OsteoBiol® by Tecnoss

Characterization of dental pulp stem cells response to bone substitutes biomaterials in dentistry

LABORATORY TESTS

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ABSTRACT

When it is necessary to regenerate the lost bone volume, the use of bone substitute biomaterials (BSBs) represents a promising alternative to bone autografts. Among the different kind of BSBs, xenogeneic bone substitute biomaterials, especially those with porcine and bovine origins, seem to be a valid alternative thanks to their biocompatibility, osteoconduction, slow resorption rates, and the ability to define and maintain volume for bone gain. As neural crest-derived stem cells isolated from human dental pulp (hDPSCs) represent a suitable stem cell source to study the biological effects of BSBs on osteoprogenitor cells involved in the physiological bone regenerative processes, in this study the Authors aimed to deeply investigate how three different BSBs affect the stem cell properties, osteogenic differentiation, and inflammatory properties of hDPSCs. The investigated BSBs were OsteoBiol® *GTO*®, OsteoBiol® *Gen-Os*®, and OsteoBiol® *Apatos*® (all by Tecnoss®, Giaveno, Italy). For the purpose of the study, Human DPSCs were cultured in presence of the three above mentioned BSBs. Human DPSCs cultured alone were used as control.
The results of the performed analysis, evaluating cell morphology, adhesion, and proliferation of hDPSCs, confirm the biocompatibility of BSBs. These biomaterials did not alter cell proliferation and stemness markers expression, nor induced any inflammatory responses. Bone metabolism data showed that hDPSCs exposed to the three BSBs distinctively secrete the factors supporting osteoblast activity and osteoclast activity. It was noted that intracellular levels of OPN increase in hDPSCs when cultured with OsteoBiol® *GTO*® and OsteoBiol® *Gen-Os*®. This increase might influence the inflammatory microenvironment, as well as contribute to the osteogenic commitment. On the other hand, OsteoBiol® *Apatos*® decreases the ALP activity, suggesting its marginal role in osteogenesis.

CONCLUSIONS

In discussing the results of the analysis, the Authors concluded that "*OsteoBiol® GTO® and OsteoBiol® Gen-Os® biomaterials exert mechanical functions and a osteogenic-promoting effect, and their clinical use in dentistry can be applied according to their commercial formulation. On the other hand, OsteoBiol® Apatos® does not exert pro-osteogenic properties and might be more appropriate as a bone void filler for critical size defects, since it exerts only a mechanical function*".

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BONE SUBSTITUTES
OsteoBiol® *GTO*®
OsteoBiol® *Gen-Os*®
OsteoBiol® *Apatos*®

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