MAD-Nano16
MADEIRA INTERNATIONAL CONFERENCE
Emerging Trends and Future of Nanomaterials for Human Health
17-20 November 2016 | Madeira Island | PORTUGAL

Nano-tools and Bioinspired Tissue Engineering Approaches for the Regeneration of Different Tissues

Rui L. Reis [1,2]

[1] 3B's Research Group - Biomaterials, Biodegradables and Biomimetics, University of Minho, Headquarters of the European Institute of Excellence on Tissue Engineering and Regenerative Medicine, AvePark, 4806-909 Taipas, Guimarães, Portugal.
[2] ICVS/3B's - PT Government Associate Laboratory, Braga/Guimarães, Portugal
rgreis@dep.uminho.pt

This talk will describe several nano-tools and biomimetic approaches for the regeneration of different tissues. The selection of a proper material to be used as a scaffold or as a hydrogel, in many cases in combination with nanoparticles, to support, hold or encapsulate cells, as well as to control their differentiation, is both a critical and difficult choice. It will ultimately determine the success or failure of any tissue engineering and regenerative medicine (TERM) strategy.

We believe that the use of natural origin polymers is the best option for many different approaches that allow for the regeneration of different tissues. In addition to the selection of appropriate material systems it is of outmost importance the development of processing methodologies that allow for the production of adequate nano delivery systems and scaffolds/matrices.

Furthermore an adequate cell source should be selected. In many cases efficient cell isolation, expansion and differentiation methodologies should be developed and optimized. We have been using different human cell sources namely: mesenchymal stem cells from bone marrow and adipose tissue, cells from amniotic fluids and membranes and cells obtained from umbilical cords.

The potential of each type of cells, to be used to develop novel useful regeneration therapies will be discussed. Their uses and their interactions with different nano systems and natural origin degradable scaffolds and smart hydrogels will be described. Examples of the engineering of different tissues will be presented.