

CLAIMS

1. A method of detecting and/or characterising an immunosuppressive neutrophil comprising determining and/or measuring the expression of one or more anti-apoptotic marker in a neutrophil population,

wherein the one or more anti-apoptotic marker comprises TNF-related apoptosis inducing ligand (TRAIL)-receptor 3 (TRAIL-R3 / *TNFRSF10C*) in human and/or decoy TNF-related apoptosis-inducing ligand (TRAIL)-receptor (dcTRAILR1) in mouse,

wherein the immunosuppressive neutrophil is a subpopulation within the neutrophil population that is detected when there is a higher expression of the one or more anti-apoptotic marker.

2. The method of claim 1, wherein the immunosuppressive neutrophil is a polymorphonuclear myeloid-derived suppressor cell (PMN-MDSC).

3. The method of any one of the preceding claims, wherein the method further comprises: determining and/or measuring the expression of one or more markers related to and/or capable of inducing immunosuppression of an immune cell

comprising one or more of the following markers: *CD274* (PD-L1), *VSIR* (VISTA), *LILRB4*, *ARG1*, *PTGS2* (COX2), or *NOS2*.

4. The method of any one of the preceding claims, wherein the method further comprises: determining and/or measuring the expression of one or more markers that negatively regulate inflammatory function comprising Dcir2, Pir-a/b, or Clec12a.

5. The method of claim 6, wherein the method further comprises: determining and/or measuring the expression of one or more markers that negatively regulate innate inflammatory function

comprising Dcir2, Pir-a/b, or Clec12a.

6. The method of any one of the preceding claims, wherein the method further comprises: determining and/or measuring the expression of one or more markers of metabolic ectoenzymes that create immunosuppressive tumour microenvironment (TME)

comprising CD39, or CD73.

7. The method of any one of the preceding claims, wherein the method further comprises: determining and/or measuring the expression of markers comprising one or more of the following markers:

CD11b⁺, Gr-1^{hi}, Ly6C^{low}, Ly6G⁺, CD101^{+/-} in mouse and/or

CD11b⁺, CD101⁺, CD66b⁺, CD15⁺, CD16^{+/-}, CD10^{+/-} in humans and/or

MMP8, MMP9, S100A9, S100A8, CSF3R, CXCR2 in RNAseq transcriptomic profiles.

8. The method of claim 7,

wherein CD101⁺ in mouse refers to mature neutrophil population and/or CD101⁻ refers to immature neutrophil population and/or

wherein CD16^{low/-}CD10⁻ in humans refers to immature neutrophil population, and/or CD16⁺CD10⁺ refers to the mature neutrophil population.

9. The method of any one of the preceding claims, wherein the method further comprises determining and/or measuring the pro-angiogenic ability of the cell,

wherein the method determines and/or measures markers comprising one or more of the following markers: MMP9, IL-6, VEGF α production, and/or combination thereof.

10. The method of any one of the preceding claims, wherein the method further comprises sorting the neutrophil population into subpopulations, the method comprising clustering the neutrophil population into subpopulations based on their expression of one or more of the following:

Lin⁻, MHCII⁻, F4/80, Ly6C^{int}, Ly6G⁺, dcTRAIL-R1⁺, ARG-1⁺, VISTA⁺ in mouse, and/or

CD11b⁺, CD101⁺, CD66b⁺, CD15⁺, TRAIL-R3⁺, ARG-1⁺, PTGS2⁺ in human

.

11. A method of evaluating the progression of a proliferative disease in a subject, the method comprising:

determining/measuring an activity, an amount and/or a proportion of an immunosuppressive neutrophil in a first sample from the subject; and

comparing the activity, the amount and/or the proportion of an immunosuppressive neutrophil to those of a second sample from the subject, the second sample being obtained from subject at a later timepoint than the first sample,

wherein an increased activity, increased amount and/or increased proportion of an immunosuppressive neutrophil in the second sample as compared to the first sample is indicative of a worsening of the condition in the subject, and/or

wherein a reduced activity, reduced amount and/or reduced proportion of an immunosuppressive neutrophil in the second sample as compared to the first sample is indicative of an improvement of the condition in the subject,

wherein the activity, the amount and/or the proportion of the immunosuppressive neutrophil is determined / measured by determining and/or measuring the expression of one or more anti-apoptotic marker in a neutrophil population,

wherein the one or more anti-apoptotic marker comprises TNF-related apoptosis inducing ligand (TRAIL)-receptor 3 (TRAIL-R3 / *TNFRSF10C*) in human and/or decoy TNF-related apoptosis-inducing ligand (TRAIL)-receptor (dcTRAILR1) in mouse,

wherein the immunosuppressive neutrophil is a subpopulation within the neutrophil population that is detected when there is a higher expression of the one or more anti-apoptotic marker.

12. A method of evaluating the efficacy of a treatment regimen and/or drug for a proliferative disease in a subject, the method comprising:

determining/measuring an activity, an amount and/or a proportion of an immunosuppressive neutrophil in a first sample from the subject; and

comparing the activity, the amount and/or the proportion of an immunosuppressive neutrophil to those of a second sample from the subject, the second sample being obtained from subject at a later timepoint in the treatment regimen than the first sample,

wherein the treatment regimen is considered effective when the second sample has a reduced activity, reduced amount and/or reduced proportion of the immunosuppressive neutrophil as compared to the first sample and non-effective if otherwise

wherein the activity, the amount and/or the proportion of the immunosuppressive neutrophil is determined / measured by determining and/or measuring the expression of one or more anti-apoptotic marker in a neutrophil population,

wherein the one or more anti-apoptotic marker comprises TNF-related apoptosis inducing ligand (TRAIL)-receptor 3 (TRAIL-R3 / *TNFRSF10C*) in human and/or decoy TNF-related apoptosis-inducing ligand (TRAIL)-receptor (dcTRAILR1) in mouse,

wherein the immunosuppressive neutrophil is a subpopulation within the neutrophil population that is detected when there is a higher expression of the one or more anti-apoptotic marker.

13. Use of a composition that is capable of decreasing an activity, an amount / a level and/or a proportion of an immunosuppressive neutrophil in the manufacture of a medicament for treating a proliferative disease in a subject,:

wherein the composition is to be administered to the subject,

wherein the activity, the amount/the level and/or the proportion of the immunosuppressive neutrophil is determined / measured by determining and/or measuring the expression of one or more anti-apoptotic marker in a neutrophil population,

wherein the one or more anti-apoptotic marker comprises TNF-related apoptosis inducing ligand (TRAIL)-receptor 3 (TRAIL-R3 / *TNFRSF10C*) in human and/or decoy TNF-related apoptosis-inducing ligand (TRAIL)-receptor (dcTRAILR1) in mouse,

wherein the immunosuppressive neutrophil is a subpopulation within the neutrophil population that is detected when there is a higher expression of the one or more anti-apoptotic marker.

14. The use of any one of the preceding claims, wherein the sample is a tissue biopsy, such as a tumour and/or cancer biopsy.