

**Category:** Medicine & Health**Table Number:** H0902**Student Name:** Emily Gerday**Team Members (if any):****Project Title:** Useless Policy? Does nail polish effect the accurate measurement of oxygen saturation by pulse oximeter?

**Abstract:** Pulse oximetry is a non-invasive technique used to measure the oxygen saturation in a person's blood. Pulse oximeters are based on light absorption characteristics of oxygenated and deoxygenated blood. Pulse oximeters shine red and infrared light through tissue. The absorption ratio between both lights enables to determine the arterial oxygen saturation. In hospitals removing nail polish is standard procedure to measure oxygen saturation for patient evaluation. Nail polish is commonly listed as a limitation in oximetry protocols. The purpose of my project is to test the validity of this practice. I hypothesized that nail polish would affect the oxygen saturation and that the clear polish would have little to no effect while dark shades would proportionately decrease the measure of oxygen saturation. I tested this hypothesis by using a portable pulse oximeter and a variety of nail polishes in colors from clear to black. As a control I left one nail unpainted. I tested three subjects five times. In my results I found that there is no statistical difference between the controls and the painted nails oxygen saturation measurements. The color and shade of the nail polish did not affect the measurements either. The standard deviations in my results were small showing that the measurements were reliable. Based on this study the removal of nail polish in hospital procedures (oximetry) is an unnecessary step that does not affect the accuracy of oxygen saturation measurements.

**Category:** Medicine & Health

**Table Number:** H0903

**Student Name:** Alexandra Gerday

**Team Members (if any):**

**Project Title:** Do I Really Sound Like That?

**Abstract:** Have you ever heard a recording of your voice and wondered if you really sound like that? Our hearing is a complex system that transforms a pressure wave signal into a neuronal electric message. My project objectively demonstrates that we hear our own voices differently when we speak and when we listen to ourselves. To do this I evaluated pressure variation close to the ear drum with a Audioscan when the ear canal is unobstructed and obstructed, these graphs (Speechmaps) unable to differentiate the air and the bone sound wave conduction independently. My results shows that the Speechmaps are different with the bone sound wave recording being more intense in low pitch and less intense in high pitch. My unusual use of the Audioscan machine as enabled me to objectively demonstrate that our perception of our own voice is different when spoken(bone and air condction) or when heard externally(only air conduction).

**Category:** Medicine & Health

**Table Number:** H0904

**Student Name:** David Evans

**Team Members (if any):**

**Project Title:** A SOLUTION FOR POST-SURGICAL PAIN CONTROL A NOVEL SUSTAINED-RELEASE LOCAL ANESTHETIC COMPOSED OF HYALURONAN, FIBRINOGEN, AND MARCAINE

**Abstract:** Early postoperative pain is controlled for six to eight hours with the use of local anesthetic injections in nearly 85 percent of all surgical procedures. Pain models demonstrate that when pain is eliminated during the first 30 hours post-surgery, healing rates improve due to the absence of stress hormones and elevated blood pressure. I have designed and tested a new local anesthetic that provides a sustained release for over 30 hours. This anesthetic incorporates substances that can be found within the body and are FDA approved. Four different composites containing a combination of Hyaluronan, Fibrinogen, Heparin, and Marcaine were constructed and tested. Because high concentrations of Marcaine result in cardiac toxicity, therapeutic doses were used in all experiments. Upon adding each composite to simulated body fluid, Marcaine release kinetics were recorded by an ultraviolet-visible spectrophotometer at 4 hour intervals for up to 32 hours. Functional testing of the anesthetic was completed by exposing secondary murine dermal fibroblasts to the four composites. The cells were stained and viewed under a microscope every 8 hours for up to 32 hours, in order to determine cell viability percentages. The Hyaluronan/Fibrinogen/Marcaine composite provided the greatest Marcaine concentration at 32 hours, with a nearly constant release rate over time. The Hyaluronan/Heparin/Marcaine compound recorded the lowest concentration. In vitro fibroblast cultures, which were exposed to each of the four composites, demonstrated the highest viability percentage with the Hyaluronan/Marcaine combination. I have developed a new local anesthetic that provides a sustained release for over 30 hours. It has widespread surgical application and the potential to dramatically improve treatment of postoperative pain.

**Category:** Medicine & Health

**Table Number:** HT905

**Student Name:** Hannah Salcido

**Team Members (if any):** Siale Vaitohi

**Project Title:** Hand Sanitizer vs. Hand Soap

**Abstract:** The question for our project was: Is hand sanitizer more effective in killing germs than hand soap? Our hypothesis was that the hand soap would kill more germs than the hand sanitizer. We used a fake germ solution and a black light to see our results. We tested 15 people of different ages and genders to more accurately determine our results. We had them either wash their hands with one squirt of hand soap and water or two squirts of hand sanitizer. We took before and after pictures of their hands under the black light. We then took the percentage of germs remaining on the hands. The hand soap was MUCH more effective than the hand sanitizer. Our hypothesis was proved correct.

