

## Editorial

# Mesenchymal Stem Cells as Promoters, Enhancers, and Playmakers of the Translational Regenerative Medicine 2018

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Mesenchymal stem cells (MSCs) are currently being tested in preclinical and clinical trials for their ability to foster wound healing and tissue regeneration [1].

They are well known to show a therapeutic potential largely depending on their ability to secrete proregenerative cytokines, making these cells an attractive option for improving the treatment of chronic wounds. The wound microenvironment is a miscellaneous key factor in the local management of the healing process: players such as the extracellular matrix or the resident and recruited cells with paracrine activity are able to determine the way and the appropriateness of the regenerative processes [2].

Dental-derived mesenchymal stem cells (D-dMSCs) are an intriguing milestone of the regenerative medicine, with regard to their potential of differentiating into osteogenic, adipogenic, and chondrogenic lineages [3–5], possessing in this way the potential to significantly influence the bone and periodontal treatment strategies in the future [6–9].

Despite the multiple barriers to their clinical use, MSCs or D-dMSCs have shown sufficient promise to garner a primary place in the field of translational medicine. In fact, MSC and D-dMSC therapies have significant implications for human health: clinical studies are greatly needed to confirm or stimulate the basic and translational researches aimed at reaching cutting-edge results [10–13].

The special issue has reported articles on MSCs used as a therapeutic aid in clinical and surgical applications. The topics in translational medicine reported were the MSC

therapy for intravertebral disc regeneration (J. Jia et al.) and the cell therapy as a promising aid for cerebral vasculature (B. Y. Choi et al.), as well as for the proper management of thin endometrium (J. Zhao et al.).

The most reported translational use of MSC/D-dMSC therapy is related to bone tissue regeneration: in fact, many authors have investigated on the osteogenic ability of different stem cell types and genes, such as TGF $\beta$ 1 that enhances MSC commitment to either the osteogenic or adipogenic lineages by reorganizing the actin cytoskeleton (M. Elsafadi et al.), as well as on the use of a PRP blood clot stabilizer to treat infrabony periodontal defects (M. Saleem et al.) and the use of vitamin D in dental-derived MSCs that promote osteogenic differentiation through the modulation of  $\alpha$ V $\beta$ 3 (F. Posa et al.), the role played by the ganglioside GM1 in the osteogenic differentiation of human tendon stem cells (S. Bergante et al.), or via low-frequency pulsed electromagnetic fields (P. S. P. Poh et al.).

Some authors have focused their researches on umbilical cord stem cells, due to their large application on translational medicine (D. R. Kwon et al.), as well on miRNA-132 MSC-derived exosomes in the treatment of myocardial infarction (T. Ma et al.).

Finally, experimental findings from *in silico* studies, on the one hand, highlighted the promotive role of hypoxia in MSC proliferation (S. Gao et al.); on the other hand, it was reported that an *in vitro* loading model (2D and 3D in combination with different scaffolds) represents a simple and

very efficient way to investigate molecular events during orthodontic tooth movement (M. Janjic et al.).

In this special issue, the editors together with the involved authors have well described the MSCs and D-dMSCs in their different but fundamental roles as promoters, enhancers, and playmakers of the translational regenerative medicine. Starting from the contents of our issue, the scientific community will be stimulated to experiment new ideas, to improve the knowledge of the MSCs/D-dMSCs, and to speed up their clinical application, so as to improve the future therapies.

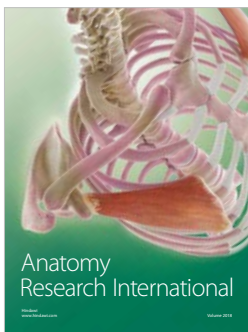
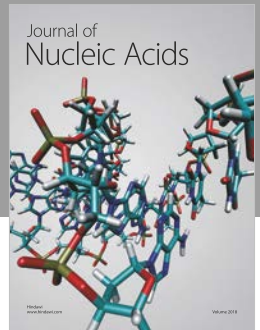
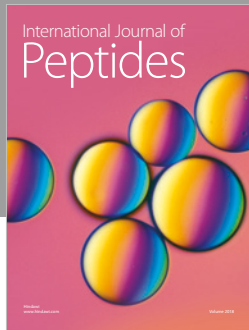
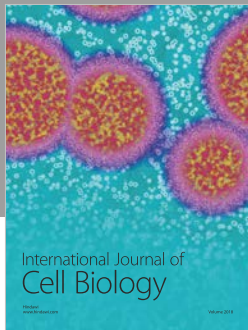
## Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this editorial.

