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Characterization of decellularized heart matrices as biomaterials for regular and whole organ tissue engineering and initial in-vitro recellularization with iPS cells

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Classic tissue engineering strategies, based on solid/porous scaffolds, suffer from several limitations, such as ineffective vascularization, poor cell distribution and organization within scaffold and low final cell density, among others. Therefore, the search for other tissue engineering approaches constitutes an active area of investigation. Decellularized matrices present major advantages compared to solid scaffolds, such as ideal chemical composition, vascularization and perfect tridimensional structure. In the present study, we aimed to characterize and investigate heart decellularized matrices as biomaterials for regular and whole organ tissue engineering. Heart decellularized matrices were characterized according to: 1. DNA content; 2. Histological evaluation; 3. Surface nanostructure. Following characterization, decellularized heart slices received induced pluripotent stem cells. Results showed complete organ decellularization and maintenance of extracellular matrix structure. As expected, decellularization maintained matrix biocompatibility, as iPS cells rapidly attached to the surface of the material and proliferated. Gene expression of these cells cultured on the matrices will be further analyzed, in order to assess the effects of culturing pluripotent stem cells in decellularized heart matrices.

Biography

Juliana Lott Carvalho has completed her MSc at the age of 24 years from Federal University of Minas Gerais and currently performs her PhD studies at the same university. Juliana started her undergraduate research activities studying mesenchymal stem cells, their differentiation and migration. During her MSc she began to study cell therapy for cardiovascular diseases and currently studies tissue engineering strategies to treat such disorders, focusing mainly on decellularized matrices.

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