Evaluation of the Most Efficient Detergent for Pancreatic Decellularization Aiming at the Development of a Bioartificial Pancreas for Type 1 Diabetes Treatment

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Type 1 diabetes mellitus (T1D) results from the autoimmune destruction of pancreatic ß cells, leading patients to require lifelong insulin therapy. Transplantation of isolated pancreatic islets from organ donors is a promising alternative treatment for T1D, however this approach is still limited. Pancreatic bioengineering has been proposed as a potential therapeutic alternative in which the pancreas is decellularized, generating an acellular extracellular matrix scaffold, which may then be reconstituted by recellularization with several cell types to generate a bioartificial pancreas. A proper choice of the detergent is crucial for successful decellularization and recellularization processes. Therefore, our proposal was to determine the most efficient detergent for pancreata decellularization by comparing Sodium Dodecyl Sulfate (SDS), Sodium Deoxycholate (DOC) and Triton X100. To this end, murine pancreata (n=12) were harvested, in accordance with Brazilian regulations and the local Institutional Ethical Committee, and decellularized according to each condition (n=3). Samples were collected for DNA and glycosaminoglycans (GAGs) quantification, histological analysis (hematoxylin and eosin, alcian blue and picrosirius) and transmission electron microscopy. The results showed that 4% DOC was more efficient than all of the other detergents, since this treatment allowed: a) effective removal of cells, b) maintenance of the extracellular matrix architecture, and c) preservation of the proteoglycans, GAGs and collagen fibers in the decellularized matrix. This study provides some guidance to improve the pancreas decellularization process, maintaining its extracellular structure, aiming to improve the islet transplantation outcome and to develop alternative treatments for T1D.

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