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Dermal fibroblasts: An alternative source for bone regeneration

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The research on cell-based strategies for bone regenerative applications is aimed at providing osteoprogenitors, which should be readily available and able to form a functional bone matrix in vivo. Bone marrow-derived mesenchymal stromal cells are mostly used for this purpose, though the small number of cells isolated and the risk of donor site morbidity limit their use. Osteogenic progenitor cells derived from dermal tissue may provide a more abundant and easily expandable source of cells. The aim of this study was to assess the spontaneous osteogenic potential of dermal fibroblasts, through the comparative analysis of cell behaviour and matrix production of dermal fibroblasts (SDF) and MSCs. SDF were isolated in primary culture from skin biopsies and cultured both in growth medium (GM) and in osteogenic medium (OM) for 10 days after reaching confluence. The expression of osteo-specific genes (RUNX2, OC, OSX, BMP2, OPN) was analyzed through qPCR, and matrix deposition was assessed by Alizarin Red staining. The results revealed that osteogenesis was efficiently induced by OM in MSC, increasing the expression of osteo-specific genes and enhancing mineralised matrix deposition. Conversely, the osteogenic potential of SDF grown in GM was greater than that induced by OM, as revealed by athe significantly higher expression of osteo-specific genes. Moreover, after 10 days of culture, SDF aggregated in spheroid structures that were analyzed morphologically and confirmed the presence of a mineralized matrix. These data suggested that undifferentiated SDF are spontaneously prone to commit towards an osteogenic lineage and could be thus suitable for the development of cell-based treatment for bone regeneration.

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