



# CALIFORNIA STATE SCIENCE FAIR 2008 PROJECT SUMMARY

<b>Name(s)</b> <b>Dhruba Banerjee</b>	<b>Project Number</b> <b>S1101</b>
<b>Project Title</b> <b>An Analysis on How Potassium Affects Hypertension</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Inside the circulatory system, sodium prompts the kidney to reabsorb water into the capillaries, increasing blood pressure. Although scientists are not sure why, ingesting potassium has been shown to moderately reduce hypertension. The purpose of this experiment is to test a theory that may answer the question, "How does potassium affect high blood pressure?" by focusing on and modeling the water reabsorption process of the kidneys.</p> <p><b>Methods/Materials</b> The collecting duct (of the kidney) lined with epithelium cells, the capillary, and the interstitial fluid in-between, are simulated using three dialysis tubes filled with condition-specific sucrose solutions submerged in a beaker. Sucrose is used, in place of sodium or potassium ions, because its molecules are large enough to not diffuse out-of the dialysis tubes. The water, as in the collecting duct, can passively diffuse out-of the dialysis tube. The volume of the water in the thistle tube is initially measured, and then re-measured after 30 minutes. A concentration of 0.3 M solution for all the tubes, serves as the control.</p> <p><b>Results</b> As hypothesized, when the sucrose concentration of the second dialysis tube is increased, the volume of water in the thistle tube increases 2.17 mL less than if the concentration of the second tube is not increased. This indicates that an increase of intracellular potassium in the transport epithelium can decrease the rate of osmosis. The data from the five trials are analyzed using standard deviation, to determine the precision, and T-tests, to determine whether the differences among averages of each condition are statistically significant.</p> <p><b>Conclusions/Discussion</b> In conclusion, this experiment proves, by chemical means, that the increased concentration of potassium in epithelium cells can inhibit the reabsorption process in the collecting duct. Such a process explains why potassium may reduce hypertension. In the future, a physiological model would be useful to re-examine this theory under a biological context. This experiment, however, is a critical building block that must precede the complications of biological testing. It is important to continue research into this subject, because a complete understanding of the functions and effects of potassium is necessary for making educated decisions when dealing with high blood pressure.</p>	
<b>Summary Statement</b> This experiment demonstrates, via a chemical model, that an increase in the potassium concentration of epithelium cells (in the kidney's collecting duct) may be the reason potassium decreases high blood pressure.	
<b>Help Received</b> I would like to acknowledge my mentors, Ms. Moilanen, Ms. Alonzo, and Ms. Loia, for all their input into this project. I would also like to thank my parents for their undeniable support and encouragement.	



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<b>Name(s)</b> <b>Aley Barnum; Emily Wright</b>	<b>Project Number</b> <b>S1102</b>
<b>Project Title</b> <b>Now You See It, Now You Don't: A Study of Chromatic Adaptation</b>	
<b>Objectives/Goals</b> The time of exposure and the time of adaptation are directly proportional. If the eyes are allowed a longer amount of time to chromatically adapt, then the effects of the adaptation will last longer.	
<b>Abstract</b> <b>Methods/Materials</b> Materials: Black box (wood, black spray paint, 24 screws); 2 clear plastic panes; 2 two-toned test photos (cause the adaptation); 2 "spotlight" LED lights; 1 12 volt battery; 1 switch; Wire; 1 timer button; DB-9 connector ; DB-9 to USB Cable; Dell Inspiron Laptop. Method: A box was designed to standardize the test subject's viewpoint, control any variables in timing and to display the required times on a laptop using a program designed for this purpose. Tests were held in a single room with a controlled amount of light. Participating students looked into the box at test photo A for a set exposure time of twenty seconds, and then were shown test photo B. The subject pressed the button when the effects of the chromatic adaptation began to wear off. Subjects were given a ten second break then tested again with set exposure time of thirty seconds. After another ten second break subjects were tested with set exposure time of forty seconds. Times from the beginning of viewing test photo B until the button was pressed were recorded along with gender, age, and any need of glasses.	
<b>Results</b> The recorded times were put into six groups by their correlation type: the way the line looked when the three recorded times were graphed. The groups were made by reasoning that each point is either the lowest (l), median (m), or highest (h) of its set, therefore each line must have a correlation of either l/m/h, l/h/m, m/l/h, m/h/l, h/l/m, or h/m/l. The results of the thirty tests from greatest to least were: h/m/l=13, m/h/l=6, l/h/m=5, m/l/h and l/m/h=3, h/l/m=0. Another result noted was that most test subjects had adaptation times between 5 and 35 seconds. No trends were found to be dependent on age, gender, or need of glasses.	
<b>Conclusions/Discussion</b> The data did not support the hypothesis in that the adaptation times were inversely proportional to the exposure time. The longer the eyes were allowed to chromatically adapt the shorter the adaptation was.	
<b>Summary Statement</b> To test the chromatic adaptability of the human eye using test pictures involving light and color.	
<b>Help Received</b> Father helped build and design test box	



