

Differentiation of the human mesenchymal stem cells derived from bone marrow and enhancement of cell attachment by fibronectin.

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Abstract

The ability of human mesenchymal stem cells (hMSC) to differentiate into osteoblasts was examined through the use of osteogenic induction medium (MSCOIM) cultures. hMSC first attached to the dish surface and exhibited fibroblast-like spindle shapes, and after proliferation, formed cuboidal shapes. Calcium assays and the use of von Kossa and alizarin red S staining showed that hMSC were capable of mineralization when cultured in MSOIM. Gene expressions of Cbfa-1 and BMP-4, which are markers for osteogenic differentiation, were also increased during the hMSC differentiation into osteoblasts. When compared to albumin (Alb)-coated dishes, microscopic observation documented enhanced cell attachment and spreading when hMSC were cultured on fibronectin (FN)-coated dishes. Adherent cell numbers also exhibited a greater increase on the FN-coated dishes during earlier culture stages than that seen for the Alb-coated dishes. These findings suggest that hMSC have the capability to differentiate into osteoblasts and that FN can stimulate the attachment and spreading of the hMSC.