

GRAVITATIONAL/MECHANICAL FACTORS AFFECT GENE EXPRESSION PROFILE AND PHENOTYPIC SPECIFICATION OF HUMAN MESENCHYMAL STEM CELLS

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ABSTRACT

Stem cell implantation is a promising approach for tissue repair. Unfortunately this possibility is strictly limited because these cells early withdraw from the cell cycle and seem to form passive, rather than active grafts. Therefore, the development of strategies capable of increasing the yield of phenotypic specification would be a primary aim in biomedical research. It is known that both biochemical and physical factors are needed for tissue homeostasis and their combination in a dose- and time-dependent manner is probably the key to *in vitro* and *in vivo* tissue regeneration. In this study, the effects of gravitational factors on human mesenchymal stem cell differentiation were investigated and compared with the ones caused by mechanical stress. The results showed that gene expression profile and phenotypic specification change according with the gravitational/ mechanical stress to which the hMSCs were exposed. Loading by hyperfuge and photomechanical stress by pulsed Nd:YAG laser induced osteoblastogenesis and chondrogenesis while microgravity favoured adipogenesis.

hypergravity conditions. Then, the response of hMSCs to gravitational alterations was compared with the one induced by photomechanical (PM) stress due to the exposure to pulsed Nd:YAG laser.