

Rapid growth and osteogenic differentiation of mesenchymal stem cells isolated from human bone marrow

ABSTRACT

Mesenchymal stem cells (MSCs) are involved in bone formation in the embryo, bone repair and remodeling. The differentiation of these cells is a complex multistep pathway that involves discrete cellular transitions and is similar to that which occurs during hematopoiesis. MSCs have self-renewal capacity without differentiation in long-term culture. In the present study, MSCs were isolated from human bone marrow and characterized by the presence of cluster of differentiation 105 marker using the labeled streptavidin biotin method. The MSCs were cultured in Dulbecco's modified Eagle's medium supplemented with fetal bovine serum, ascorbic acid, β -glycerol phosphate and dexamethasone to differentiate into osteoblasts. Biological *in vitro* analysis showed the rapid proliferation of the MSCs. Further evaluation of specific osteogenic markers using von Kossa staining and the alkaline phosphate assay demonstrated that the MSCs were stimulated to differentiate into osteoblast-lineage cells. This mesengenic potential indicated that the bone marrow-derived cells were multipotent MSCs. The findings of this study show that bone marrow can be a legitimate source of MSCs for the production of osteoblasts for utilization in bone replacement therapy.

Keyword: Bone marrow; Cell differentiation; Mesenchymal stem cell; Osteoblast