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Osteoconductivity and Mineralization of Different Commercial Bone Substitute Materials and Newly Hybrid Bone Substitute Material Between Xenograft and Alloplastic Material: An *In-vitro* Comparative Study on the Human Osteoblast Cell Line

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Abstract

Objectives: To investigate the effect of different bone graft substitutes on osteoconduction and mineralization in bone cells derived from the osteoblast cell line hFOB 1.19.

Methods: Osteoblast cells were cultured and placed on different bone graft materials, including Bio-Oss (xenograft), M bone (alloplast), Osteon II (alloplast), HXT1, and HXT2 (hybrid between xenograft and TCP). The concentration of elements in bone grafts was analyzed by X-ray fluorescence (XRF). The vitality test was evaluated by the methyl thiazolyl tetrazolium assay (MTT) after 1, 3, and 7 days. Alkaline phosphatase (ALP) activity was measured at 3, 7, and 14 days. Alizarin red S staining assay was performed at 7, 14, 21, and 28 days. The data were analyzed using ANOVA along with Tukey's honestly significant difference test.

Results: The cell viability rate was significantly higher in Osteon II and HXT2 compared to the other materials ($p<0.001$). On day 14, Osteon II and the HXT2 group had higher levels of ALP activity than the Bio-Oss group ($p<0.05$). Alizarin red assay showed that Osteon II had the highest mineralization ($p<0.001$) at days 14, 21, and 28, followed by HXT2 and Bio-Oss respectively.

Conclusions: Osteon II, an alloplastic bone graft, and HXT2, a newly developed hybrid between xenograft and TCP, exhibited high viability rates and expression levels in mineralized tissue cells of the osteoblast cell line hFOB 1.19 *in vitro*.

Keywords: bone graft, bone tissue engineering, hybrid bone graft, osteoblast cells, xenograft