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Direct digital manufacturing trends for regenerative medicine

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Direct digital manufacturing (DDM) is not a futuristic expertise. Actually, its use has been employed throughout a wide spectrum of areas/industries. One of the areas where DDM is having a major impact is on the development of implants for tissue science and regenerative medicine. To do so, both anatomical as functional characteristics must be addressed. In fact, a combination of scaffolds, cells and/or growth factors should aim the production of implants (temporary or permanent), so that damaged or degenerated tissues can be fully restored. The DDM ability to join different composites layer-by-layer enriches hybrid 3D structures that aim to mimic the native tissue and adds a new degree in freedom of design. However, the available methodologies lack some level of expertise regarding biocompatibility, bioactivity and/or biodegradation (example the lack of porosity and architecture control on 3D scaffolds). In this presentation we will show new technologies that we have been developing for 3D printing (both hard and soft scaffolds) as well as present major achievements that we have accomplished regarding bone and cartilage regeneration. For instance, the printing of multiple (up to 3) hydrogels with or without loading cells that are intend to generate layered mechanically stable implants through the double-printing of hydrogels with thermoplastics. This technology has shown promising results to overcome identified gaps in cartilage regeneration.

Biography

Pedro G Morouco is a PhD Research Fellow and Head of the CDRsp BioFabrication Research Group. He has Co-edited 2 books, authored and co-authored more than 70 papers published in books (n=12), international journals (n=31) and international conferences (n=36). He is the Member of the Editorial Board in several international peer-review journals and was distinguished with the New Investigator Award 2014 from ISBS. He is the Chairman of the CDRsp Advanced Courses on Regenerative Medicine and Workshops on DDM, he is engaged in several national and international projects focusing on biomechanics and/or DDM.

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