

Collagen type I promotes osteogenic differentiation of amniotic membrane-derived mesenchymal stromal cells in basal and induction media

ABSTRACT

Collagen has been widely shown to promote osteogenesis of bone marrow mesenchymal stromal cells (BM-MSCs). Due to the invasive procedure of obtaining BM-MSCs, MSCs from other tissues have emerged as a promising alternative for regenerative therapy. MSCs originated from different sources, exhibiting different differentiation potentials. Therefore, the applicability of collagen type I (COL), combining with amniotic membrane (AM)-MSCs was examined through proliferation and differentiation assays together with the expression of surface markers and genes associated with stemness and differentiation under basal or induction conditions. No increase in cell growth was observed because AM-MSCs might be directed toward spontaneous osteogenesis. This was evidenced by the calcium deposition and elevated expression of osteogenic genes when AM-MSCs were cultured in collagen plate with basal media. Under the osteogenic condition, reciprocal expression of OCN and CEBPA suggested a shift toward adipogenesis. Surprisingly, adipogenic genes were not elevated upon adipogenic induction, although oil droplets deposition was observed. In conclusion, our findings demonstrated that collagen causes spontaneous osteogenesis in AM-MSCs. However, the presence of exogenous inductors could shift the direction of adipo-osteogenic gene regulatory network modulated by collagen. © 2020 The Author(s). This is an open access article published by Portland Press Limited on behalf of the Biochemical Society and distributed under the Creative Commons Attribution License 4.0 (CC BY).