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STUDY ON THE BIODEGRADABILITY OF FeMnSi ALLOY

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Abstract

A biodegradable iron based alloy was obtained through classical melting method using a furnace with controlled atmosphere. The metallic material was obtained from high purity materials using a proper obtaining method. The material is proposed as an alternative to magnesium alloys that have a very fast degradation period for applications with longer healing periods (more than 3 and between 12 to 18 months). The material was analyzed using scanning electron microscopy (SEM) and X-ray dispersive energy analyze EDAX, before and after implantation to observe the influence of the human medium on the metallic implant. Both implantation areas (subcutaneous and in bone) indicate reactions with the biological environment as compounds form on the surface or with loss of metallic material. Bio-chemistry of Ca, P and Mg of the implanted subjects was realized for subcutaneous and in bone implantation comparing with the results of a Zr implant behavior. In vivo experiment on Wistar rats highlight a very good bio-compatibility of the subcutaneous implant by the absence of any kind of local reaction or toxic systemic fact, which is explained by slow degradation of FeMnSi alloy and the metabolism of resulted products in conditions of maintaining organism homeostasis.

Key words: biodegradable implant, EDAX, FeMnSi, SEM

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