CLAIMS

1. A method for determining the suitability of a neutrophil for treating cancer, the method comprising:

a. comparing a measured expression level of one or more genes by the neutrophil, wherein the one or more genes are associated with suitability for treating cancer and are selected from: *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PPP3CB, ANXA1, PERM, PLEC, ACSL1, RAC1,* and *PSMB2,* with the expression level of the same one or more genes in a reference standard; and

b. determining the suitability of the neutrophil for treating cancer based on the comparison.

2. A method for identifying whether or not a donor produces neutrophils suitable for treating cancer, the method comprising:

a. comparing a measured expression level of one or more genes by a neutrophil comprised in a sample obtainable from the donor, wherein the one or more genes are associated with suitability for treating cancer and are selected from: *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PPP3CB, ANXA1, PERM, PLEC, ACSL1, RAC1,* and *PSMB2,* with the expression level of the same one or more genes in a reference standard; and

b. identifying whether or not the donor produces neutrophils suitable for treating cancer based on the comparison.

3. The method according to claim 1 or 2, wherein step b. comprises:

determining that the neutrophil is suitable for treating cancer or identifying that the donor produces neutrophils suitable for treating cancer when:

i. the measured expression level of one or more of *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* is increased when compared to the reference standard when the reference standard is from a neutrophil unsuitable for treating cancer; or

ii. the measured expression level of *ANXA1* and/or *PPP3CB* is decreased when compared to the reference standard, when the reference standard is from a neutrophil unsuitable for treating cancer; or

iii. the measured expression level of one or more of *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* is increased or the same when compared to the reference standard, when the reference standard is from a neutrophil suitable for treating cancer; or

iv. the measured expression level of *ANXA1* and/or *PPP3CB* is decreased or the same when compared to the reference standard, when the reference standard is from a neutrophil suitable for treating cancer; or

determining that the neutrophil is unsuitable for treating cancer or identifying that the donor produces neutrophils that are unsuitable for treating cancer when:

v. the measured expression level of one or more of *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* is decreased or the same when compared to the reference standard, when the reference standard is from a neutrophil unsuitable for treating cancer; or

vi. the measured expression level of *ANXA1* and/or *PPP3CB* is increased or the same when compared to the reference standard, when the reference standard is from a neutrophil unsuitable for treating cancer; or

vii. the measured expression level of one or more of *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* is decreased when compared to reference standard, when the reference standard is from a neutrophil suitable for treating cancer; or

viii. the measured expression level of *ANXA1* and/or *PPP3CB* is increased when compared to the reference standard, when the reference standard is from a neutrophil suitable for treating cancer.

4. A method for selecting whether or not a subject is suitable for treatment with a neutrophil or a stem cell for treating cancer, the method comprising:

a. comparing a measured expression level of one or more genes by a neutrophil comprised in a sample obtainable from the subject, wherein the one or more genes are associated with suitability for treating cancer and are selected from: *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PPP3CB, ANXA1, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* with the expression level of the same one or more genes in a reference standard; and

b. identifying whether or not the subject is suitable for treatment with a neutrophil or a stem cell for treating cancer based on the comparison.

5. A method for determining a subject's risk for developing cancer, the method comprising:

a. comparing a measured expression level of one or more genes by a neutrophil comprised in a sample obtainable from the subject, wherein the one or more genes are associated with suitability for treating cancer and are selected from: *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PPP3CB, ANXA1, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* with the expression level of the same one or more genes in a reference standard; and

b. determining the subject's risk for developing cancer based on the comparison.

6. The method according to claim 4 or 5, wherein step b. comprises:

identifying the subject as suitable for treatment with a neutrophil or a stem cell for treating cancer or determining that the subject is at risk of developing cancer when:

i. the measured expression level of one or more of *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMKATM, IKBKB, BCAP31, TAPBP, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* is decreased or the same when compared to the reference standard, when the reference standard is from a neutrophil unsuitable for treating cancer; or

ii. the measured expression level of *ANXA1* and/or *PPP3CB* is increased or the same when compared to the reference standard, when the reference standard is from a neutrophil unsuitable for treating cancer; or

iii. the measured expression level of one or more of *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* is decreased when compared to the reference standard, when the reference standard is from a neutrophil suitable for treating cancer; or

iv. the measured expression level of *ANXA1* and/or *PPP3CB* is increased when compared to the reference standard, when the reference standard is from a neutrophil suitable for treating cancer; or

identifying the subject as unsuitable for treatment with a neutrophil or a stem cell for treating cancer when or determining that the subject is not at risk of developing cancer when:

v. the measured expression level of one or more of *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* is increased when compared to the reference standard when the reference standard is from a neutrophil unsuitable for treating cancer; or

vi. the measured expression level of *ANXA1* and/or *PPP3CB* is decreased when compared to the reference standard, when the reference standard is from a neutrophil unsuitable for treating cancer; or

vii. the measured expression level of one or more of *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* is increased or the same when compared to the reference standard, when the reference standard is from a neutrophil suitable for treating cancer; or

viii. the measured expression level of *ANXA1* and/or *PPP3CB* is decreased or the same when compared to the reference standard, when the reference standard is from a neutrophil suitable for treating cancer.

