

Implementing environmentally responsible biomedical laboratory practices and developing a model for use in student-faculty research at Seattle University

Seattle University, Center for Environmental Justice & Sustainability 2013-14 grant – Gabe Kaemingk, Mid-year Report, March 2014

Background:

During my first summer in a pharmaceutical lab, after over 450 hours of research, I began to seriously reflect on the amount of waste generated in our lab, and I hypothesized that taking environmentally sensitive actions would not only improve the lab's environmental sustainability, but also produce time and cost-savings that would improve overall lab productivity. The ultimate goal of this project is to model time, material, chemical, energy, and cost-savings using a sustainably focused framework, then engage Seattle University's academic and research labs in meaningful dialogue in order to empower mindful and sustainable student research leaders for a just and humane world.

I began my project by familiarizing myself with standard lab practices, researching the nucleotide dependency of endogenous hsp90 chaperone protein machinery and its association with baculovirally expressed glucocorticoid receptor. After establishing my own procedures, I examined other lab project procedures to determine the basal level of the Murphy Lab's environmental stewardship.

Outcomes:

- Developed a simple, sustainability slogan and accompanying acronym: "EESI [ee-zee] lab practices for sustainable research" – educate, evaluate, simulate, integrate; this serves as a framework for self-auditing the sustainability of lab practices and critically thinking about ways to address subsequent findings.
 - EESI lab practices applied to my own experimental procedures resulted in a 43% reduction in material waste generated (measured by the average item quantity savings per step of procedure).
- Trained the summer of 2015 Murphy Lab cohort according to the EESI lab practices modeled in Figure 1 below.
- Developed a distributable graphic challenging lab researchers to think sustainably when developing experimental procedures (Figure 2).
- Spoke about CEJS and the sustainable research initiative at the 2016 Sullivan Leader's day Research and Academic Excellence panel.

Figure 1

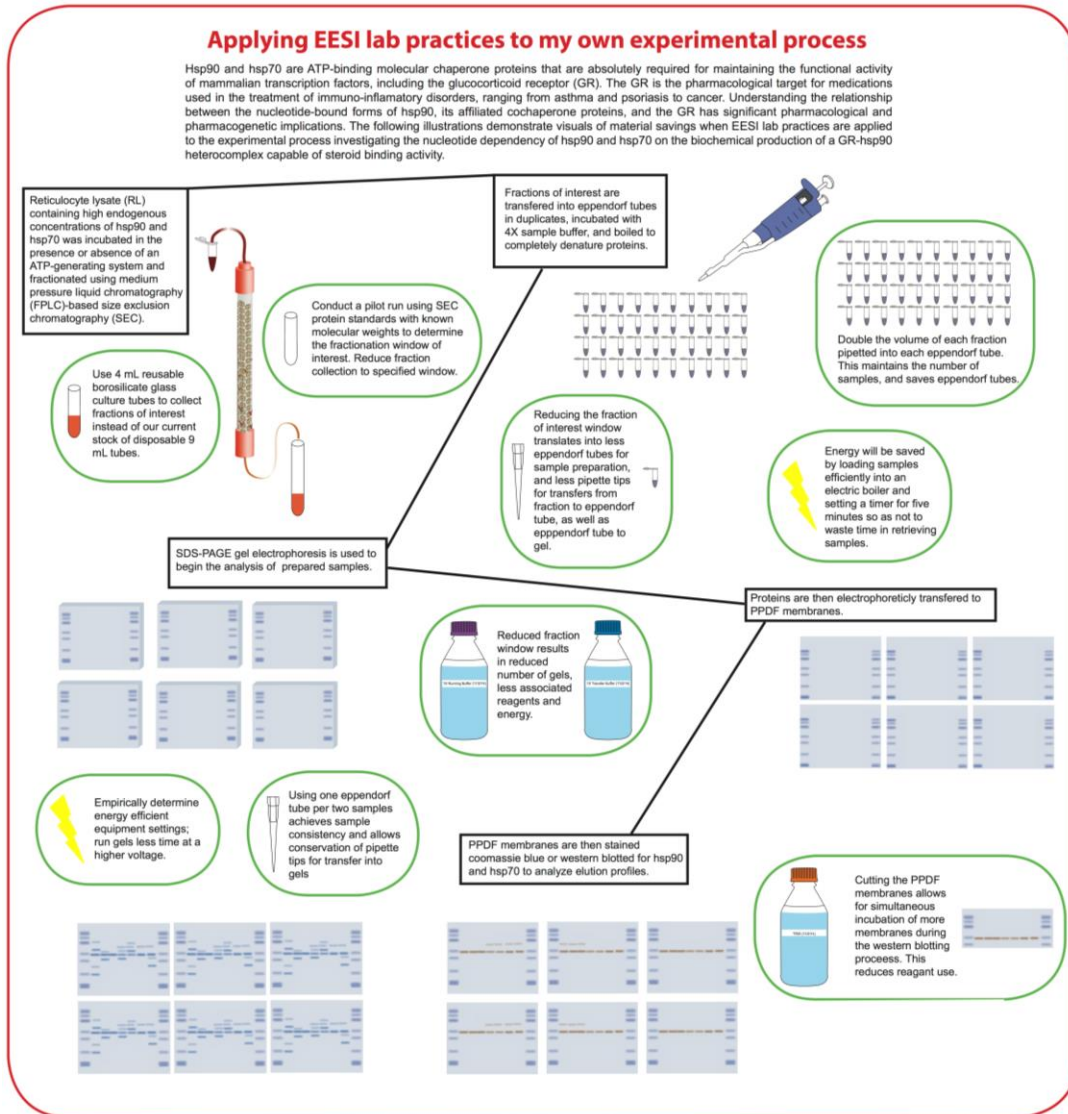


Figure 2

EESI lab practices for sustainable research

What efforts will succeed in instigating behavioral changes that lead to waste reduction, energy savings and tangible gains indicating our labs are performing research sustainably? "EESI [ee-zee] lab practices for sustainable research" was born. It is my hope that the framework I developed is meaningful, direct, accessible, and effective.

- E**DUCATE: What are the systems at work that are allowing you to make decisions, and how do those decisions affect interconnected global communities? This broad question is intended to change the way you think about the day to day decisions you make in the lab and beyond.
- E**VALUATE: What is your current level of sustainability in lab, and how can you improve upon them?. Investigate alternatives to using disposables. Determine the most energy efficient run-settings of your equipment. Consider alternative techniques that reduce waste.
- S**IMULATE: Validate and practice techniques, and test the innovated experimental procedures that you determined. Become habitually sustainable with your actions during the experimental process.
- I**NTEGRATE: Use the procedures and techniques that you determined in your experimental process as you become familiar and comfortable with the new methods.