

عنوان مقاله:

Development of An Automatic Decellularization De-vice of Biological Tissues and Rat Renal Tissue Decellular-izing with Sodium Dodecyl Sulfate

محل انتشار:

بیستمین کنگره بین المللی بیولوژی تولید مثل و پانزدهمین کنگره بین المللی سلول های بنیادی (سال: 1398)

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خلاصه مقاله:

Background: End stage renal disease (ESRD) caused by chronic diseases such as diabetes and hypertension is a rapidly-growing reason for morbidity and mortality worldwide. ESRD usually leads to either dialysis or renal transplantation which is costly and also hardly available for majority of people. To surpass the current limitations, such as shortage of donor and unavailability, using tissue engineering as a new hope for people with ESRD is considered. The first step is the fabrication of an intact decellularized kidney scaffold. Materials and Methods: We developed an automatic decellularization device to perfuse and decellularize male Wistar rats kidney with sodium dodecyl sulfate (SDS). After anesthesia with ketamine and xylazine, a longitudinal abdominal incision was made and the left kidney, aorta, vena cava and ureter were identified. Then heparin was injected intravenously to prevent blood clotting. Renal artery was cannulated and perfused with phosphate buffer saline (PBS) for 2 hours at a flow rate of 2 ml/ min. To remove blood from kidney, renal vein was cut. Then, kidney was arterially perfused with a 1% SDS solution for 4 hours at a flow rate of 1 ml/min and then another 2 hours with PBS to remove the remaining detergent in scaffold. Physiological pressure was maintained within 62 to 107 mmHg (it is assumed to be rat kidney pressure) by setting the device flow rate between 1 to 2 ml/min through the entire duration of the decellularization process. The decellularized scaffold was stained with hematoxylin and eosin, Verhoeff's Van Gieson, Masson's trichrome, and Alcian blue to check cell removal and examine elastin, collagen and Glycosaminoglycans (GAGs), respectively. Results: We developed an automatic and digital decellularization device for decellularizing the biological tissue. Our data showed complete cell removal and effectively preservation of extracellular matrix (ECM) architecture in rat kidney. Conclusion: SDS is a promising detergent that could be a useful decellularization agent to produce acellular kidney scaffold much alike native kidney scaffold. An automatic and digital decellularization device could facilitate kidney decellularization.

کلمات کلیدی:

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