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<b>Name(s)</b> <b>Autri Chattopadhyay</b>	<b>Project Number</b> <b>S1103</b>
<b>Project Title</b> <b>An Analytical Study of the Effects of iPods on Hearing Loss: Continuation of Research Year 2</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of my research is to find the effects certain patterns of iPod usage have on our hearing both at rest and when exercising.</p> <p><b>Methods/Materials</b> I required an iPod Video, a pair stock iPod headphones, a Sony Stereo and a quiet environment. There were two parts to my experiment. First I surveyed a group of 200 individuals to see the trends of iPod use and analyze them. Then, I had actual hearing tests where a subject listened to a song and I recorded at what levels he/she could hear and then reconducted this test using the same song after iPod use. I did this after listening at rest and at exercise. This was to see a measure of the change in audible range or the occurrence of a threshold shift.</p> <p><b>Results</b> I found through the survey that 86.5% of those surveyed owned an iPod. Of these 200, 58 listen at volumes of 60% or higher and 41 people listen longer than 10 hours a week. Trends showed that at 70 and 80 percent, over 65% of the users faced some hearing discrepancies. 88 people workout with their iPods and over 12% do so for more than 10 hours a week. Through the hearing tests, notices a large threshold shift at volumes of 60% or higher. Effects were minimal at 30 and 40% volume. Exercise doubled the effects on our hearing at volumes of 70% or higher, but still increased the effect of the noise at other volumes as well.</p> <p><b>Conclusions/Discussion</b> Through my study, I was able to estbalish a direct correlation between volume and the degree of threshold shift. This signifies a direct relationship between the volume we use our iPods and Noise induced Hearing Loss. However contrary to my thesis, exercise did not double the effects on our hearing for all of my test subjects but only those listening at 70% or higher. I would like to raise awareness of the importance of listening at safe volumes as I do not want my generation to suffer from "self-induced" hearing loss.</p>	
<b>Summary Statement</b> I tested to see how different patterns of iPod usage including duration, volume and exercise affect our hearing.	
<b>Help Received</b> Parents helped me build my board and drove me everywhere.	



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<b>Name(s)</b> <b>Stephanie T. Cuaderno</b>	<b>Project Number</b> <b>S1104</b>
<b>Project Title</b> <b>Does Natural or Commercial Food Increase Weight Gain the Most?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My purpose of my experiment is to find out if natural foods (mealworms, lettuce, carrots) or commercial food (pellets) increases weight gain the most. I want to know this answer because before I had a hamster and it gained a lot of weight during its lifetime. I thought maybe there is a chance I can control a hamster's weight with different foods. You see, my hamster was only fed commercial pellets, which seemed to be fattening to his health. Now, I have had the chance to attempt to solve the answer of weight gain in hamsters among different foods for the science fair project.</p> <p><b>Methods/Materials</b> To summarize the most important steps, this was my procedure: feed one hamster about 3 pellets (or as much as it can eat) and the other hamster about 5 mealworms, 2 baby carrots, and 2-3 small leaves of lettuce (or as much as it can eat). Weigh the hamsters for their starting weights, and then at a designated time every day, weigh them again and keep their food supplements in control. Try not to underfeed them, but give them extra food, even if they don't finish it. Then record your results.</p> <p><b>Results</b> I showed my results in charts that you can observe on my board. I recorded mainly each hamster's daily consumption and their weight gains during different trials. My first trial, my mistake was blindly allowing one hamster to eat as much as he wanted, and the other hamster finishing his own meal and not being able to continue. There, my results proved that with one hamster on a restricted diet of natural food and the other hamster eating normal food (1-2 pellets average), the commercial eating hamster gained weight and the natural food eating hamster lost weight. Then, I changed it so that both hamsters were allowed to eat to their extent and the natural eating hamster gained weight alongside the other hamster.</p> <p><b>Conclusions/Discussion</b> In conclusion, both natural and commercial food can increase weight gain, but the amount of food eaten and given to each hamster can greatly fluctuate the results. I also found that some of the natural food given to one hamster was a favorite which was why he ate so much, compared to the hamster who didn't like his pellets that much, so he didn't eat much of it. That influenced my results too.</p>	
<b>Summary Statement</b> My project is about what foods will affect the weight gain of hamsters the most.	
<b>Help Received</b> parent funded project; borrowed cage from friend	



