

# INFLUENCE OF CONDITIONED MEDIUM OVER THE CHONDROGENIC DIFFERENTIATION OF ADULT STEM CELLS IN 3D CO-CULTURES WITH ARTICULAR CHONDROCYTES

M.L. Alves da Silva<sup>1,2</sup>, A.R. Costa-Pinto<sup>1,2</sup>, V.M. Correlo<sup>1,2</sup>, P. Sol<sup>1,2</sup>, M. Bhattacharya<sup>3</sup>, S. Faria<sup>4</sup>, R.L. Reis<sup>1,2</sup>, N.M. Neves<sup>1,2</sup>

<sup>1</sup>*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, Zona Industrial da Gandra, S. Claudio do Barco, 4806-909 Caldas das Taipas, Guimarães, Portugal*

<sup>2</sup>*IBB – Institute for Biotechnology and Bioengineering, PT Associated Laboratory, Guimarães, Portugal*

<sup>3</sup>*Department of Biosystems Engineering, University of Minnesota, USA*

<sup>4</sup>*CMAT – Mathematical Research Centre, Department of Mathematics and Applications, University of Minho, Campus de Azurém, 4800-058, Guimarães, Portugal*

## **Aim:**

Soluble factors released by chondrocytes have been shown to influence stem cells differentiation onto the chondrogenic lineage. The use of conditioned medium obtained from chondrocytes for stimulating stem cells chondrogenic differentiation may be a very interesting alternative for the clinical application of these cells. Therefore, we tested the influence of conditioned medium obtained from articular chondrocytes cultures to determine its influence on indirect co-cultures of human bone marrow-derived MSCs (hBMSCs) and human Wharton's jelly MSCs (hWJSCs) seeded in 3D porous scaffolds.

## **Method:**

In the present work, indirect co-cultures (using conditioned medium obtained from a culture of human articular chondrocytes) hBMSCs and hWJSCs were established. Cells were isolated from human samples collected at the São Marcos hospital, under the donors informed consent. The co-cultures were performed in 3D fibrous and porous scaffolds, composed by a blend of 50/50 chitosan and poly (butylene succinate) – CPBS. Co-cultures were maintained during 28 days.

## **Results:**

Both types of stem cells were able to undergo chondrogenic differentiation. By the end of the experiment co-cultures showed glycosaminoglycans (GAGs) accumulation and up-regulated expression of cartilage-related gene, for both types of adult MSCs tested. The hWJSCs showed higher chondrogenic differentiation ability when compared to hBMSCs, as denoted by the higher values for GAGs accumulation and cartilage-specific gene expression.

## **Conclusions:**

The use of conditioned medium obtained from articular chondrocytes induced the chondrogenic differentiation of MSCs and ECM formation. The obtained results showed that this new strategy enables the development of new therapies for cartilage repair.