain enriched very small embryonic like stem cells.

15. The method as claimed in claim 14, wherein the processing of the second mixture comprising RBC fraction, comprises at least one method selected from a group consisting of: (a) extraction process comprising lysis of the RBC fraction; (b) washing process; (c) centrifugation process, and combinations thereof.

16. The method as claimed in claim 3, wherein the increase in the expression level of Oct4A in the very small embryonic like stem cells from the blood sample in the range of 5-10 folds as compared to the expression level of Oct4A in the control indicates stage I of cancer, in the range of 10-15 folds as compared to the expression level of Oct4A in the control indicates stage II of cancer, and in the range of 15-20 folds as compared to the expression level of Oct4A in the control indicates stage III of cancer.

17. The method as claimed in claim 3, wherein the increase in the expression level of Oct4A in the very small embryonic like stem cells from the blood sample in the range of 20 and higher folds as compared to the expression level of Oct4A in the control indicates stage IV of cancer.

18. The method as claimed in any one of the claims 1-3, 7 or 10, wherein the nucleic acid is either cDNA or RNA.
19. The method as claimed in any one of the claims 1-3, 7 or 10, wherein the enriching of the very small embryonic-like stem cells from the blood sample is by any method selected from the group consisting of flow cytometry, magnetic bead-based separation, filtration, microfluidic-based cell sorting, aptamer-based cell isolation, and buoyancy activated cell sorting.
20. The method as claimed in claim 2, wherein an increase of less than 3 folds in the expression level of Oct4A in the very small embryonic like stem cells from the blood sample as compared to the expression level of Oct4A in the control sample indicates an absence of cancer in the subject.
21. Use of a detection kit for detecting presence of a medical condition, the kit comprising: (a) primer set for analysing expression level of Oct4A in a mixture comprising very small embryonic-like stem cell; (b) reagents for performing quantitative PCR assay; (c) reagents for performing whole genome or exome or transcriptome sequencing; and (d) at least one tissue-specific array for analysing a sequence profile, wherein the medical condition is selected from the group consisting of diabetes, tuberculosis, Alzheimer's disease, dementia, cardiovascular disease, and arthritis.
22. A method for detecting presence of cancer in a subject, said method comprising: (a) enumerating the number of very small embryonic like stem cells in a blood sample of a subject; and (b) comparing the number of very small embryonic like stem cells in the blood sample with the number of very small embryonic like stem cells in a control blood sample, wherein an increase in the number of very small embryonic like stem cells in the blood sample as compared to the number of very small embryonic like stem cells in a control blood sample detects the presence of cancer in the subject.

23. A method for predicting the onset of cancer in a subject, said method comprising:

(a) enumerating the number of very small embryonic like stem cells in a blood sample of a subject; and (b) comparing the number of very small embryonic like stem cells in the blood sample with the number of very small embryonic like stem cells in a control blood sample, wherein an increase in the number of very small embryonic like stem cells in the blood sample as compared to the number of very small embryonic like stem cells in a control blood sample predicts the onset of cancer in the subject.

24. A method for detecting the presence of a medical condition in a subject, said method

comprising: (a) enriching very small embryonic like stem cells from a blood sample of a subject to obtain a mixture comprising said very small embryonic like stem cells; (b) enumerating the number of very small embryonic like stem cells in the blood sample; and (c) comparing the number of very small embryonic like stem cells in the blood sample with the number of very small embryonic like stem cells in a control blood sample, wherein an increase in the number of very small embryonic like stem cells in the blood sample as compared to the number of very small embryonic like stem cells in a control blood sample detects the presence of a medical condition in the subject.