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Biofabrication in tissue engineering: Current and future trends

In the 80's, tissue engineering and regenerative medicine (TE&RM) emerged as scientific fields with a huge potential due to the complexity of human tissues. It does not matter if the aim is to regenerate bone, skin, cartilage, or other types of tissue; bridging the anatomy with its physiology is a paramount challenge to be solved. Several efforts have been made, by several research groups spread worldwide, to develop constructs that could mimic native tissues. However, the achievement of 3D complex organ structures has been intangible. Due to its nature TE&RM gathers scientists, engineers and physicians in multidisciplinary teams using a variety of methods to construct biological substitutes. One of the common procedures in tissue engineering is to construct three-dimensional (3D) porous scaffolds, which are posteriorly seeded and cultured with cells. Thus, understanding the current approaches to fabricate 3D scaffolds is crucial, as they must provide the proper structure for promoting homogenous cell spreading, cell differentiation, and host tissue ingrowth upon implantation. Its' pore architecture, mechanical and biological properties should confine in a tailored construct that enables tissue development. Furthermore, years ago researchers were focused on engineering scaffolds without provoking a negative host response while nowadays more importance is being given to the integration of the biomaterial with the surrounding tissue. At the present talk, current and future strategies used in biofabrication will be discussed. The statement of the advantages and drawbacks of the available methodologies will be highlighted using cartilage regeneration as an example. Finally, strategies to overcome the mentioned drawbacks will be presented.

Biography

Pedro G Morouço is the Head of R&D Biofabrication Group at the Centre for Rapid and Sustainable Product Development – Polytechnic Institute of Leiria, Portugal, with a PhD specialized in Biomechanics. His research activity focuses, mostly, on products and processes engineering, aiming to bringing the gap between the lab and *in vivo* applications. He is the Principal Investigator of the Project “2bio4cartilage – Integrated intervention program for prevention and treatment of cartilage lesions” and member of the research team in various national and international projects. He has co-edited 3 books, authored and co-authored more than 100 papers published in book-chapters, international journals and international conferences. He is Editorial Board Member in several (n=9) international peer-review journals and was distinguished with the New Investigator Award 2014 and Hans Gros Emerging Researcher Award from ISBS. He is the Chairman of the CDRsp advanced courses on regenerative medicine and member of the scientific committees in various conferences.

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