

Involvement of Platelets in Stimulating Osteogenic Activity

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Summary: Osteoblast-like cells have been shown to be sensitive to the proliferative action of a wide variety of growth factors. Many of these growth factors have been isolated from platelets and are thought to be released at local sites in response to injury. In this study, we tested whether human platelet concentrate, as a supplement to basic medium, would support the proliferative and functional activity of human fetal osteoblast-like cells in both short-term and long-term culture. In short-term studies, uptake of [^3H]thymidine was increased in platelet-treated cultures by more than 4-fold compared with 10% serum-supplemented controls. When cultured for prolonged periods on coverslips, the cells formed multilayers, with a collagen-based matrix separating the layers. Long-term cultures that were treated with 1.5% (vol/vol) platelets in serum-supplemented medium showed increases in the depth of the multilayers of as much as 36-fold at 30 days after confluence, compared with the 10% serum-supplemented controls; this difference persisted until day 50. Incorporation of growth factor in the matrix was examined with the use of colloidal gold immunoelectron microscopy. Immunogold labeling intensities for transforming growth factor- β 1 were significantly lower in the platelet-treated cultures at 20 days and then increased to a maximum level of 2.1-fold more than in the controls at 40 days. Labeling intensities for insulin-like growth factor-I and basic fibroblast growth factor were significantly lower in the platelet-treated cultures than in the controls at all stages of culture. These results indicate that platelet-supplemented medium stimulates proliferation and maintains the differentiated function of human osteoblast-like cells. Platelets may play an important role in early healing of fractures and also may be useful as a cheap autologous source of multiple growth factors to enhance osteoblast proliferation *in vivo* and *in vitro*.
