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THE CONVERGENCE OF TISSUE ENGINEERING AND EMERGING TECHNOLOGIES: WHERE ARE WE NOW AND WHAT'S NEXT TO BE ENGINEERED

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Tissue Engineering (TE) has been showing a great promise for tackling different diseases/disorders. By its turn, emerging technologies such as microfluidics, bioreactors, and Bio 3D Printing possibly addressing the 4th medical revolution challenges, in particular the need for developing personalised therapies and in vitro 3D models of diseases (e.g., osteoarthritis and cancer). Thus, the convergence of TE with such emerging technologies can offer new regenerative possibilities which can greatly impact Human health. In this lecture, we will discuss the recent developments related to the Biomaterials and TE strategies developed at the 3Bs Research Group. We recently proposed gellan gum, silk fibroin and silk fibroin/elastin hydrogels and bioinks (e.g. ionic-, photo- and enzymatically crosslinked) for tissue engineering scaffolding, fabrication of personalized and memory-shape implants, and Bio 3D printing of different tissues (e.g., meniscus, intervertebral disc, etc). These achivements will be overviewed herein. In addition, the engineering approaches combining (nano)biomaterials and in vitro 3D models on a chip will be also overviewed. A personal perspective of the future directions of the field will be also presented in particular how we can functionalize the developed bioinks for imaging purposes, i.e. that can be detected under Mn-MRI. In summary, we aim to develop a novel class of multimodal biomaterials and bioinks that can open new possibilities in tissue engineering, imaging and personalized medicine.