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Great Neck Breast Cancer Coalition Student Research Internship

Rensselaer Polytech Institute (Summer 16')

Motivation, focus, and resolve are just some qualities that are necessary in pursuing one's dream. Many teens aren't sure about their dreams or aspiration for their future. However, it is their experiences through life that may guide them to their future careers. Teenagers are unique because they are capable of absorbing large amounts of information and sharing them with their fellow peers at a faster pace. The Great Neck Breast Cancer Coalition selected many students, one of which is I, so we can educate our communities about breast cancer prevention. While there is research in cancer treatment, there is not much research in prevention. That's why Great Neck Breast Cancer Coalition Student Research Internship gives students the resources to investigate carcinogenic products and replace them with non-toxic, eco-friendly alternatives. Many of these students are sent to colleges all over the tri-state area to perform their research.

I had the pleasure of going to Rensselaer Polytech Institute in Troy, NY. This was my first time living away home and at first I felt a lot of emotions, most of which were nervousness and anxiety, but that went away quickly. As soon as my fellow interns moved in I felt a lot better and all of us became a "family" that supported each other.

I had the great opportunity working in Dr. Richard Gross's Green Chemistry lab at the Center for Biotechnology and Interdisciplinary Studies building. With the guidance of my mentor Pedro Jimenez, I conducted research that focused on replacing toxic commercial surfactants with non-toxic, biodegradable biosurfactants. Now, you may be asking, "What's a surfactant?" A surfactant is a molecule that lowers the surface tension between two immiscible liquids such as: oil and water. This occurs because surfactants are amphiphilic, which means one compound is hydrophobic, not able to attach to water, and the other compound is hydrophilic, has an affinity to water. The hydrophobic side attaches to the oil, while the hydrophilic side attaches to the water, together they allow for the miscibility between oil and water. Surfactants allow these two immiscible liquids to mix forming an emulsion. Emulsions are found in everyday life such as: butter, cream, shampoos, makeup, vinaigrettes and etc. Many commercial surfactants are petroleum based which may contain some toxicity. Furthermore, many surfactants

are contaminated with other carcinogenic chemicals such as: Toluene, 1,4 Dioxanes, Nonylphenol Ethoxylates and many more. Commercial surfactants are found in the cosmetics industry, detergents, food industry and the pharmaceutical industry.

In my experiment, I researched the performance between TritonX100, a commercial surfactant, and Ethyl Ester Sophorolipid, a biosurfactant. TritonX100 is used in detergents and cleaning solutions. In addition, TritonX100 has shown to be toxic mainly towards aquatic life and the ecosystem that later affects us. In order to replace many surfactants I was using an eco-friendly biosurfactant called Ethyl Ester Sophorolipid (EE-SL). EE-SL is a Sophorolipid, which is produced by non-pathogenic yeast, which is non-toxic and biodegradable. The TritonX100 and EE-SL were tested with Almond and Lemon Oil because these oils are commonly used in cosmetics. Additionally, Almond and Lemon Oil were used because of their difference in structure. Along with the biosurfactant and oils, I added fatty acids. Fatty acids are found in nature, and are known for stabilizing emulsions and increasing viscosity, or thickness, of the emulsion. When compiling the results, EE-SL with fatty acids performed better than the TritonX100 alone. EE-SL with fatty acids also exhibits promising application in the cosmetics industry.

My summer at Rensselaer Polytech Institute taught me so much about science, teamwork, and responsibility. I enjoyed using many of the scientific instruments and my favorite part was working with Pedro, my mentor, in successfully creating a new batch of EE-SL. It was a lot of fun making the EE-SL and it was very interesting because it gave me a better appreciation for chemistry and it taught me a lot about patience, which is a quality I lack in. This internship made me understand what college life and rooming entails and prepared me for college.

I would like to thank Mr. Suchmann, Research Director at NSHAHS, for introducing me to Mrs. Laura Weinberg, Mrs. Lisa Levine and the entire Great Neck Breast Cancer Coalition. Thank you to Laura and Lisa who gave me the opportunity of my high school career. I'd also like to thank Dr. Richard Gross and Pedro Jimenez for guiding me to my future career. This internship allows me to educate my community and fellow peers in breast cancer prevention.