Vita Jaspan Essay

Soto/Sonnenschein Laboratory at Tufts University School of Medicine

GNBCC Summer Internship July 2011

I can't say I wasn't nervous that first day as Melissa and I awoke to the loud alarm at 6:30 AM. As I rushed to get ready, the thought occurred to me—I had absolutely no idea what to expect. Not only had I barely any knowledge on the topic of environmental links to breast cancer, but I also had never before even stepped foot into a working laboratory. Thankfully, both of these facts quickly changed. As Melissa and I successfully navigated ourselves through the streets of Boston and on the T, my nerves and excitement continued to grow until, finally, we arrived at the Jaharis building on 150 Harrison Avenue at the edge of China Town, an hour too early.

After what felt like years of waiting, Cheryl Michaelson, our main advisor over the two-week period, arrived at the Soto-Sonnenschein lab and introduced herself to us. After a quick tour and introduction, I began to feel much more comfortable. I could tell almost immediately that all the researchers, post-docs and lab technicians alike would do their absolute best to teach us and guide us through our experience. In fact, they were kind enough to include me and Melissa in their very scientific lunch discussions regarding how much stuffing there should be in between two Oreo cookies. Also, one of the post-docs even took us to the Museum of Fine Arts with her to view an exhibit. This was all just an extension of the team spirit that was always evident in the lab. Everything was a team effort; including trying to identify a structure in a section of tissue during one of the weekly lab meetings. It also showed us that the scientists are very real, down-to-earth, friendly people. They laugh and manage to keep the mood light, even in the middle of very important and complicated research. Even Ana and Dr. Carlos Sonnenschein, who were kind enough to even let us into their lab, could not have been more helpful, always smiling and asking if we had any questions.

Although lunch was always a relaxing, laid back experience, there was certainly more than enough learning that took place during the rest of the time to make up for it. In fact, I don't think I have ever learned more in a two-week period. First, Cheryl taught us about the chemical bisphenol-A, more commonly referred to as BPA, and its effects on organisms. She also gave us

a brief overview of its history and the federal government's regulation (or lack thereof) of the chemical. Later, two of the post-docs taught us about the components of the mammary gland and all of their functions. They also went into much greater detail about exactly what BPA does, and how it acts. Going into the lab, I had already known that BPA was an endocrine disruptor, but it was not until now that I actually understood exactly what that meant. BPA is a synthetic estrogen that is able to bind to estrogen receptors in the body, thus mimicking and acting as an agonist for natural estrogens. It is found to have extremely dangerous effects, even at very low concentrations, and could, potentially, increase risk for the development of breast cancer. Also, we learned about the lab's current research on the development of 3D cultures. By culturing cells in 3D, the structures of the mammary gland can form, unlike in the more common 2D cultures. This way 3D cultures are more similar to cells *in-vivo* than are 2D cultures, but they are much easier to observe.

Over the course of the two-week experience, different members of the lab spent time teaching us different laboratory techniques and allowing us to observe their research. This ranged from taking pictures of sections of mammary tissue with a microscope to observing one of the post-docs using a confocal microscope, which is used for 3D imaging. One of the projects that Melissa and I took part in included taking photographs of slides containing mammary glands and then analyzing the morphological structures of these glands. We did this by placing a grid over the photograph and, one-by-one, counting the structures that appeared at each of the cross-hairs on the grid. These values were then entered into the statistical analysis program SPSS to determine the effect that BPA had on these glands, and if this effect was statistically significant.

We also learned several staining techniques. One of these, H&E (hematoxylin and eosin) staining, colors different parts of the cell differently, so one can easily distinguish between them. Another, called an ICC (immunocystochemistry), indicates the presence (or absence) of a specific antigen. Both of these techniques are done by following very similar protocols. Other lab techniques that we learned about included the E-screen test, which Drs. Soto and Sonnenschein actually invented in order to test the estrogenicity of various substances. Also, we learned how to section tissue and mount it onto slides before staining.

Overall, the experience was incredible. I learned more than I ever imagined possible in a short two-week span, and had so much fun doing it. In Carlos's words, I am now "officially a

nerd!", and I could not be happier about that. Now that I am aware of the extremely dangerous effects of BPA, its potency, and how ubiquitous it is (it is found in approximately 93% of Americans!), I am going to be much more careful when choosing which products to use. BPA is found in everything from receipts to dental sealants, so it is virtually impossible to avoid completely. Also, thousands of other chemicals have the same or very similar effects as BPA; they are just not as well publicized or fully understood. It is important to increase public awareness of these chemicals, and hopefully, eventually, have all of them removed from our products.