DECELLULARIZED EXTRACELLULAR MATRIX USING LIQUEFIED DIMETHYL ETHER FOR TISSUE ENGINEERING/REGENERATIVE MEDICINE

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Abstract:

Decellularized extracellular matrix (ECM) has been used as a scaffold for cell delivery in tissue engineering. The most commonly methods of decellularization of tissue using surfactants such as sodium dodecyl sulfate (SDS) and triton X-100 have several problems. These methods lead to ECM structure denaturation, decreased mechanical properties, and toxicity by surfactant. We developed decellularization method using liquefied dimethyl ether (DME), which is a surfactant-free process. Porcine aorta was used as tissue for decellularization test. The porcine aorta tissue was placed into the extraction vessel and decellularized at 25 ^{o}C, 0.7 MPa and 1 mL/min DME. After liquefied DME treatment, DNA in the porcine aorta was decomposed by DNase treatment. The treated tissues were evaluated by absence of nucleic acids using hematoxylin and eosin (HE) staining, residual DNA using UV/Vis spectroscopy, and DNA chain length using agarose gel electrophoresis in the decellularized tissue. The decellularized tissues using liquefied DME are confirmed absence of nucleic acids, below 50 ng/mg based on dry ECM (residual DNA) and 200 base pair (DNA chain length). It is found that decellularization method using liquefied DME, which is a surfactant-free process can be realized.