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Cellular Responses of Human Gingival Fibroblast to Bone Grafting Materials

Key Words

Human gingival fibroblasts
MTT assay
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ABSTRACT

Many natural and artificial bone grafting materials have been developed since bone transplantation treatments began to be used clinically. Evaluation of tissue responses to these materials becomes important when transplantation surgery must be considered. Therefore, the properties of bone grafting materials should be evaluated in advance. Four grafting materials, hydroxyapatite (HA), beta-tricalcium phosphate (β -TCP), demineralized freeze-dried bone allograft (DFDBA), and non-ceramic hydroxyapatite (NCHA) were evaluated for cytotoxicity using a MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide) assay. The 4 materials were also cultured with human gingival fibroblasts. On the 1st, 3rd, and 7th days, these specimens were observed using phase-contrast microscopy, and scanning electron microscopy. Fibroblasts were cultured alone as the control. No or low cytotoxicity of the bone grafting materials in the MTT assay was noted, but there were differences among the materials. As to morphological observations, cell aggregation was found on the 1st and 3rd days in the β -TCP, NCHA, and DFDBA groups, but not in the HA group. In particular, cell aggregated and adhered to the graft particles at the 1st day in the β -TCP group. In addition, a phagocytosis effect was noted in the β -TCP group. In conclusion, the 4 bone grafting materials demonstrated no toxicity to human gingival fibroblasts. Earlier aggregation and adhesion to fibroblasts were enhanced by β -TCP particles.

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Since 1921, when the concept of bone grafting was proposed, the development and application of bone grafting materials in the orthopedic and dental

fields have undergone rapid progress.¹ Bone grafting materials may be grouped into 2 categories: natural and artificial materials. Natural bone grafting materi-

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