

We claim:

1. A method for assessing the potency of human mesenchymal stem cells (MSCs), comprising:

stimulating a population of MSCs with a pro-inflammatory cytokine or other pro-inflammatory molecule;

identifying anti-inflammatory cytokine production from said MSCs; and

quantifying levels of the anti-inflammatory cytokine production from said MSCs.

2. The method according to claim 1, wherein the pro-inflammatory cytokine is TNF- α , IL-17a or a combination thereof.

3. The method according to claim 1, wherein the pro-inflammatory cytokine is TNF- α .

4. The method according to claim 1, wherein the stimulation step occurs between 1 hour and 24 hours.

5. The method according to claim 1, wherein the pro-inflammatory cytokine is administered to the MSCs in an amount ranging from 0.1 pg/mL to 1 μ g/mL.

6. The method according to claim 1, wherein the MSCs are derived from bone marrow, adipose tissue, peripheral blood, a lung, a heart, amniotic fluid, inner organs, an amniotic membrane, an umbilical cord or a placenta, or other tissue, or differentiated from induced pluripotent stem cells (IPSCs) or other sources.

7. The method according to claim 1, wherein the anti-inflammatory cytokines that can be identified and quantified are selected from the group consisting of IL-1RA, IL-4, IL-7, IL-8, IL-10, IL-13, G-CSF and combinations thereof.

8. The method according to claim 1, wherein the method further comprises a step of checking for the expression of biomarkers on the MSCs before stimulation with the pro-inflammatory cytokine.

9. The method according to claim 8, wherein the biomarkers that are searched for include CD105⁺, CD90⁺, CD73⁺, CD45⁻, CD34⁻, CD19⁻, CD11b⁻, IL-17RA⁺, HLA-DR⁻ or any combination thereof.
10. The method according to claim 1, wherein the method can further comprise a step of seeding the MSCs onto a substrate before stimulation with the pro-inflammatory cytokine.
11. The method according to claim 10, wherein the substrate is a membrane, a plastic surface, a glass surface or a cell culture well plate, such as a 96-well plate, with or without an added substrate coating.
12. The method according to claim 10, wherein the seeding of the MSCs onto the substrate lasts from 1 hour to 24 hours.
13. The method according to claim 1, wherein the MSCs are divided into smaller populations of MSCs before stimulation with the pro-inflammatory cytokine.
14. The method according to claim 1, wherein the method further comprises a step of isolating supernatants of the MSCs after stimulation with the pro-inflammatory cytokine.
15. The method according to claim 14, wherein the supernatants are cryopreserved once they have been isolated from the MSCs.
16. The method according to claim 14, wherein the supernatants are analyzed with a electrochemiluminescence immunoassay or other assays to determine the levels of anti-inflammatory cytokines produced by the MSCs.
17. The method according to claim 1, wherein the method further comprises performing a viability assay on the MSCs after they have been stimulated with the pro-inflammatory cytokine.
18. The method according to claim 17, wherein the viability assay is an ATP detection assay, a tetrazolium reduction assay, a resazurin reduction assay, a protease viability marker assay, a sodium-potassium ratio assay, a cytolysis or membrane leakage assay, a mitochondrial activity or caspase assay, a functional assay, a genomic and proteomic assay or any combination thereof.

19. The method according to claim 17, wherein the viability assay comprises the use of flow cytometry.
20. The method according to claim 17, wherein the viability of the MSCs after stimulation with a pro-inflammatory cytokine is greater than 70% when compared to MSC populations treated with a vehicle.
21. The method according to claim 17, further comprising assigning a grade to the potency of the MSCs based on the amount of produced anti-inflammatory molecules.