Academy of Romanian Scientists *Volume 11, No. 1, 2022, pp. 167-190*
Annals Series on Biological Sciences Online ISSN 2285 – 4177
 REVIEW

Review on the Biocompatibility and Bioactivity of Forsterite: *In Vitro* and *In Vivo* Studies

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Abstract. *There is an increasing demand for new materials in orthopedics, biomaterials that can stimulate osseointegration and vascularization, either repairing damaged tissue or producing new one. Currently, the forsterite (FS, Mg_2SiO_4) is actively researched in regards to bone tissue engineering due to its biocompatibility and high bioactivity. The present review focuses on summarizing the research regarding the in vitro (from apatite formation in simulated body fluid, SBF, to cells) and in vivo studies on forsterite.*

Keywords: forsterite, orthopedic implants, in vitro effect, in vivo action

DOI **https://doi.org/10.56082/annalsarscibio.2022.1.167**

1. Introduction. The ideal orthopedic implant

Bone defects can follow a variety of conditions such as infections, physical trauma, neoplastic or congenital processes. All issues regarding bone health have led to an increasing need to find the ideal orthopedic implant, namely a biocompatible one with a high bioactivity and good mechanical properties. It should be able to offer proper support regardless of load or mechanical stressors, in the meantime being able to help bone completely regenerate whilst also preventing any infections related to orthopedic surgery as well as any other potential problems. Not unexpectedly, research concerning this perfect material is still ongoing.

However, a rapid progression can be seen within this field of research. Figure 1 presents a schematic classification of biomaterials. The first generation of biomaterials started as being inert due to the fact that the human body is a highly corrosive medium. Also, they had to be able to withstand all stressors, fatigue and high wear level that come with day to day use. However they were not developed specifically for medical use, and instead were already available industrial materials [1]. Hence, they did not interact with the host tissues and this poor integration led to possible implant rejection. Also, no matter how inert the material, it was still a foreign body being able to be recognized as such by the host, thus triggering an inflammatory response [2].

The need for a better integration of the implant gave rise to bioactive, biodegradable materials. These bioactive materials interact with bone tissue leading to a better osseointegration and thus preventing implant failure.