Creating Perfusable Tissue Scaffolds From Decellularized Plant Leaves

Cable-Treadwell, Jaxyn (School: Kauai High School)

Currently, both synthetic and animal-derived grafts currently used as scaffolds for perfusable human tissue have limitations due to low availability, poor biocompatibility, and cost. Plant leaves have favorable characteristics that make them uniquely suited for use as scaffolds, such as high surface area, excellent water transport and retention, interconnected porosity, and preexisting vascular networks. The method used in this experiment is based on detergent baths to remove cellular matter, which is similar to previously established methods used to clear mammalian tissues. This method yielded a scaffold with mechanical properties and low cellular metabolic impact, perfect for acting as perfusable tissue. Out of all three plant samples, Spinacia oleracea, Basella alba, and Ipomoea aquatica, S. oleracea was the only sample to make it through the complete incubation period in the detergent solution and yielded very promising results as a potential vascular structure replacement. Successful utilization of plant tissues as tissue engineering scaffolds proposes a potentially cheap alternative to costly, and often difficult to design, alternative scaffolds from animals or other plants. The biggest takeaway from this experiment is acknowledging the fact that plant-derived scaffolds possess the necessary properties to be successfully applied towards tissue engineering applications, thereby creating a cost-effective, quickly acting permanent substitute as a scaffold. The future is full of possibilities of replicating or modifying this experiment to explore the different vascularity qualities of other plants, and others might provide an even better source of biomaterial acting as perfusable tissue scaffolding.

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