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<b>Name(s)</b> Charles D. Dewey	<b>Project Number</b> <b>S1105</b>
<b>Project Title</b> <b>The Ramifications of Sound Stimuli on the Human Autonomic Nervous System</b>	
<b>Abstract</b> <b>Objectives/Goals</b> By using different tones to cause differing effects in people I found whether or not people's heart rates are changed by the tones I can find which tones soothe and calm people, and which tones cause the opposite response. <b>Methods/Materials</b> By using speakers to project different sounds produced through a media player, I record the information gained by heart rate monitors onto data sheets. <b>Results</b> The Ocean Waves sample on average lowered the heart rate, followed by the Thunderstorm sample. The Fast Tempo music increased the heart rate the greatest, followed by the Babbling Brook sample, then the Slow Tempo music sample. <b>Conclusions/Discussion</b> My hypothesis was partially correct, the Fast Tempo music sample did increase the heart beat, although the Thunderstorm lowered the heart beat instead of raising it. The Ocean Waves sample was the stimuli that lowered the heart beat the most, followed by the Thunderstorm, while the Babbling Brook stimuli increased the heart beat.	
<b>Summary Statement</b> I tested whether audio stimuli would change a subject's heart rate, and if so which sounds were the most effective.	
<b>Help Received</b> Richard Conlan allowed me use of his oscilloscope, Micheal Talley helped build the finger photoplethysmography board.	



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<b>Name(s)</b> <b>Emily Dolson; Sanaya Forbes</b>	<b>Project Number</b> <b>S1106</b>
<b>Project Title</b> <b>Anthropogenic Influences on the California Sea Otter (<i>Enhydra lutris nereis</i>) Population in Moss Landing Harbor</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The California sea otter (<i>Enhydra lutris nereis</i>) has been highly endangered since being nearly hunted to extinction one hundred years ago by fur traders. The population is taking far longer to recover than predicted. As the sea otter is a keystone species in the kelp forest ecosystem, it is crucial to understand what factors are inhibiting its growth. Human impacts, though widely suspected, have not been closely examined. The purpose of this project was to determine what effects, if any, humans have on sea otter well-being. What behavioral changes occur in sea otters when humans approach them? The hypothesis was that, if approached, sea otters would dive and swim away, thus inhibiting the thermoregulative abilities which are essential for survival. An important corollary hypothesis was that humans would approach sea otters, even though it is illegal.</p> <p><b>Methods/Materials</b> A raft of sea otters floating in Moss Landing Harbor was observed over four months, using a time-budget methodology to insure that results were statistically comparable. Every ten minutes, the location and activity levels of all otters were recorded, along with a variety of other factors that could affect sea otter behavior. Human interactions were noted as new entries, allowing comparison of alterations in group dynamics.</p> <p><b>Results</b> Through a comparison of differences in behaviors between these data points, it was determined that human approach changes otter behavior in a statistically significant manner. Otters tend to expend more energy when humans are present.</p> <p><b>Conclusions/Discussion</b> Our results suggest that human interaction may pose a threat to otters, by causing them to expend more energy than is available to them. They also suggest that a reexamination of current laws may be in order to more effectively protect otters; reducing the amount of space that boaters must maintain in between themselves and otters may increase compliance without harming the otters.</p>	
<b>Summary Statement</b> This project examines the changes in sea otter behavior that result from humans approaching them illegally.	
<b>Help Received</b> Mentor from Monterey Bay Aquarium helped with project design; parents helped with editing; teacher helped with organization	



