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Effect of Bioactive Glass Addition to the TTCP/DCPA Based Injectable Bone Substitute for Improved Biocompatibility

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In this work, the effect of the addition of bioactive glass in the biocompatibility and mechanical behavior of conventional TTCP/DCPA based bone cement were investigated. The cement was initially modified with chitosan and HPMC which cross-linked with citric acid to improved mechanical properties.The injectable bone substitutes were further modified by adding varying amounts of bioactive glass (0%, 10%, 20% and 30%) and its effects on the biocompatibility of the material were studied. Afterbio-glass powders were mixed with the optimized composition for HPMC and citric acid content,the IBS was incubated at 37°C at different time intervals and showed progressive formation of HAp with increasing time. Mechanical properties like Vickers hardness and compressive strength were found to increase with the increasing amount of bioactive glass addition and that setting time was shortened. The fabricated IBS morphologies were further characterized using SEM. MTT assay was performed to check the cell cytotoxicity and cell proliferation for 1, 3 and 5 days. Cell morphology, adhesion and proliferation behavior of cell in the IBS by culturing MG-63 cells on the IBS for 20, 60 and 90 mins and 1, 3 and 5 days was also investigated. All the results showed increasing biocompatibility as the bioglass content increased. MTT results found the materials to be cytocompatible and SEM images showed that cells attached and proliferated successfully.

Keywords: Injectable bone substitute, Bio-glass, Biocompatibility

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Anticancer Loaded Multi-wall Carbon Nanotube for Targeting Tumors

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Flat form technology for constructing anticancer loaded multi-walled carbon nanotubes (mwCNTs) was introduced in this study. Conventional anticancer drugs, such as MTX (Methotrexate), cisplatin, DOX (Doxorubicin hydrochloride), DAU (Daunorubicin) and EPI (epirubicin) were bio-conjugated with folic acid (FA) for selective targeting tumor cells. Loading efficiencies of the used anticancer drugs on mwCNTs have shown different order of bindings depending on the molecular bind affinity of NH (amine) formation on mwCNTs. MTT assays have shown increased selective target efficiency of FA conjugated mwCNTs on breast cancer cell growth inhibition. All results collectively indicated promising application of mwCNTs as a smart inorganic nanomaterial for selective targeting drug delivery vehicle at tumor tissues.

Keywords: Anticancer Drugs, Carbon Nanotubes, Bio-Conjugation, Tumor, Selectivity