**Category:** Medicine & Health

**Table Number:** HT905

**Student Name:** Siale Vaitohi

**Team Members (if any):** Hannah Salcido

**Project Title:** Hand Sanitizer vs. Hand Soap

**Abstract:** The question for our project was: Is hand sanitizer more effective in killing germs than hand soap? Our hypothesis was that the hand soap would kill more germs than the hand sanitizer. We used a fake germ solution and a black light to see our results. We tested 15 people of different ages and genders to more accurately determine our results. We had them either wash their hands with one squirt of hand soap and water or two squirts of hand sanitizer. We took before and after pictures of their hands under the black light. We then took the percentage of germs remaining on the hands. The hand soap was MUCH more effective than the hand sanitizer. Our hypothesis was proved correct.

**Category:** Medicine & Health

**Table Number:** H0910

**Student Name:** Alison Schmidt

**Team Members (if any):**

**Project Title:** Can you hear that?

**Abstract:** Question: Is it age based for the ability to hear the high frequencies of the mosquito ring tones?  
Hypothesis: I think that yes it is age based. I think that the older you are the more hearing loss you have and are not able to hear the higher frequencies. Method: I got a disk of 13 ringtone frequencies each a number a higher frequency than the last starting at 8kHz as one and 22kHz as the last number. I went around my neighborhood and played each ringtone to everybody that I tested after I had asked everyone these following questions: age, gender, occupation, if there was loud noises at work, on average how much they listened to music everyday, and if when listening to music it was out of stereo or headphones. I played each ringtone to 78 people the same distance apart and the same volume. I then recorded the data of if yes they could hear it or no they couldn't. Based on the group I tested ( 78 people total, 38 males and 40 females) I found that my hypothesis was correct. It is age based. I than just wanted to see if more males could hear them or more females could. Out of my results for the most part males can hear more than females.

**Category:** Medicine & Health

**Table Number:** H0909

**Student Name:** Alizabeth Leake

**Team Members (if any):**

**Project Title:** Playing with Flour (2)

**Abstract:** Question: My question is whether or not the Acid denatures the Vitase or if it only temporarily inhabits the Enzyme. Hypothesis: I think the acid denatures the enzyme, because H<sup>+</sup> ions in the acid would attach to the charges on the enzymes and on the substrate. Experiment: I filled a jar of hydrochloric acid(stomach acid). I put in two tablets of Vitase, stirred and timed it for fifteen minutes. After fifteen minutes, I put forty drops of the acid Vitase mix in each of four different test tubes. In two, I added Biuret's reagents, and Iodine in the other two. I timed it for an hour, and then added baking soda for a neutral pH. I recorded any change in the Iodine or Biuret's reagents in Time increments. Conclusion: Based off of my results, the Acid denatures the enzyme. This means that once the enzyme comes in contact with the acid, it no longer works, nor will work when it is away from the enzyme. Because of this, the Vitase isn't an effective pill once it has entered the stomach and doesn't break down the gluten, showing that it doesn't effectively work for Celiacs.

**Category:** Medicine & Health

**Table Number:** H0908

**Student Name:** Austin Heder

**Team Members (if any):**

**Project Title:** Dominant Eye Dependency

**Abstract:** "I have a personal interest in athletic performance. For my experiment I chose to test the impact of eye dominance on athletic skills. My specific inquiry was whether athletes from hand-eye coordination sports would adapt better or worse than other people when their dominant eye was covered. I selected equal numbers of hand-eye coordination sport athletes (baseball, basketball and volleyball players, both boys and girls) and non-athletes. I put both groups of people through the same series of exercises with a basketball. I had 5 boys and 4 girls, all of similar age, shoot 30 free throws and throw 20 passes at a target with the benefit of both eyes. I then identified their dominant eye using a simple focus technique and covered it. Each subject was then required to repeat the exercises for a second time

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**Table Number:** H0911

**Student Name:** Jensen Hayter

**Team Members (if any):**

**Project Title:** Relationship Between Paxillin and Metastasis

**Abstract:** I began wondering what makes cells bind to a substratum. I began researching cell structure and motility and found out about the protein paxillin. After my initial research, I hypothesized that if cancer were induced in cells then the amounts of paxillin would decrease and fail to localize at focal adhesion points. I began research at the BYU labs. First, I was provided with 16 colonies of squamous epithelial cells. I divided the colonies into four groups of four. I then induced mock-cancer in 3 of the groups using HGF (Hepatocyte Growth Factor). Then using a procedure called methanol fixation, I stopped the cells in mid-movement at varying intervals of time. I stopped the first group at two hours, the next at four hours, and the last group at 6 hours. The last group (the one in which the cancer was not induced) was my control. I then stained the cells using immunofluorescence. Immunofluorescence is used to tag antigens. I stained the cells using tags on paxillin and actin. I then photographed the cells, keeping the groups together. After taking the pictures, I used my previous research to analyze what had to paxillin when cancer was induced in the cells. I determined that the paxillin had failed to localize at focal adhesions on the cell colonies. In the control group, the paxillin localized as it should. As time lapsed, however, the paxillin began to spread out. By the time six hours had passed the paxillin had not localized at all. I concluded that when cancer occurs the paxillin fails to work and therefore allows the cancer cells to metastasize.

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**Table Number:** H0912

**Student Name:** Regina Farley

**Team Members (if any):**

**Project Title:**

**Abstract:**

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**Table Number:** H0913

**Student Name:** Matthew Hales

**Team Members (if any):**

**Project Title:**

**Abstract:**

**Category:** Medicine & Health

**Table Number:** HT907

**Student Name:** Alex Parata

**Team Members (if any):** Christa Little

**Project Title:**

**Abstract:**