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<b>Name(s)</b> Shay C. Edwards	<b>Project Number</b> <b>S1107</b>
<b>Project Title</b> <b>Prospective Study of the Effectiveness of Thermal Imaging in the Diagnosis of Arthritis</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this study is to see if a radiometric thermal imager can detect pre-clinical stages of arthritis in a quick and noninvasive method.</p> <p><b>Methods/Materials</b> To establish the effectiveness of thermography as a useful tool for diagnosis pre-clinical stages of arthritis in participants hands using a radiometric thermal imager a double blind test was performed. Participants filled out medical history about general health, height, weight, diabetes, smoking, and known diagnoses of arthritis. Participants were then assigned an identification number. During the 16 minute test participants were asked to submerge their left hand and to keep it moving while it was in <math>63^{\circ}\text{F} \pm 2^{\circ}</math> water for 1 minute. The left hand would then be dried and placed on a wood surface. A thermal image was recorded of the left hand every 4 minutes starting with a preliminary test image.</p> <p><b>Results</b> Inflammation in the interphalangeal joints is the first sign of arthritis. Inflamed joints are warmer. The distal interphalangeal (or DIP; the first knuckle), proximal interphalangeal (or PIP; the middle knuckle), and metacarpophalangeal (MCP; the knuckle at the base of the finger) were closely observed and evaluated. All participants with medical history of confirmed cases of arthritis by conventional methods were detected by the use of the radiometric thermal imager showing an elevated temperature of <math>4^{\circ}\text{-}5^{\circ}</math> in the interphalangeal joints.</p> <p><b>Conclusions/Discussion</b> The data from the test supports my hypothesis that thermal imaging can be a used to diagnosis arthritis. My data also identified 5 additional participants displaying pre-clinical stages of inflammation of the interphalangeal joints. This was a brief and simplified preliminary study designed to evaluate a cold stimulation test to learn whether it would be likely to yield valuable results.</p>	
<b>Summary Statement</b> Thermography simply identifies thermal anomalies using an infrared imager. This research proves that thermal imaging can be used effectively to detect pre-clinical stages of arthritis in the interphalangeal joints.	
<b>Help Received</b>	



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<b>Name(s)</b> Anna Gaona; Thea Grusky-Foley	<b>Project Number</b> <b>S1108</b>
<b>Project Title</b> <b>Stop, Drop, and Stare</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> We are trying to determine how much a dog's age affects their understanding of a spatial relationship between objects.</p> <p><b>Methods/Materials</b></p> <ol style="list-style-type: none"><li>1. A large number of dogs to test, with owner's cooperation, between 25-50 dogs.</li><li>2. Dog treats (strong smell)</li><li>3. Low table or tray (top needs to be above dog's eye level. You can hold a tray above the dog's eye level for large dogs)</li><li>4. Small cushion or towel</li></ol> <p><b>Results</b> The data that we collected from our tests showed that the middle-aged dogs have a better understanding of spatial relationships between objects.</p> <p><b>Conclusions/Discussion</b> We have come to the conclusion that middle-aged dogs have a better understanding of spatial relationships between objects. To further explain this, the middle aged dogs have a larger percentage of looking at the table, instead of their surroundings. The younger dogs had a hard time concentrating while the test were being performed. The results of the younger dogs were very close to those of the middle-aged dogs, but yet not complimentary. We also noticed that the older dogs had very low percentages, but it was partly because we had many more young-aged dogs than old-aged dogs.</p>	
<b>Summary Statement</b> We are trying to see if age affects a dog's understanding of a spatial relationship between objects.	
<b>Help Received</b> Mom did lots of spell checking (I'm dyslexic)	





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<b>Name(s)</b> <b>Ross L. Hillery</b>	<b>Project Number</b> <b>S1109</b>
<b>Project Title</b> <b>EEG Patterns of Video Game Players</b>	
<b>Abstract</b> <b>Objectives/Goals</b> In June, 2007 the American Medical Association (AMA) met to discuss the issue of video game addiction. The AMA stated that more research on this topic would be needed in order to determine whether or not video game addiction could be a given diagnosis. The purpose of this experiment was so study the effects video game playing has on the brain. <b>Methods/Materials</b> I chose a control group of casual video game players and a group of excessive video game players to test using the BrainMaster 2E by evaluating the data I collected from the surveys I issued. Each test session was 240 seconds long with electrodes placed at the Ten20 standard reference locations A1, A2, and C4. Three sessions were conducted; the first one resting, the second one playing video games, and the last one resting again immediately after playing. <b>Results</b> While the subjects played video games the data shows an increase in theta microvolts by 42% in casual gamers compared to the 19% increase in excessive gamers. After playing video games excessive gamers show an 8% increase in Alpha activity. However, statistical analysis shows that with p-values of 0.11 for theta and 0.42 for alpha respectively, there is no significant difference between the casual and excessive gamers <b>Conclusions/Discussion</b> My data showed slight differences in the brain activity of casual and excessive gamers but these differences are not significant. Other studies have shown that changes in brain activity do occur while playing video games but the extent of these changes and their long term effect is yet to be determined.	
<b>Summary Statement</b> My project observes EEG activity of 2 groups of video game players; casual and excessive.	
<b>Help Received</b> School provided EEG, Parents helped with board, Larry Kuhn answered a few questions i had related to an EEG	



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<b>Name(s)</b> <b>Austin Humphrey; Umar Khan</b>	<b>Project Number</b> <b>S1110</b>
<b>Project Title</b> <b>Age vs. BMI: A Two Year Study</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of the project was to figure out whether age or BMI played a greater role in a child's heart rate's response to exercise. This year we wanted to see if controlling the food intake would affect the results. We also controlled other aspects of the experiment too, to see what affect it had.</p> <p><b>Methods/Materials</b> Methods: Find Children that are willing to have their BMI measured and are willing to run; Measure distance for each age group (6 yr. olds- 25 yards, 12 yr. olds- 50 yards and 15 yr. olds- 100 yards); Measure each child's height and weight to calculate BMI; Measure heart rate before run and have children run, then measure heart rate after the run; Record results and continue procedure for each child.</p> <p>Materials: 36 children (Three Age Groups: 6, 12, 15 yr. olds, 3 abnormal BMI kids for each group, 3 normal BMI kids for each age group, female and male); Heart Rate Monitor; Weight Scale; Measuring Tape; Masking Tape; Note Cards.</p> <p><b>Results</b> This year's results greatly differed from last year's results. This year our data was supported by proven research. Our data showed that normal weight people had lower heart rate's than overweight and underweight people. This was true through all age groups. Because of this we concluded that BMI had a greater affect on heart rate than age. Last year's result were the exact opposite and were not supported by research.</p> <p><b>Conclusions/Discussion</b> We believe that last year's data was incorrect because the experiment was not as controlled, and all the students could have been from different cultures. Because of that some of them could have had too much food and others too little. This year we controlled the food intake in the morning. We also controlled the pace at the students ran to make the project better. This year our data was more accurate than last year's because of the elimination of all the variables. Also for next year's project, we plan to apply our knowledge from the last two years. We plan to test kids again and then we will sit down and make a health plan for all the studets. Then we would come back and test them again to see if the plans worked. That way we could help people live healthier lives and slowly raise awareness about health problems.</p>	
<b>Summary Statement</b> The project was about whether age or BMI played a greater role in a child's heart rate's response to exercise and if controlling the variables, such as food intake, would affect the outcome of the results.	
<b>Help Received</b>	



