

25th Euro Dentistry Congress

September 20-21, 2017 Dublin, Ireland

Dental neural crest-derived progenitor cells as a better source for jawbone repair

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The gold standard for cellular therapy in regenerative medicine is mesenchymal stem cells. However, for jawbone repair it would be beneficial to use stem cells pre-committed towards the osteogenic lineage. We have shown recently that adult stem cells derived from dental follicles are pre-committed towards the osteogenic lineage. However, the availability of these cells derived from wisdom teeth is restricted to the youth of the donors. Therefore, we investigated another cell type, dental neural crest-derived progenitor cells (dNC-PC), which might have a similar differentiation potential and can be found in adult teeth. Dental neural crest-derived progenitor cells from the apical pad which can be found beneath the papilla of maxillary third teeth were isolated and characterized for mesenchymal markers. Similar to dental follicle cells, dNC-PCs are pre-committed towards the osteogenic lineage since they are no longer able to differentiate towards adipocytes, endothelial cells and smooth muscle cells. In addition the dNC-PCs differentiate towards osteoblasts within two weeks which is faster and might even be stronger than the other mentioned cell types. All three tested cell types show the same pattern for mesenchymal stem cell marker, although they are of different embryonic origin: both, dNC-PCs and DFCs, are derived from the brachial arc whereas MSC are derived from somites during embryogenesis. Since dNC-PCs showed the strongest and fastest osteogenic differentiation of the tested cell types, they might be a suitable alternative for dental follicle cells in jawbone repair.

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