## CLAIMS

What is claimed is:

1. A method of increasing a purity of mesenchymal stem cells (MSCs) population, comprising:

isolating and collecting MSCs using a marker EphA2 expressed on the MSCs, wherein the MSCs are from a primary culture derived from a placenta-related tissue; and

culturing the MSCs.

2. The method of claim 1, wherein the placenta-related tissue is selected from the group consisting of amniotic membrane, chorionic disk, chorionic membrane, and umbilical cord.

3. The method of claim 1, wherein the isolating step is performed through an antibody-based or a nucleotide-based isolation method.

4. The method of claim 1, wherein the cells derived from a placenta-related tissue are cultured in a culture medium for MSC.

5. The method of claim 1, wherein the purity of the MSCs population is at least 95% at P0 after the isolating step.

6. The method of claim 3, wherein the antibody-based isolation method is an antibody-based magnetic cell sorting or an antibody-based flow cytometry.

7. The method of claim 3, wherein the nucleotide-based isolation method is a nucleotide-based flow cytometry.

8. A method of isolating a population of mesenchymal stem cells (MSCs) which is more responsive in an inflammatory environment, comprising:

isolating and collecting MSCs using a marker EphA2 expressed on the MSCs, wherein the MSCs are from a primary culture derived from a placenta-related tissue, and the population of MSCs is more responsive in an inflammatory environment than an un-isolated MSC population from a primary culture of cells of a placenta-related tissue.

9. The method of claim 8, wherein the isolating step is performed through an antibody-based or a nucleotide-based isolation method.

10. The method of claim 8, wherein the MSC population is more responsive to a TNF-α signaling or a TNF-α-dependent signaling than the un-isolated MSC population.

11. The method of claim 9, wherein the antibody-based isolation method is an antibody-based magnetic cell sorting or an antibody-based flow cytometry.

12. The method of claim 9, wherein the nucleotide-based isolation method is a nucleotide-based flow cytometry.