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<b>Name(s)</b> <b>Jill M. Jergens</b>	<b>Project Number</b> <b>S1111</b>
<b>Project Title</b> <b>The Manipulation of Scar Maturation</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of this experiment was to discover if an IPL laser treatment could be used to increase the rate of maturation of a scar. Because of its uses in decreasing hyperpigmentation, it was hypothesized that the IPL could also be effective in decreasing the hyperpigmentation of scars. Considering the versatility of the machine's capabilities, its treatments could extend to surgery patients of any kind who wish to minimize the effects of scarring.</p> <p><b>Methods/Materials</b> Three subjects were chosen for the experiment. Each subject is a middle aged female of Hispanic descent that underwent an abdominoplasty performed by the same doctor four months prior to experimentation. Each subject was photographed, using a digital camera, before receiving any treatment. Once a month, each subject received an IPL laser treatment on one half of the scar. The other half of the scar received no treatment. The same side of each scar was treated every time. The intensity level and specifications that are appropriate for the individual's skin type are programmed into the machine. Photographs are taken of the scar after all treatments are complete.</p> <p><b>Results</b> It was concluded that the IPL treatment increased the rate of maturation. The scars treated with the IPL laser showed a reduction in hyperpigmentation. This shows that the IPL was effective in shrinking the dilated and broken blood vessels under the scar that cause it to appear red.</p> <p><b>Conclusions/Discussion</b> The data supported the hypothesis, with the IPL laser treated halves of the scars producing more aesthetically pleasing results than the halves of the scars that did not receive this treatment. They were more aesthetically pleasing because of their reduction of redness and inflammation. The success of the IPL laser treatment was most likely due to its ability to treat dilated and broken blood vessels in the dermis layer of the skin that cause hyperpigmentation. This experiment could be improved by conducting a larger number of trials with more subjects, by quantifying the data using software technology to compare the amount of red color saturation in each photo or by taking measurements of the subjects' scars. This project could be expanded to testing other types of scar treatments such as topical creams.</p>	
<b>Summary Statement</b> An IPL (Intense Pulsed Light) laser machine was used to determine if the rate of maturation of a postoperative patient's scar could be increased, compared to the rate of maturation during routine postoperative care.	
<b>Help Received</b> Used patients and equipment of Dr. Verbin. Dr. Verbin performed laser treatments.	



# CALIFORNIA STATE SCIENCE FAIR 2008 PROJECT SUMMARY

<b>Name(s)</b> Casey M. Kelly	<b>Project Number</b> <b>S1112</b>
<b>Project Title</b> <b>The Effect of Body Mass Index, Leg Length, and VO2 Max on Ergometer Scores in Males and Females</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The goal of the experiment was to be able to determine what certain body types or characters set an individual up for rowing ergometer success.</p> <p><b>Methods/Materials</b> A consent form was given to 15 males and 15 females from the Marin Rowing Association, ranging from ages 14-17 years old, in order to have them perform a 4000 meter ergometer test. Prior to testing, each subject was measured for height (in centimeters), weight (in lbs.), and leg length (in cm). An online body mass index calculator was used to determine each individual's BMI. VO2 max was taken from the size of the individual and their corresponding erg results. After the subjects finished the 4k, their time and watts were recorded. Each independent variable and result was run through descriptive and inferential analysis to determine accuracy and significance.</p> <p><b>Results</b> The descriptive statistics show a correlation between BMI and VO2 levels and not leg length but when run through t-tests, the inferential statistics show that there is no correlation between either BMI and leg length. There is a linear correlation with VO2 max, however it was discovered that this data was invalid for further analysis (see conclusion/discussion). In both males and females for BMI and leg length, the t-calc value was larger smaller than that of the t-critical value, which indicates that there is not any statistical significance between the variables and the results. The t-tests did show that these results were accurate and reliable.</p> <p><b>Conclusions/Discussion</b> From this data it was concluded that Body Mass Index and leg length do not have any statistical significance on ergometer scores in males or females. VO2 max was not viable to draw conclusions from due to an error in the experimental design. BMI, most likely did not correlate with ergometer scores because this experiment tested fit athletes racing at a collegiate level, hence many of the subjects had similar low BMIs. Leg length did not correlate to a better erg score (the higher the watts, the better the score) because, although leg length gives one a longer stroke, it does not necessarily bring more power and increased wattage. VO2 Max had to be discarded due to a flaw in the design. Due to time, coaching, and availability constraints I had to use a race test formula to calculate each individual's VO2 max, therefore it was ensured that they would directly correlate.</p>	
<b>Summary Statement</b> This experiment was intended to draw connections and predict successes between BMI, leg length, and VO2 max on ergometer scores in males and females.	
<b>Help Received</b> My science teacher proofed by experimental design before I performed it.	



