Peter Timashev, J Tissue Sci Eng 2017, 8:3 (Suppl)
DOI: 10.4172/2157-7552-C1-036

Laser structuring technologies for tissue engineering

Peter Timashev
I.M. Sechenov First Moscow State Medical University, Russia

Statement of the Problem: To date, numerous achievements in personalized medicine, i.e., medicine based on an individual approach to each clinical case have significantly increased possibilities in reconstructive and replacement surgery. Personalization of treatment is crucial to raise the efficacy of tissue restoration and to reduce the risk of side effects. One of the strategies in reconstructive therapy is based on tissue engineering methods, which allow the restoration of tissue integrity and functions and use porous biodegradable matrices. These matrices become a substrate for progenitor cell adhesion and stimulate reparative processes within recipient's tissues.

Methodology & Theoretical Orientation: Success in the development of cell-laden matrices was achieved in bone tissue regeneration when high-strength and chemically stable 3D matrices were fabricated via two-photon polymerization (2PP) and applied. This technique allows the use of a large material variety for scaffold fabrication with the possibility of controlling accurately their microarchitecture and surface roughness to increase matrix functionality. Moreover, the use of 2PP in combination with other microfabrication methods can significantly increase the reproduction rate of tailor-made scaffolds and make the application of even more different materials possible. The 2PP structure functionalization permits us to deposit and to control the release of biologically active compounds and drugs.

Conclusion & Significance: Thus, the 2PP technique enables the personalized fabrication of tailor-made cell-laden matrices, which reproduce native tissue architectonics and the translation of its use into clinical practice.

Biography

Peter Timashev has worked on the development of novel biodegradable polymers and hybrid and ceramic biocompatible materials for laser additive technologies. His studies, which discuss the 2PP formation of 3D scaffolds inducing the osteogenic differentiation of stem cells, their mechanical and surface features and in vivo fluorescent imaging of their degradation rates, underlie the development of laser-induced structure formation for bone tissue engineering.

timashev.peter@gmail.com

Notes: