

Natural polymers for the development of multi-functional biomaterials for regenerative medicine

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Tissue Engineering (TE) has been integrating principles of materials science and engineering, chemistry, biology and health sciences in order to develop regenerative-based therapeutic strategies combining stem cells and biomaterials. Biomaterials have been widely used in many TE solutions, as a structural support for adherent cells and as a vehicle to provide relevant biochemical and biophysical signals to control cell behavior. In particular hydrogels and other volumetric structures obtained from natural-derived polymers have been explored in our group to provide the adequate 3D environment for cells to produce a new tissue *ex-vivo*. Such systems can be bioprinted in order to engineer complex hybrid devices with the structural requirements for the particular clinical need. We have been also proposed the compartmentalization of cells in liquified capsules, to provide the necessary freedom of cells to self-assemble and generate new tissue under minimal external influence. Examples of such systems presenting, where the possibility of adding topographic or dynamic stimuli to the cells are discussed.