Project ID: 141

SR - Biochemistry

Melany Ibarra Almanza

Effects of Ultraviolet Rays on Gelatin

Ultraviolet rays are derived from sunlight emission, as well as artificial. UV rays are known to be a great source of Vitamin D, calcium absorption, seasonal depression, and the immune system. But it is also the main cause of sunburn, eye damage, hyperpigmentation, skin aging, and skin cancer. Sunlight affects the production of melanin, which behaves as a natural sunscreen for the human skin. UV-ray waves have less than 400 nanometers, shorter than other visible lights. When UV rays surpass the protection melanin provides, it will cause tanning, but extensive exposure will lead to hyperpigmentation, and in the worst-case scenario, skin cancer, which includes DNA damage. In this current study, we investigated the effects of UV rays on hydrolyzed collagen (gelatin), microsorum pteropus var. (windelov java fern), saccharomyces cerevisiae (yeast), and vigna radiata (mung beans). Hydrolyzed collagen showed futile and inconclusive results, microsorum pteropus var results were subjective, while saccharomyces cerevisiae showed a decrease in mass and slower reproduction, and vigna radiata showed slower germination. These results proved that UV rays affect the production of melanin, but if longer exposure to UV rays had been tested, saccharomyces cerevisiae could have died, and Magna radiata would not have germinated. If this were to happen, it would mean that cells have died and repair enzymes are unable to continue their function.

Project ID: 142

SR - Biochemistry

Jaden Martin

The Concentration Difference of Proteins During Different Stages of Lactation in Bovines

The intention of this study was to discern whether each stages of lactation provides different quantities of proteins in an attempt support the importance of lactation's role in a calves diet. Lab procedure was conducted using three samples of each of the four stages of lactation. Samples were diluted and mixed with Standard Bovine Gamma Globulin, Thereafter the samples were measured for absorption in a spetrophotmer. Absorptions were documented and recorded via a bradford assay. The Assay was utilized to calculate the protein concentrations in each samples which then were averaged to conclude which stage of lactation contained highest concentration of proteins while also determining wether the differences between all stages were substantial enough to support the use of lactation as a core food source for newborn's. The first stage of lactation contained the largest average concentration of proteins according to collected data with Involution being hin a close second. The last two phases where significantly lower concentration levels than then the involutional and Colostrum stages which shows a diversity between stages of lactation and supports the idea that proteins contained in each stage is designed for a specific stage of growth.

Project ID: 143

SR - Biochemistry

Medha Nandhimandalam

Exploring the Effect of Turmeric Absorption with Black Pepper-Turmeric Combination

Clinical research has proven that turmeric has many therapeutic benefits. However, poor bioavailability makes it hard to maximize the benefits of consuming this useful spice. Some studies have shown the pepper may increase the absorption of turmeric. As a part of this experiment, we want to test how varying the amount of black pepper will affect the absorption. We used potato to test the cellular absorption. We added varying amounts of pepper to 2g of turmeric. To simulate digestion, we added HCl and Pepsin and held this between 99F-100F in a thermal insulator for 100 minutes, thereafter added equal size and mass of potato to this and allowed it to absorb for the next 6 hours. We checked the Potato mass after this. The results have shown that absorption increased with increase of pepper, but after a certain point, it proved to be diminishing. The ideal absorption is at about 1:1 ratio of turmeric and pepper. The absorption increased by about 20%. The results prove some promise to using turmeric with pepper to increase its bioavailability.

Project ID: 144

SR - Biochemistry

Andrew Tsui

Novel High-Throughput Screening and Identification of FDA-Approved Drugs for Alzheimer's Disease Treatment

Alzheimer’s Disease (AD) is currently the 6th leading cause of death in the US. Despite over $1.9 Billion pledged to AD research in 2018, there remains to be a definitive cure for the disease. Current treatments include proliferation-retarding treatments, such as Donepezil, and experimental drugs such as Aducanumab. Drug discovery is often slow and ineffectual; as a result, alternative methods such as drug repurposing are necessary in order to identify new AD treatments. Thus, this study prepared an amyloid-beta (AB) fibril through energy minimization and various protein modifications, and also parsed 1040 FDA Approved Drugs into separate PDBQT files for docking. Three novel binding pockets on the fibril were generated using CASTp. High-throughput, automated docking was conducted through AutoDock Vina, with thirty binding poses generated for each FDA-Approved Drug at each pocket. This study hypothesized that one or more BBB-Penetrable drugs will be identified, whose binding affinities at each binding pocket are statistically significant. Eight Compounds were identified with statistically significant binding affinities at all pockets (p =

Project ID: 145

SR - Biochemistry

Noah Caballero

Effect of Inhibitors on Functionality of Phenolase in Apples

To test the impact of denaturants and inhibitors enzyme productivity, I aim to answer the question to what extent do inhibitors and denaturants such as temperature, antioxidants and acids impact the productivity of Polyphenol Oxidase in Malus domestica (apples) during the oxidation reaction process? Four different inhibitors and denaturants were used in this experiment including vitamin C (antioxidant), lime juice (acidic compound), high temperature environment and a low temperature environment. Five trials were conducted with five groups per trial: one control, an experimental using vitamin C, an experimental using lime juice, an experimental in a high temperature environment, and an experimental group in a low temperature environment. Time was taken for each individual group to reach a point of an even pigment of brown along the exposed surface of the apple slice. The control groups took around an hour to reach a consistent brown pigmentation along the surface while the experimental groups took over two hours in order to reach a similar level of pigmentation. Average browning time for each group was calculated as follows: control group took 67.8 minutes, vitamin C experimental group took 185.2 minutes, lime juice group took 207.6 minutes, high temperature group took 150.6 minutes, and the low temperature group took 137.8 minutes. Standard deviation for each group was also calculated and statistical tests were conducted to find that each experimental group was statistically significant in its difference from the control group. Overall, this proved my hypothesis correct as it demonstrated how denaturants and inhibitors did cause a drastic decrease in PPO productivity, as evidenced by the increased browning times.