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Zinc-doped bioactive glass behavior evaluated after irradiation and *in vivo* assays: Antioxidative/ oxidative effects

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Oxidative stress is considered as the most common factor that generates body's pathologies such as osteoporosis. Zinc intervenes in more than 100 enzymes and enhances the quality of the bone formation. This work is focused on the study of the antioxidative effect of zinc-doped bioactive glass (noted Zn-BG) used as bone graft. Bioactive glasses and zinc were synthesized by using melting process. This biomaterial was sterilized by γ-irradiation from ^{60}Co source gamma rays at a dose of 25 Gy, and then implanted in the femoral condoyle of rats. After 3à days, all rats were subdivided in two groups: in the first group, animals received 1 Gy and in the second groups they received 2 Gy. Gamma rays increases thiobarbituric acid reactive substance (TBARS) and decreases Superoxide Dismutase (SOD), Catalase (CAT) and Glutathione Peroxidase (GPx). It decreases biochemical and hematological parameters. While in Zn-BG groups' alkaline phosphatase, (CAT), (SOD) and (GPx) increased and (TBARS) decreased. This explained the antioxidant roles of Zn. The respected bone was prepared for analysis using several physico-chemical techniques such as infrared spectroscopy (FT-IR), scanning electron microscopy (SEM) and inductively coupled plasma ICP-OES. SEM and FT-IR spectra showed the good bone bonding of bioactive glass and good osteointegration with bone formation in biomaterials pores of biocomposite Zn-BG. However, ICP-OES analyses showed that the most content of calcium and Ca/P rapport is detected in group irradiated with 1 Gy and implanted with Zn-BG. All those make Zn-BG as a therapeutic biomaterial protecting against oxidative stress and effective candidate for applications in tissue engineering.

Biography

H Oudadesse graduated from the University Blaise Pascal of Clermont-Ferrand, France. He obtained his PhD (1989) and 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, physicochemical and biological studies of new biomaterials for applications in orthopaedic surgery. He is author of more than 112 papers and 61 international conferences. He is the Head of the Biomaterials team, Vice President of University of Rennes 1 (2008-2012) and Director of Master 2 Solid State Chemistry and Materials.

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