

Numerical Simulation of Bio-Chemical Diffusion in Bone Scaffolds

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Abstract : Previously, some materials like solid metals and their alloys have been used as implants in human's body. In order to amend fixation of these artificial hard human tissues, some porous structures have been introduced. In this way, tissues in vicinity of the porous structure can be attached more easily to the inserted implant. In particular, the porous bone scaffolds are useful since they can deliver important biomolecules like growth factors and proteins. This study focuses on the properties of the degradable porous hard tissues using a three-dimensional numerical Finite Element Method (FEM). The most important studied properties of these structures are diffusivity flux and concentration of different species like glucose, oxygen, and lactate. The process of cells migration into the scaffold is considered as a diffusion process, and related parameters are studied for different values of production/consumption rates.

Keywords : bone scaffolds, diffusivity, numerical simulation, tissue engineering

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