Reviewer #1:

Scientific Quality: Grade C (Good)

Language Quality: Grade B (Minor language polishing)

Conclusion: Minor revision

Specific Comments to Authors:

The theme of this review article is to explore in detail the differentiation of MSCs towards adipocytes, to describe the biological regulatory pathways behind this phenomenon, and to provide readers with therapeutic insights. The characteristic phenotypic markers of MSCs and the prominent signaling pathways of adipocyte-directed differentiation are correctly described. The roles of actin/Rho, TGF-beta/SMAD, and BMP signaling pathways are summarized in a detailed and understandably correct manner. They also summarize in detail the role of noncoding RNAs based on the most recent literature. The crucial aspects of the DNA methylation and acetylation/deacetylation processes are also summarized in a correct manner. The figures are illustrative and help to interpret what is described in the text. In the case of therapeutic options, I suggest expanding the description to autoimmune diseases, osteogenesis, and cancer, as there is a role for the MSC-adipocyte lineage in these pathologies as well. The use of English grammar is appropriate.

Answer: We appreciate Reviewer's comments and we have added contents on the relationship between MSC-adipocyte lineage and pathologies such as autoimmune diseases, osteogenesis, and cancer. (Part 6. ADIPOGENESIS OF MSCs AND DISEASES highlighted in yellow)

Reviewer #2:

Scientific Quality: Grade B (Very good)

Language Quality: Grade B (Minor language polishing)

Conclusion: Minor revision

Specific Comments to Authors:

The review is very comprehensive regarding the molecular mechanisms by which mesenchymal cells differentiate into adipogenic cells. The only thing I missed was the discussion on protocols for differentiating MSCs into adipocytes. I recommend a paragraph discussing this topic.

Answer: Thanks for the reviewer's advice. We have added a paragraph about protocols of differentiating MSCs into adipocytes in the revised manuscript.