IX International Conference on Computational Bioengineering
ICCB 2022
P. R. Fernandes and J. Folgado (Editors)

Abstract ID 78

NUMERICAL SIMULATIONS OF STANDARD MECHANICAL TESTS FOR THE DEVELOPMENT AND OPTIMIZATION OF FULLY BIORESORBABLE STENTS

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Keywords: In vitro mechanical test, vascular scaffold, bioresorbable PLLA stent, design and optimization, finite element analysis

Summary: Standard mechanical tests are required according to ISO standards for stents produced for the purpose of deployment within coronary arteries. The development of a stent design that successfully passes all experimental tests is a time-consuming, difficult and expensive process, which consists of several stages and requires many cycles of mechanical testing and redesigning of the basic model. On the other hand, in-silico mechanical tests could reduce the cost and the number of necessary real mechanical tests. In this paper we use a recently introduced material model of poly-L-lactic acid (PLLA) fully bioresorbable vascular scaffold and recently empowered numerical InSilc platform, in order to perform in-silico mechanicals tests of different stent designs with different material and geometrical characteristics. In this work we compare and analyze the impact of strut thickness on mechanical characteristics of AB-BVS scaffold, as well as the impact of additional pocket holes (slots) in stent geometry on mechanical characteristics of Renuvia-PLLA stent. The numerical results and corresponding analysis are provided for each of the stent designs, and for four different tests: radial compression, inflation, three-point pending, two-plates crush resistance, local compression, kinking and flex.