Numerical Modelling of Effective Diffusivity in Bone Tissue Engineering

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Abstract : The field of tissue engineering is an active area of research. Bone tissue engineering helps to resolve the clinical problems of critical size and non-healing defects by the creation of man-made bone tissue. We will design and validate an efficient numerical model, which will simulate the effective diffusivity in bone tissue engineering. Our numerical model will be based on the finite element analysis of the diffusion-reaction equations. It will have the ability to optimize the diffusivity, even at multi-scale, with the variation of time. It will also have a special feature, with which we will not only be able to predict the oxygen, glucose and cell density dynamics, more accurately, but will also sort the issues arising due to anisotropy. We will fix these problems with the help of modifying the governing equations, by selecting appropriate spatio-temporal finite element schemes, by adaptive grid refinement strategy and by transient analysis.

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