

Human-based biomaterials and magnetic stimulus in tissue engineering strategies

Manuela E. Gomes^{1,2,3}

¹ 3B's Research Group, Research Institute on Biomaterials, Biodegradables and Biomimetics, University of Minho, Headquarters of the European Institute of Excellence on Tissue Engineering and Regenerative Medicine, AvePark – Parque de Ciência e Tecnologia, Zona Industrial da Gandra, 4805-017, Barco GMR, Portugal

² ICVS/3B's – PT Government Associate Laboratory, Braga/Guimarães, Portugal

³ The Discoveries Centre for Regenerative and Precision Medicine, Headquarters at University of Minho, Avepark, 4805-017 Barco, Guimarães, Portugal.

Human blood components play key roles in the modulation of the wound healing process and therefore, the use of blood derivatives in tissue engineering and regenerative medicine (TERM) strategies has awakened as an inexpensive and safe source of multiple therapeutic biomolecules. Our studies have demonstrated that Platelet Lysates, in particular, either reinforced with cellulose nanocrystals (CNC) and/or combined with other biomaterials, such as Hyluronic Acid, can be used as stable pre-formed or injectable formulations for simultaneous delivering biological factors and stem cells, providing a platform for exploring PL based biomaterials in various TE applications. Nevertheless, to trigger the regenerative process in many tissues, biophysical stimulus are also essential as these take part in their proper functioning. The incorporation of magnetic nanoparticles (MNPs) within 3D constructs constitutes a novel and attractive strategy towards the development of magnetically-responsive system that may successfully combine therapeutic and diagnostic functionalities. An additional advantage is that cells naturally respond to magnetic forces, and consequently, the application of a magnetic field may enhance stem cells biological performance, and ultimately stimulate cell proliferation and/or differentiation.

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Presenting author: Manuela E. Gomes
I3Bs
University of Minho
Portugal
Email: megomes@i3bs.uminho.pt