7. The method according any one of the preceding claims, wherein:

a. the method further comprises measuring the expression of the one or more genes;

b. further comprising measuring the expression level of one or more gene selected from: *S100A9* and *S100A8*;

c. the one or more genes associated with suitability for treating cancer are one or more genes associated with:

~~.~~i. killing cancer cells and are selected from: *GM2A, CTSG, CAP37, CYBB, GZMK, ATM, PERM, ACSL1, ATG7, SYK, DOCK8, RAC1, and PSMB2*; and/or

~~.~~ii. locating and/or binding to cancer cells and are selected from: *ANXA1, ITGB1, COMP, SLC2A1* and *PLEC*; and/or

~~i.~~iii. recruitment of immune mediators and are selected from: *BCAP31, TAPBP, IKBKB,* and *PPP3CB*;

d. the expression level is measured by proteomic techniques; and/or

e. the expression level is measured by transcriptomic techniques.

8. The method according to any one of claims 1-3 or 7 further comprising selecting a neutrophil when the neutrophil has been determined to be suitable for treating cancer or selecting a neutrophil from a sample obtainable from a donor when the donor has been

identified as a donor that produces neutrophils for treating cancer, preferably wherein the selecting comprises isolating the neutrophil.

9. An *in vitro* method for obtaining a neutrophil or stem cell for treating cancer, said method comprising obtaining a neutrophil or stem cell from a sample obtainable from a donor, wherein said donor produces neutrophils comprising:

a. increased expression of one or more of *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* when compared to a reference standard, wherein the reference standard is from a neutrophil unsuitable for treating cancer; and/or

b. decreased expression of *ANXA1* and/or *PPP3CB* when compared to a reference standard, wherein the reference standard is from a neutrophil unsuitable for treating cancer.

10. A method for preparing a stem cell suitable for treating cancer, the method comprising:

a. identifying a donor that produces neutrophils suitable for treating cancer according to the method of any one of claims 2-3 or 7-8; and
b. obtaining the stem cell from a sample obtainable from said donor.

11. A method for producing a stem cell for treating cancer, the method comprising:

a. providing a stem cell obtainable from a sample from a donor, wherein said donor produces neutrophils comprising:
    i. increased expression of one or more of *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* when compared to a reference standard, wherein the reference standard is from a neutrophil unsuitable for treating cancer; and/or
    ii. decreased expression of *ANXA1* and/or *PPP3CB* when compared to a reference standard, wherein the reference standard is from a neutrophil unsuitable for treating cancer ; and
b. differentiating the stem cell into a different stem cell (preferably a precursor cell); and
c. optionally isolating the different stem cell (preferably the precursor cell).

12. The method according to any one of claims 9-11, wherein the sample comprises a somatic cell and obtaining the stem cell from the sample comprises reprograming the somatic cell into a stem cell.

13. A method for isolating a neutrophil or stem cell for treating cancer, the method comprising:

a. contacting a sample of neutrophils or a sample of stem cells with a binding means, wherein the binding means binds to one or more polypeptides selected from GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PPP3CB, ANXA1, PERM, PLEC, ACSL1, RAC1, and PSMB2; and
b. isolating the neutrophil or stem cell, respectively, based on the presence or absence of binding between the binding means and the one or more polypeptides.

14. A method for producing an engineered neutrophil or stem cell for treating cancer, the method comprising:

a. providing a neutrophil or stem cell, respectively; and
b. engineering the neutrophil or stem cell, respectively, to:
    i. increase expression of one or more genes selected from: *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PERM, PLEC, ACSL1, RAC1,* and *PSMB2*; and/or
    ii. decrease expression of *ANXA1* and/or *PPP3CB*;

thereby producing the engineered neutrophil or stem cell, respectively, wherein the engineered neutrophil or stem cell, respectively, is suitable for treating cancer.

15. A stem cell for treating cancer obtainable by the method according to any one of claims 9-14.

16. A stem cell which is capable of differentiating into a neutrophil for treating cancer, wherein the neutrophil comprises:

a. increased expression of one or more of *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* when compared to a reference standard, wherein the reference standard is from a neutrophil unsuitable for treating cancer; and/or

b. decreased expression of *ANXA1* and/or *PPP3CB* when compared to a reference standard, wherein the reference standard is from a neutrophil unsuitable for treating cancer.

17. The stem cell according to claim 15 or 16, wherein the stem cell is an induced pluripotent stem cell, or wherein the stem cell is a haematopoietic stem cell, a common myeloid progenitor cell, a myeloblast, a N. promyelocyte, a N. myelocyte, a N. metamyelocyte, a N. band, or combinations thereof; preferably wherein the stem cell is a haematopoietic stem cell.

