عنوان مقاله:

New Strategy of Decellularization and Production of Human Kidney Scaffolds

محل انتشار:

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خلاصه مقاله:

Background and Aim: Incidence of end-stage renal disease (ESRD) isgreatly increasing. Renal transplantation is one of the goal treatmentsfor ESRD. The development of tissue engineering and regenerativemedicine have catalyzed due to a gap between limited organ supply andincreasing demands. Natural scaffolds prepared from an extracellularmatrix (ECM), have emerged as an ideal tissue microenvironment forthis goal. An important technique in regenerative medicine to prepare anacellular ECM is the decellularization of native tissues. Therefore, the aimof this study was to determine the effective method for decellularizationof human kidney and producing the natural human kidney scaffold.Methods: After Nephrectomy, human kidneys that could not betransplanted were used in this study. Adipose tissue and capsule aroundthe kidney were removed. We cut kidneys into transverse sections(approximately 10 × 10 × 2 mm3 pieces) using a scalpel. Then Cortexmedullakidney sections were washed twice with phosphate bufferedsaline (PBS), followed by decellularization in a solution of either 1%Triton X-100 or sodium dodecyl sulfate 1% (SDS). The sample wasdecellularized at 4 using shaker (200 rpm). Decellularization solutionwas changed 4 hours after initial tissue harvesting and then every 24hours until tissues were transparent (for 14 days). In order to confirmationof decellularization, hematoxylin-eosin (H&E) staining was performed on days 2, 5, 10, and 14.Results: Comparison of H&E staining of the decellularized and nativekidney tissue revealed successfully elimination of cell nucleus in SDSand Triton-treated sections. Also, H&E staining revealed that in the Tritontreatedsections the native ECM architecture, integration of renal vascularand glomerular structures was more preserved than the SDS-treatedsections.Conclusion: We have developed an effective decellularization methodfor the preparation of human renal ECM scaffold. Additionally, it maybe possible to use the scaffolds that prepared with 1% Triton X-100 forkidney regeneration. These results also indicate that discarded humankidneys are a suitable source of renal scaffolds and their use for tissueengineering applications may be more clinically applicable andbeneficial than kidneys derived from animals.

کلمات کلیدی:

Human kidney; Regenerative medicine; Scaffold; Decellularization; 1% Triton X-100