



Registration Form

TEAM INFORMATION

Team Name/Project Title: dECM

Department: Bioengineering

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PROJECT INFORMATION

Description:

The device created by dECM provides an automated way to decellularize rat lung tissue. The system incorporates up to 6 lungs and six decellularization reagents.

Abstract:

The extracellular matrix (ECM) plays a crucial role in the development and function of organs. Particularly in the lungs, the ECM can regulate biological processes such as organogenesis and injury repair. Researchers are still investigating whether altered cellular function leads to an aberrant lung ECM, or if an aberrant lung ECM disrupts normal cellular function. Understanding this interplay between diseased lung tissue and the ECM can help scientists determine the causes and treatments of chronic lung diseases. This is commonly investigated by isolating the ECM from the lung tissue through decellularization. Typically, this process can take up to 50 hours and is commonly performed manually by a hand-syringe pump method.

The goal of this project is to create an inexpensive system that automatically delivers the necessary decellularization reagents through the lungs, ultimately reducing user operation and developing protocol consistency for repeatable outcomes. This device is controlled via a Matlab-based user interface that interacts with an Arduino. The user operates the device through a custom GUI, where the reagent regiment and desired delivery times are selected. The system controls the opening/closing of valves to deliver six various decellularization reagents to up to six murine lungs.

As the lungs decellularize, the reagents perfuse out of the lungs, drain into the collection basin before exiting to a waste container. The reagents (along with cellular debris) are also expelled through the trachea by the natural constriction of the lungs.

