EFFECT OF ELECTROMAGNETIC STIMULATION ON BONE MATRIX PRODUCTION BY SAOS-2 OSTEOBLASTS SEEDED ONTO A POLYURETHANE POROUS SCAFFOLD

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Abstract: There is increasing interest in designing new biomaterials that could potentially be used in the form of scaffolds as bone substitutes. In this study we used a crosslinked polyurethane in a typical biomaterial-research approach, that is, the surface modification of a bulk biomaterial. Using an electromagnetic bioreactor (magnetic field intensity, 2 mT; frequency, 75 Hz), we investigated the effect of the electromagnetic stimulation on SAOS-2 human osteoblast proliferation and calcified matrix production. In comparison with the static conditions without electromagnetic wave stimulation, we observed double cell proliferation, higher surface coating with decorin, osteocalcin, osteopontin, and type-I collagen (1.3-fold, 12.2-fold, 12.1-fold, and 10.0-fold, respectively), and 5-fold increased calcium deposition. Immunolocalization of the extracellular matrix constituents showed their colocalization in the cell-rich areas. The design of the bioreactor and the design of the polyurethane foam aimed at obtaining cell colonization and calcified matrix coating. This cultured biomaterial could be used, in clinical applications, as an osteoinductive implant for bone repair.

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