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Osteoporosis treatment of hybrid biomaterial chitosan- bioactive glass graft: Effects on bone remodeling

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Abstract

Chitosan biopolymer offer good possibilities in the field of osteoporosis treatment after its association with bioactive glass. However, the quality of new bone after implantation is yet to be extensively investigated. This study characterized the newly formed bone tissue of chotosan-doped bioactive glass (BG-CH) implants. In this work, BG-CH was implanted in the femoral condyl of ovariectomised rats (OVX). The resected bone was prepared for analysis using several physico-chemical, biological and histological assays such as Fourier Transform Infrared Spectroscopy (FT-IR), X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Energy-Dispersive X-ray (EDX) and Histomorphometry. BG-CH biomaterial favored calcium phosphate layer integration on the surface of the glass and offered better bioactivity. Moreover, the histomorphometric analysis demonstrated that BV/TV and N.Ob were significantly higher in BG-CH treated rats groups than those of pure bioactive glass (BG) groups. However, Ob. S/BS and OV/BV were significantly lower in BG-CH treated rats groups than those of BG groups. The Oc.S/ BS was significantly decreased in BG-CH groups, when compared with that of BG rat groups. These findings suggest that BG-CH can be used as an inhibitory therapeutic potential of osteoporosis by delivering chitosan to stimulate new bone remodeling.

Biography

Hassane Oudadesse graduated from the University Blaise Pascal of Clermont-Ferrand, France. He obtained his PhD in 1989. His works concern the use of physicochemical methods for development in biomedical field. He worked as associate Professor and obtained his HDR (Habilitation à Diriger des Recherches) in 1998. Since 2001, he works in the University of Rennes 1 as Full Professor in the “Sciences Chimiques de Rennes”, UMR CNRS 6226. His works concern the conception, synthesis and physicochemical studies of new biomaterials for applications in orthopaedic surgery. Biocompatibility, kinetic of bioactivity, kinetic of bio consolidation in the interface bone - implants, cells enhancement and other properties of biomaterials present the research filed of Professor Hassane Oudadesse. He is author of more than 100 papers published in international journals and about 60 international conferences. Professor Hassane Oudadesse is a Head of the research unit on Biomaterials since 2001, Vice President of University of Rennes 1 (2008-2012), human resources, Director of Master 2 Solid State Chemistry and Materials since 2006. He was the President of the Chemical Department from 2002 to 2004 and the President of the specialists commission CNU 33 (Materials Chemistry) from 2003 to 2008.