

Gravity, an Regulation Factor in BMSCs Differentiation to osteoblasts

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Abstract: PURPOSE: Most studies of regulatory mechanisms of adult stem cell differentiation are concentrated in chemical factors, but few efforts are put into physical factors. Recent space life science studies indicate mechanical factors participate in the differentiation of cells. The aim of this study is to investigate the effects of simulated microgravity or hypergravity on the osteogenic differentiation of rat bone marrow mesenchymal stem cells (BMSCs). **METHODOLOGY:** The BMSCs at day 7 were added osteogenic inducer (10nM dexamethasone, 10mM β -glycerophosphate, and 50 μ M asorbic acid-2-phosphate) for 7 days, and cultured under simulated microgravity or hypergravity (2g) for 1 day, 3 days, 5 days or 7 days. **RESULTS:** After treating BMSCs with osteogenic inducer and hypergravity, the cells expressed more ColIA1, Cbfa1 and ALP than in single steogenic inducer treatment. Reversely, the cells treated with osteogenic inducer and simulated microgravity expressed less ColIA1, Cbfa1 and ALP. **CONCLUSIONS:** Our study suggests that hypergravity promotes the osteogenic differentiation of BMSCs, and simulated microgravity inhibits this process. Gravity is an important regulation factor in BMSCs differentiation to osteoblasts.