3rd 3B's Symposium on *Biomaterials and Stem Cells in Regenerative Medicine*

3B's Research Group Auditorium– AvePark, Caldas das Taipas, Guimarães, Portugal
Date: 22 May, 2013

Chairmen: João F. Mano and Rui L. Reis
3B's Research Group, University of Minho, Portugal

Program

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Program

9:00-09:10	Welcome	*João F. Mano / Rui L. Reis*
	Stem cells and biological aspects in regenerative medicine (Chair: Rui L. Reis)	
9:10-9:35	Adult stem cells for TERM: sources and manipulation	*Ana Rita Costa-Pinto*
9:35-10:00	Induced pluripotent stem cells	*Ana M. Martins*
10:00-10:25	Vascularization strategies in Regenerative Medicine	*Rogério R. Pirraco*
10:25-11:00	Keynote Lecture: Extracellular matrix-driven tissue regeneration	*Alexandra P. Marques*
	BREAK	
	Biomaterials: from *nano* to *macro* (Chair: Ricardo A. Pires)	
11:20-11:45	Polymeric biomaterials from marine-origin	*Anabela Alves*
11:45-12:10	What is common between pintarolas and cells?	*Iva Pashkuleva*
12:10-12:35	Nanobiomaterials in tissue engineering	*Albino Martins*
	LUNCH BREAK	
14:00-14:25	Shaping biomaterials into porous 3D constructs	*Ana R. Duarte*
14:25-14:50	Shaping biomaterials into spherical objects	*Clara R. Correia*
14:50-15:15	Combinatorial analysis of biomaterials for Tissue Engineering	*Mariana B. Oliveira*
	BREAK	
	Using natural-based biomaterials in case studies of Tissue Engineering (Chair: João F. Mano)	
15:40-16:00	Regeneration strategies in the Central Nervous System	*Susana R. Cerqueira*
16:00-16:20	Skin tissue engineering	*Mariana Cerqueira*
16:20-16:40	Cartilage tissue engineering	*Marta L. Silva*
16:40-17:00	Regeneration of the intervertebral disk	*Joana S. Correia*
17:00-17:20	Strategies for the regeneration of the tendon	*Márcia Rodrigues*
17:20-17:40	Sports & regenerative medicine	*Hélder Pereira*
	Creative thinking (Chair: Nuno M. Neves)	
17:40-18:15	Keynote Lecture: 3C's - Cultura, Ciência e Criatividade em gastronomia	*Renato Cunha*

TISSUE ENGINEERING AS A REMARKABLE TOOL FOR CARTILAGE REPAIR

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Articular cartilage is a very specialized tissue with outstanding load-bearing capacity. It consists mainly of a dense extracellular matrix (ECM) with chondrocytes embedded on it. Cartilage has very low capacity of self-repair and regeneration after traumatic, degenerative or inflammatory injury. Current available surgical treatments for cartilage repair present several drawbacks, such as possible implant rejection or infection, or the need for revision after some years of implantation. Autologous chondrocyte implantation (ACI) is an autologous therapy that was proposed as a basis for tissue engineering strategies to repair cartilage (1). Modifications on various aspects of this surgical technique have been developed, comprising the use of natural-based scaffolds as supports for chondrocyte expansion (2).

Many strategies and systems have been developed along the years for cartilage regeneration and repair. Scaffolds play a major role in those strategies, as they provide the support for cell growth and to promote extracellular matrix production. Both natural based (3) or synthetic scaffolds (4) have been successfully used as supports for chondrogenic differentiation or cartilage-like tissue production.

The interest in cells cross-talk and communication has been growing in the past years, revealing that signalling pathways are pivotal elements when understanding the tissue formation and its repair mechanisms (5). Chondrocytes release morphogenetic signals that influence the surrounding cells, for example, stem cells, to differentiate into the chondrogenic lineage (5). In fact, the increased cartilage formation on co-cultures using stem cells and articular chondrocytes has been reported (6). Therefore, the study of co-cultures using chondrocytes and undifferentiated cells is a very promising strategy to develop engineered cartilage.

References

1. Brittberg M. Articular Cartilage Repair in the Knee Joint with Autologous Chondrocytes and Periosteal Graft. Orthopedics and Traumatology. 2001;3:185 - 94.

2. Welsch GH, Trattnig S, Hughes T, Quirbach S, Olk A, Blanke M, et al. T2 and T2* mapping in patients after matrix-associated autologous chondrocyte transplantation: initial results on clinical use with 3.0-Tesla MRI. Eur Radiol. 2010 Jun;20(6):1515-23.

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5. Hwang NS, Varghese S, Puleo C, Zhang Z, Elisseeff J. Morphogenetic signals from chondrocytes promote chondrogenic and osteogenic differentiation of mesenchymal stem cells. J Cell Physiol. 2007 Aug;212(2):281-4.

6. Meretoja VV, Dahlin RL, Kasper FK, Mikos AG. Enhanced chondrogenesis in co-cultures with articular chondrocytes and mesenchymal stem cells. Biomaterials. 2012 Sep;33(27):6362-9.