Animal Reproduction

Support biotechnologies: Cryopreservation and cryobiology, diagnosis through imaging, molecular biology, and "omics"

Using placenta morphological diversity as advantage in tissue bioengineering

Maria Angelica Miglino[1], Gustavo S.S. Matias[1], Vitória F Batista[1], Nathia N. Rigoglio[1], Igor S. Cordeiro[1], Amanda B. T. Hill[2], Ana Cláudia O. Carreira[1], Rodrigo SN Barreto[1], Paula Fratini[1]

[1]School of Veterinary Medicine and Animal Science, University of São Paulo, SP, Brazil; [2]São Paulo State University, Jaboticabal, SP, Brazil.

The search for an alternative non-synthetical extracellular matrix (ECM) scaffold for tissue engineering have been increasing due to advances in bioengineering techniques to supply regenerative medicine grafts. As a disposable material with well-structured and rich ECM, placenta may be an adequate source. Also, morphological placental diversity can reach several approaches. Canine (day 35), mice (day 18.5) and bovine (4 month) placentas were SDS decellularized and were validated as biomaterial by means of morphology (standard histology), structure (electron microscopy) and content (immunohistochemistry for major ECM proteins and genomic DNA). The three different models were sterilized firstly by complete dehydration, and then by 70% alcohol bath associated with UV light, to evaluate cytocompatibility by cell culture (fibroblast, mesenchymal stem cell, and/or hematopoietic precursor). Withal, 3 non-decellularized and3 decellularized samples were analyzed by OrbitrapFusionLumos mass-spectrometer (Thermo Scientific), and protein list were generated (MaxQuant software, v1.6.10.43). The LFQ intensity were statistically ($P > 0.05$ Inferno software, v.1.1.6970), and ECM and cellular junction-related proteins were manually annotated (DAVID Bioinformatics Resources 6.8). Overall, all three models were validated as biomaterials, because decellularization maintained natural gross morphology and structure and major ECM protein, also decreased genomic DNA to safe levels for regenerative medicine. All models where cytocompatibility and allowed different cell lineages adhesion. Bovine and canine placenta-derived biomaterials maintained around 80% of ECM and cellular junction related proteins, however mice were around 50%. Bovine placenta as parenchymatous and villous-shaped may be used for profound and deep grafts. Canine placenta, however, as thin and membranous-shaped could be elected for superficial grafts. And finally, mice placenta, due their small size and lower protein content maintenance could be designated for delicate cell-driven grafts. In conclusion, those three placentas produced adequate biomaterial models aiming different suggest purposes in tissue bioengineering.Support: FAPESP (2014/50844-3 and 2015/14535-9), CNPq (467476/2014-4 and 406022/2016-0) and CAPES.