Biomaterial Fabrication Technique: Using Decellularized Plants as Perfusable Engineering Scaffolds

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Decellularization is a promising technique for creating biomaterial scaffolds that uniquely possess properties that cannot be 3D printed and are used for artificial organ and tissue regeneration. I hypothesized that a chemical detergent solution would decellularize spinach leaves enough to be useful as a tissue scaffold. To perform this experiment, spinach leaves were cannulated and perfused with 2% Biokleen for 48 hours. Different spinach leaves were perfused with a 1% SDS solution for 24 hours, followed by 0.1% Triton X-100 in 10% sodium chlorite solution for 24 hours to replicate a commonly accepted decellularization technique. Leaves perfused with deionized water for 48 hours served as a control. After 48 hours, leaves were rated in two ways. First, a visual rating of the percentage of leaf area that had lightened in color post-treatment was made. Second, lighter areas of the leaves were rated using the color scale. Control leaves showed no change post-treatment. Leaves perfused with Biokleen averaged 80% lightened leaf area and color rating of 70. Leaves perfused with SDS averaged 96.7% lightened leaf area and color rating of 40. The data I collected caused me to reject my hypothesis. The leaves treated with detergents did show some decellularization, but not enough to be used as a scaffold. Biokleen's decellularization was out-performed by SDS's decellularization. But, Biokleen still showed a promising amount of decellularization, so future research using higher concentrations may allow Biokleen to be utilized in tissue engineering.

Awards Won:

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