

***In vivo* response of novel calcium phosphate-mullite composites: results upto 12 weeks of implantation**

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Abstract

In this paper, the *in vivo* response, in particular, the histocompatibility of newly developed CaP-mullite composites is reported. In the present experiments, the bioceramic implants were inserted in the long bones of healthy rabbits according to standard protocols (ISO-10993) and the tissue response was studied at different time intervals of upto 12 weeks. Ultrahigh molecular weight polyethylene (UHMWPE) was used as control samples. The post implant bone-material interfaces were analyzed by staining of histological sections, following bone tissue histopathology protocols. The interface zones were critically observed by fluorescent optical microscopy, scanning electron microscopy (SEM) and atomic force microscopy (AFM). Importantly, no inflammation, necrosis was observed during this tenure. New bone formation was observed at all the implantation time intervals (1-12 weeks). However, the bone integrity with the material was increased after twelve weeks of implantation. Although macrophages and fibrous tissue were present during the first week of implantation, they were not observed on histology sections after 12 weeks post implantation. More importantly, foci of chondrocytes could be observed after 12 weeks of implantation. Remodeling of haversian canal was observed at the interfacial area of natural bone and implant material. All the observations were assessed critically to analyze the *in vivo* biocompatibility of this novel composite material.

Keywords: Hydroxyapatite, composites, *in vivo*, implantation, histopathology

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