



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY**

Name(s) Ava P. Rothenberg	Project Number J1424
Project Title The Decellularization of a Spinach Leaf by Perfusion and Submersion of Detergent Solution	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to decellularize a leaf using sodium lauryl sulfate (SLS), leaving only its extracellular matrix with an intact vascular system. If completely decellularized, this new scaffold could be infused with animal cells, and turned into transplantable tissue. I also wanted to discover whether perfusion or submersion of SLS would decellularize more efficiently.</p> <p>Methods/Materials To decellularize through perfusion, I inserted an IV into the stem of a spinach leaf. The IV was set on a drip to perfuse detergent solution (2.2% sodium lauryl sulfate and distilled water) through the vascular system. To decellularize through submersion, I soaked a leaf in the same detergent solution. The control group was soaked in only water. A fully decellularized leaf is transparent or white, therefore, I measured opacity/color.</p> <p>Results After a 42 day trial (for all groups), the submerged leaf lost color, and was translucent with an intact vascular system/scaffolding. Once placed in the isopropyl alcohol intended to preserve the leaf, it turned white. A faulty IV prohibited data collection from the perfused leaf. The control group was more transparent than the soaking group, but fell apart when removed from water.</p> <p>Conclusions/Discussion My results disprove my hypothesis because sodium lauryl sulfate didn't complete decellularization though either method. The SLS removed cells while leaving an intact scaffolding, and worked better than water, but didn't remove all cells. Next time for perfusion, I'll use a smaller, secured needle, and air pressure relief in the IV tubing. Next time for submersion I'll try isopropyl alcohol.</p>	
Summary Statement I tested if perfusion or submersion of detergent solution would best decellularize a leaf, leaving an intact scaffolding and vascular system, and found submersion did.	
Help Received When my perfusion group failed, I reached out to (emailed) Joshua Gershlak at Worcester Polytechnic Institute and he explained that before decellularization can commence, I had to first open the stomata on the leaves.	