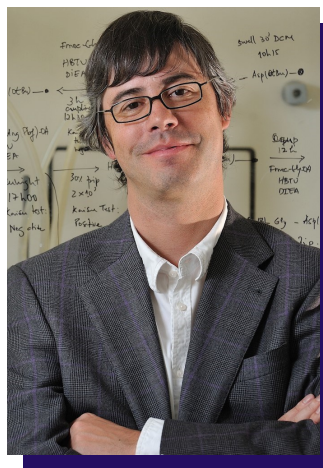


## “New Approaches, Combining Natural Materials and Stem Cells, for the Engineering of Different Types of Tissues”

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Professor Rui L. Reis, PhD, DSc, Hon. Causa MD, FBSE, FTERM, member of NAE, is the Vice-President for Research and Innovation of University of Minho, Portugal, Director of the 3B's Research Group and of the ICVS/3B's Associate Laboratory of UMinho. He is also the CEO of the European Institute of Excellence on Tissue Engineering and Regenerative Medicine, the Global President of the Tissue Engineering and Regenerative Medicine International Society (TERMIS) and the Editor-in-chief of the Journal of Tissue Engineering and Regenerative Medicine (Wiley). He is a recognized World expert, with around 1040 published works listed on ISI Web of Knowledge, being also an inventor of around 60 patents. He has been awarded many important international prizes, many of them for his contributions to the literature, and is the PI of projects with a budget totaling more than 45 million Euros.



### ABSTRACT

The selection of a proper material to be used as a scaffold or as a hydrogel to support, hold or encapsulate cells is both a critical and a difficult choice that will determine the success or failure of any tissue engineering and regenerative medicine (TERM) strategy. We believe that the use of natural origin polymers, including a wide range of marine origin materials, 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 utmost importance the development of processing methodologies that allow for the production of adequate scaffolds/matrices, in many cases incorporating bioactive/differentiation agents in their structures.

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

The development of dynamic ways to culture the cells and of distinct ways to stimulate their differentiation in 3D environments, as well as the use of nano-based systems to induce their differentiation and internalization into cells, is also a key part of some of the strategies that are being developed in our research group.

The potential of each combination materials/cells, to be used to develop novel useful regeneration therapies will be discussed. The use of different cells and their interactions with different natural origin degradable scaffolds and smart hydrogels will be described. Several examples of TERM strategies to regenerate different types of tissues will be presented. This will include the use of original high-throughput methodologies to look at materials/cell interactions.

**Friday, April 6th  
12:00 Noon**

**Presented From: 4142 Engineering Building III (NC State)**

**Videoconferenced to: 321 MacNider Hall (UNC)**

**& East Carolina University (ECU)**