FORSTERITE AS AN ALTERNATIVE FOR ORTHOPAEDIC IMPLANTS – SHORT REVIEW

Alexandra AVRAM[1], Aurora MOCANU[1], Gheorghe TOMOAIA[2,3], Maria TOMOAIA-COTISEL[1,3*]

Abstract. *The research to find an ideal bone substitute material is still ongoing. The majority of research is focused on calcium phosphates and predominantly on hydroxyapatite. However, forsterite, a magnesium silicate (FS, Mg_2SiO_4), has recently received a large attention in regards to biomedical applications due to its high bioactivity. Its superior mechanical properties also recommend it for load-bearing applications. This work focusses on the significance of the properties of FS as a promising candidate for bone substitutions.*

Keywords: forsterite, bioactivity, ceramic scaffolds, hydroxyapatite formation, antibacterial activity

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1. Introduction. Human bone and implants

A dynamic tissue, bone is different from the rest of human tissues on account of its hardness. It is composed of a limited number of cells in a fibrous collagen matrix that becomes the adhesion surface for hydroxyapatite as well as other inorganic compounds (magnesium hydroxide, fluorides, and sulphates). Although bone cells (osteocytes, osteoblasts, osteoclasts, osteogenic cells) are small in number, they are quite significant for bone function. Osteoclast cells resorb the old bone lining the medullary cavity, while osteoblasts, by intramembranous ossification, produce young bone tissue under the periosteum. The bone goes through a remodeling process, in which the absorption of damaged or old tissue takes place at the same interface where osteoblasts produce new bone to replace the resorbed one. With excessive resorption, the incapability to produce an optimal osseous matter, or an inadequate response to the increased resorption during the bone remodeling process, the skeleton gains the fragility trait of osteoporosis [1].

To aid in healing the bone, or at least support it, several types of materials have been used along the years, such as metals, either pure or in alloy form,

[1]*Babes-Bolyai University of Cluj-Napoca, Faculty of Chemistry and Chemical Engineering, Research Centre of Physical Chemistry, 11 Arany Janos Str., RO-400028, Cluj-Napoca, Romania*
[2]*Department of Orthopedics and Traumatology, Iuliu Hatieganu University of Medicine and Pharmacy, 47 General Traian Mosoiu Street, RO-400132 Cluj-Napoca, Romania*
[3]*Academy of Romanian Scientists, 3 Ilfov Street, RO-050044, Bucharest, Romania*
[*] *Corresponding author: Maria Tomoaia-Cotisel, mcotisel@gmail.com*