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Dental pulp stem cells: senescence mechanisms and regenerative perspectives

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The aging of population is a worldwide phenomenon that brings a new set of challenges in the field of regenerative medicine. In the development of strategies able to face these needs, it is important to gain information on possible changes that could affect cell behaviour during aging. For dental and maxillofacial reconstruction, human Dental Pulp Stem Cells (hDPSCs) are an attractive option as they have a great self-expansion and differentiation capabilities [1]. Pulp tissue undergoes to age-related modifications [2] such as volume reduction, decrease of vascularization, innervation and cell availability, therefore it could be of interest investigate these changes at the cellular level to offer valid in vitro tools to investigate regenerative strategies. Aim of the present study has been the in vitro investigation of age-related changes in hDPSCs morphology, multipotency and differentiation ability in view of their possible use in regenerative approaches for elderly. Cells were isolated from patients undergoing third molar extraction and divided into three age groups. Cell morphology and senescence features as well as proliferation capability, gene/protein expression profile, odontogenic and neurogenic potential were assessed. hDPSCs isolated from the young donors demonstrated increased proliferation and stemness properties compared with old cells. The latter displayed typical sign of aging, such as the expression of Senescence Associated-β-Galactosidase (SA β-Gal) and p16ink4a. Our observation indicated that hDPSCs of young group were more prone to differentiate into osteogenic, odontogenic and neurogenic lineages in comparison to cells from the aged group. In conclusion our results pointed out age dependent modifications in hDPSCs. Our results could also be considered a valid in vitro tool for the study and/or development of regenerative strategies solving the challenges of an aging population.

References

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Key words

Dental Pulp Stem Cells, Aging, Regenerative Medicine.

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