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Beating Clusters Created with Cardiac Extracellular Matrix from Decellularized Pig Hearts and Repopulated with Human Induced Pluripotent Stem Cell-Derived Cardiomyocytes

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Introduction
Due to the high prevalence of heart disease, scarcity of donors, and high risk of transplant rejection, we aim to engineer patient-specific beating cardiac patches and whole hearts for transplants.

Background

Materials and Methods

Decellularization
Porcine heart ECM was isolated in an automated apparatus² using the following protocol:

- **Solutions**
  - 1X PBS 1 hr
  - Type 1 distilled Water
  - 0.5% Sodium Dodecyl Sulfate (SDS) 6 hrs total
  - 1% Triton X-100 (TX-100) 2 hrs

Decellularization

Cell Sources:
- **Patient Specific Cells:**
  - Cardiomyocytes (CMs)
  - Endothelial Cells
  - Smooth Muscle Cells
  - Fibroblasts

Decellularized Porcine Heart Patches

Ideal decellularization can be achieved by completely removing all cells and cell debris from an organ while keeping the heart scaffold's vasculature intact as well as preserving the important growth factors: glycosaminoglycans (GAGs) and proteins in the extracellular matrix (ECM).

Conclusions and Future Work

References