18. A method for producing a neutrophil for treating cancer, the method comprising:

a. providing a cell; and

b. converting the cell into a neutrophil, wherein:

i. the measured expression level of one or more of *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* is increased in the neutrophil when compared to a reference standard when the reference standard is from a neutrophil unsuitable for treating cancer; or

ii. the measured expression level of *ANXA1* and/or *PPP3CB* is decreased in the neutrophil when compared to the reference standard, when the reference standard is from a neutrophil unsuitable for treating cancer; or

iii. the measured expression level of one or more of *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* is increased or the same when compared to the reference standard, when the reference standard is from a neutrophil suitable for treating cancer; or

iv. the measured expression level of *ANXA1* and/or *PPP3CB* is decreased or the same when compared to the reference standard, when the reference standard is from a neutrophil suitable for treating cancer; and

c. optionally isolating the neutrophil.

19. The method according to claim 18, wherein:

a. the cell is a stem cell according to any one of claims 15-17; optionally wherein converting the stem cell into a neutrophil comprises differentiating the stem cell into a neutrophil; or

b. the cell is a somatic/differentiated cell, optionally from a donor who produces neutrophils suitable for treating cancer as determined according to any one of claims 2-3 or 7-8; optionally wherein converting the somatic/differentiated cell into a neutrophil comprises transdifferentiating the somatic/differentiated cell into a neutrophil.

20. A neutrophil (e.g. obtainable by the method according to any one of claims 8, 13-14 or 18-19), wherein the neutrophil comprises:

a. increased expression of one or more of *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* when compared to a reference standard, wherein the reference standard is from a neutrophil unsuitable for treating cancer; and/or

b. decreased expression of *ANXA1* and/or *PPP3CB* when compared to a reference standard, wherein the reference standard is from a neutrophil unsuitable for treating cancer.

21. A composition for treating cancer (e.g. obtainable by the method according to any one of claims 8, 13-14 or 18-19), the composition comprising neutrophils: wherein at least 90%, 95%, 99% or 100% of the neutrophils comprised in the composition have:

a. increased expression of one or more of *GM2A, CTSG, CAP37, ITGB1, CYBB, SYK, DOCK8, COMP, ATG7, SLC2A1, GZMK, ATM, IKBKB, BCAP31, TAPBP, PERM, PLEC, ACSL1, RAC1,* and *PSMB2* when compared to a reference standard, wherein the reference standard is from a neutrophil unsuitable for treating cancer; and/or

b. decreased expression of *ANXA1* and/or *PPP3CB* when compared to a reference standard, wherein the reference standard is from a neutrophil unsuitable for treating cancer.

22. A pharmaceutical composition comprising:

a. the neutrophil according to claim 20, the stem cell according to any one of claims 15-17, or the composition according to claim 21; and

b. a pharmaceutically acceptable carrier, excipient, adjuvant, and/or salt.

23. The pharmaceutical composition according to claim 22, further comprising:

a. TNF-alpha;

b. a granulocyte-macrophage colony-stimulating factor (GM-CSF), a granulocyte colony-stimulating factor (G-CSF), a growth hormone, and serotonin, vitamin C, vitamin D,

glutamine (Gln), arachidonic acid, AGE-albumin, an interleukin, TNF-alpha, Flt-3 ligand, thrombopoietin, foetal bovine serum (FBS), retinoic acid, lipopolysaccharide (LPS), IFN-gamma, IFN-beta, or combinations thereof; and/or

c. a granulocyte-macrophage colony-stimulating factor (GM-CSF) and IFN-gamma.

24. A kit comprising:

a. the neutrophil according to claim 20, the stem cell according to any one of claims 15-17, the composition according to claim 21, or the pharmaceutical composition according to any one of claims 22-23; and

b. instructions for use of the same in medicine.

25. A neutrophil according to claim 20, stem cell according to any one of claims 15-17, composition according to claim 21, pharmaceutical composition according to any one of claims 22-23, or kit according to claim 24 for use in treating cancer.

26. Use of the neutrophil according to claim 20, the stem cell according to any one of claims 15-17, the composition according to claim 21, the pharmaceutical composition according to any one of claims 22-23, or the kit according to claim 24 in the manufacture of a medicament for treating cancer.

27. The neutrophil for use, stem cell for use, composition for use, pharmaceutical composition for use, or kit for use according to claim 25, or the use according to claim 26, wherein the cancer is one or more of: pancreatic cancer, liver cancer, oesophageal cancer, stomach cancer, cervical cancer, ovarian cancer, lung cancer, bladder cancer, kidney cancer, brain cancer, prostate cancer, myeloma cancer, non-Hodgkin’s lymphoma (NHL), larynx cancer, uterine cancer, or breast cancer; preferably wherein the cancer is pancreatic cancer.

28. A cell bank comprising the neutrophil according to claim 20, the stem cell according to any one of claims 15-17, the composition according to claim 21, or the pharmaceutical composition according to any one of claims 22-23.