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## References

- [1] J. Galipeau, M. Krampera, J. Barrett et al., "International Society for Cellular Therapy perspective on immune functional assays for mesenchymal stromal cells as potency release criterion for advanced phase clinical trials," *Cytotherapy*, vol. 18, no. 2, pp. 151–159, 2016.
- [2] A. Ballini, S. Scacco, D. Coletti, S. Pluchino, and M. Tatullo, "Mesenchymal stem cells as promoters, enhancers, and playmakers of the translational regenerative medicine," *Stem Cells International*, vol. 2017, Article ID 3292810, 2 pages, 2017.
- [3] A. Ballini, A. Boccaccio, R. Saini, P. Van Pham, and M. Tatullo, "Dental-derived stem cells and their secretome and interactions with bioscaffolds/biomaterials in regenerative medicine: from the in vitro research to translational applications," *Stem Cells International*, vol. 2017, Article ID 6975251, 3 pages, 2017.
- [4] F. Paduano, M. Marrelli, F. Palmieri, and M. Tatullo, "CD146 expression influences periapical cyst mesenchymal stem cell properties," *Stem Cell Reviews*, vol. 12, no. 5, pp. 592–603, 2016.
- [5] A. di Benedetto, F. Posa, C. Carbone et al., "NURR1 downregulation favors osteoblastic differentiation of MSCs," *Stem Cells International*, vol. 2017, Article ID 7617048, 10 pages, 2017.
- [6] S. Cantore, V. Crincoli, A. Boccaccio et al., "Recent advances in endocrine, metabolic and immune disorders: mesenchymal stem cells (MSCs) and engineered scaffolds," *Endocrine, Metabolic & Immune Disorders Drug Targets*, vol. 18, no. 5, pp. 466–469, 2018.
- [7] A. Boccaccio, A. E. Uva, M. Fiorentino, G. Monno, A. Ballini, and A. Desiate, "Optimal load for bone tissue scaffolds with an assigned geometry," *International Journal of Medical Sciences*, vol. 15, no. 1, pp. 16–22, 2018.
- [8] A. Ballini, A. Scattarella, V. Crincoli et al., "Surgical treatment of gingival overgrowth with 10 years of follow-up," *Head & Face Medicine*, vol. 6, no. 1, p. 19, 2010.
- [9] A. Ballini, S. Tetè, A. Scattarella et al., "The role of anti-cyclic citrullinated peptide antibody in periodontal disease," *International Journal of Immunopathology and Pharmacology*, vol. 23, no. 2, pp. 677–681, 2010.
- [10] C. Lechanteur, A. Briquet, O. Giet, O. Delloye, E. Baudoux, and Y. Beguin, "Clinical-scale expansion of mesenchymal stromal cells: a large banking experience," *Journal of Translational Medicine*, vol. 14, no. 1, p. 145, 2016.
- [11] M. Tatullo, G. M. Simone, F. Tarullo et al., "Antioxidant and antitumor activity of a bioactive polyphenolic fraction isolated from the brewing process," *Scientific Reports*, vol. 6, no. 1, article 36042, 2016.
- [12] M. Marrelli, S. Gentile, F. Palmieri, F. Paduano, and M. Tatullo, "Correlation between surgeon's experience, surgery complexity and the alteration of stress related physiological parameters," *PLoS One*, vol. 9, no. 11, article e112444, 2014.
- [13] A. Uccelli and D. J. Prockop, "Why should mesenchymal stem cells (MSCs) cure autoimmune diseases?," *Current Opinion in Immunology*, vol. 22, no. 6, pp. 768–774, 2010.



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