Claims

1. An *in vitro* produced peripheral blood mononuclear cell (PBMC) monolayer or bone-marrow cell monolayer, wherein natural-occurring cell-cell interactions and membrane integrity are maintained during formation of the monolayer.

2. A PBMC monolayer or bone-marrow cell monolayer *in vitro* produced by a method comprising

    (a) isolating PBMCs from a blood sample or bone-marrow cells from bone-marrow; and
    (b) incubating PBMCs or bone-marrow cells at a density of about 100 cells per mm^2 to about 30000 cells per mm^2.

3. A method for culturing PBMCs or bone-marrow cells comprising

    (a) isolating PBMCs from a blood sample or bone-marrow cells from bone-marrow; and
    (b) incubating PBMCs or bone-marrow cells at a density of about 100 cells per mm^2 to about 30000 cells per mm^2.

4. The monolayer of claim 2 or the method of claim 3, wherein the PBMCs or bone-marrow cells are incubated at a density of about 2000 cells per mm^2.

5. The monolayer of claim 2 or 4 or the method of claims 3 or 4, wherein PBMCs or bone-marrow cells are isolated from non-nucleated cells, wherein the PBMC sample or bone-marrow cell sample to be incubated contains less than about 100 non-nucleated cells per PBMC/bone-marrow cell.

6. The monolayer of claims 2, 4 or 5 or the method of any one of claims 3 to 5, wherein the monolayer is obtained by a method further comprising or wherein the method further comprises a step (c), fixing said PBMCs or bone-marrow

cells and/or fixing the formed PBMC monolayer or bone-marrow cell monolayer.

7. The monolayer of claim 6 or the method of claim 6, wherein the monolayer is obtained by a method further comprising or wherein the method further comprises, subsequent to step (c), a step (d) comprising adding a detectable label to the fixed PBMCs/bone-marrow cells.

8. The monolayer of claim 7 or the method of claim 7, wherein the detectable label is an antibody.

9. The monolayer of any one of claims 2 to 8 or the method of any one of claims 3 to 8, wherein the monolayer is obtained by a method further comprising or wherein the method further comprises a step of adding a viability dye.

10. The monolayer of claim 10 or the method of claim 10, wherein the addition of a viability dye occurs prior to fixation of the formed PBMC monolayer or bone-marrow cell monolayer.

11. The monolayer of any one of claims 2 to 10 or the method of any one of claims 2 to 10, wherein subsequent to isolation the PBMCs or bone-marrow cells are maintained/processed/analyzed at about 1g, i.e. 9.81 m/s^2.

12. The monolayer of any one of claims 2 to 11 or the method of any one of claims 2 to 11, wherein subsequent to isolation the PBMCs or bone-marrow cells are not subjected to centrifugation or spinning.

13. A PBMC monolayer or bone-marrow cell monolayer of claim 1 or 2 or as obtained by a method of any one of claims 3 to 12 for use in determining whether the PBMC donor/bone-marrow cell donor suffers from a disease or is predisposed to suffer from a disease.

14. A method for diagnosing a disease or predisposition to a disease in a PBMC donor/bone-marrow cell donor comprising the monolayer of any one of claims 2 to 12 or PBMCs/bone-marrow cells cultured according to the method of any one of claims 3 to 12.

15. The method of claim 14, wherein the cultured PBMCs or bone-marrow cells are contacted with a diagnostic agent.

16. The PBMC monolayer/bone-marrow cell monolayer for use according to claim 13 or the method of claim 14, wherein the disease is a hematologic malignancy or a malignancy of myeloid and/or lymphoid tissue.

17. The PBMC monolayer/bone-marrow cell monolayer for use according to claim 13 or the method of claim 14, wherein the disease is a myeloproliferative disorder, inflammatory disorder, latent virus infection, cellular growth disorder, cellular chemotaxis disorder, metabolic disorder, or autoimmune disorder.

18. The PBMC monolayer or method of claims 16 or 17, wherein the disease is leukemia or lymphoma.

19. A method for determining whether a subject suffering from or predisposed to a disease will respond or is responsive to treatment with a therapeutic agent comprising

    (a) isolating PBMCs/bone-marrow cells from a blood sample obtained from said subject;
    (b) incubating said PBMCs/bone-marrow cells at a density of about 100 cells per mm^2 to about 30000 cells per mm^2;
    (c) contacting said PBMCs/bone-marrow cells with said therapeutic agent; and
    (d) assessing the response of the PBMCs/bone-marrow cells to the therapeutic agent.

20. The method of claim 19, wherein the PBMCs/bone-marrow cells are incubated at a density of about 2000 cells per mm^2.

21. A PBMC monolayer or bone-marrow cell monolayer of claim 1 or 2 or as obtained by a method of any one of claims 3 to 12 for use in a diagnostic method for determining whether a subject suffering from or predisposed to a disease will respond or is responsive to treatment with a therapeutic agent.

22. Use of a pharmaceutical composition comprising a compound in the manufacture of a medicament for the treatment of a disease of an individual, wherein said compound is selected from at least two or more test compounds, wherein each of the at least two or more test compounds is tested in an assay comprising the steps of:

    (a) preparing the PBMC monolayer or bone-marrow cell monolayer of claims 1 or 2 or using a PBMC monolayer or bone-marrow cell monolayer prepared by the method of any one of claims 3 to 12 using PBMCs or bone-marrow cells of said individual;
    (b) determining viability and/or cell-cell interactions of one or more subpopulations comprised in the PBMC monolayer or bone-marrow cell monolayer;
    (c) adding one of the at least two or more test compounds to the hematopoietic cell monolayer; and
    (d) determining/track/assessing/verifying changes of viability and/or cell-cell interactions of the one or more subpopulations comprised in the PBMC monolayer or bone-marrow cell monolayer,

    wherein the assay is repeated for each of the at least two or more compounds and wherein the compound reducing the viability/cell-cell interactions the most is selected for treatment of said individual.

23. The use according to claim 22, wherein the disease is a hematologic malignancy or a malignancy of myeloid and/or lymphoid tissue.

24. The use according to claim 23, wherein the hematologic malignancy is acute or chronic myeloid leukemia or primary myelofibrosis.

25. A culture device comprising the PBMC monolayer or bone-marrow cell monolayer of claims 1 or 2 or a monolayer obtained by the methods of any one of claims 2 to 12.

26. The culture device of claim 25, wherein the culture device comprises flat-bottom wells.

27. The culture device of claims 25 or 26, wherein the culture device comprises wells coated with an adhesion molecule.