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<b>Name(s)</b> <b>Joseph S. Levenson</b>	<b>Project Number</b> <b>S1113</b>
<b>Project Title</b> <b>The Effect of Transcendental Meditation on Resting Heart Rate</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of this research was to compare the difference in heart rate change between an eyes open and an eyes closed period for Transcendental Meditators and non-meditators. It was hypothesized that those who practice transcendental meditation would exhibit significant reduction in heart rate between the periods of when they were simply resting with their eyes open and when they were practicing Transcendental Meditation with their eyes closed; as compared with non meditators whose heart rate change was measured between periods of eyes open resting and eyes closed resting.</p> <p><b>Methods/Materials</b> Meditators practiced the technique of Transcendental Meditation during the eyes closed period and the non-meditators simply sat with their eyes closed. Twelve Transcendental Meditators and twelve non-meditators were selected to participate. They were measured during the two periods using a Polar F11 heart monitor as they sat in a standard chair. The eyes open period lasted five minutes and the eyes closed period lasted ten minutes. Heart rate measurements were taken at minute intervals.</p> <p><b>Results</b> The meditators' average heart rate change was an average decrease of 6.47% between the two periods with a median change for that group being a 6.58% decrease. The non-meditators' average heart change was an average increase of 3.54% between the two periods with a median change for that group being a 1.34% increase. Eleven out of twelve meditators' average heart rate decreased between the two periods with all eleven having a greater heart rate percent decrease than any one of the non-meditators had between the two periods.</p> <p><b>Conclusions/Discussion</b> The study clearly demonstrated that Transcendental Meditators' resting heart rates will likely decline while they are meditating. When that decline is compared to a change in heart rate for non-meditators between the two periods studied, the meditators' change was profound. In fact, through statistical analysis, it was concluded that the likelihood of this data resulting from chance was less than 0.5%.</p>	
<b>Summary Statement</b> My project was about seeing if Transcendental Mediation had an effect on resting heart rate.	
<b>Help Received</b> Father helped supervise the measuring of human subjects; Dr. Hoffman helped give advice with the statistical analysis of my project; Penny Hintz helped in the networking of meditators.	



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<b>Name(s)</b> <b>Olivia K. Puckett</b>	<b>Project Number</b> <b>S1114</b>
<b>Project Title</b> <b>Man: A Dog's Best Friend?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> In "Man: A Dog's Best Friend?" the objective was to investigate whether or not culture has an effect on brain hemisphere dominance in dogs.</p> <p><b>Methods/Materials</b> Thirty canine test subjects and their owners were surveyed via video camera and written survey before average angles of tail wagging were calculated and brain hemisphere dominance was found. Brain hemisphere dominance tendencies were compared in each dog/owner combination.</p> <p><b>Results</b> It was found that 38.71% of dogs that had been owned by the same owner since they were puppies had the same dominant brain hemisphere, 32.26% of dogs that were owned by the same owner since they were puppies had different dominant hemispheres than their owners, 12.9% of dogs that were not owned by the same owner all their lives had different dominant hemispheres, and 16.13% of dogs that were not raised by the same owner since they were puppies had the same dominant brain hemisphere.</p> <p><b>Conclusions/Discussion</b> The hypothesis "if the same people have raised their dog since it was a puppy, then the dog will have the same dominant hemisphere as its owner" turned out to be correct, according to the sample of thirty canines from the High Desert of Southern California. Humans do affect their dogs' dominant brain hemispheres, so they might even affect their beloved furry friends in other ways, too.</p>	
<b>Summary Statement</b> "Man: A Dog's Best Friend?" investigates whether or not a dog's owner affects it's brain hemisphere dominance tendencies.	
<b>Help Received</b> Mother provided transportation to the homes of various dog owners; Various friends and family members gave a little bit of their time to promote scientific research about their effects on their dog's or dogs' brain hemisphere dominance tendencies	



**CALIFORNIA STATE SCIENCE FAIR  
2008 PROJECT SUMMARY**

<b>Name(s)</b> Sarah E. Rice	<b>Project Number</b> <b>S1115</b>
<b>Project Title</b> <b>Does Noise Physically Stress Mus musculus, the House Mouse?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> Everyday, we experience various levels of stress, good and bad. Being exposed to continuous stressors can show up in various physical or mental behaviors. My goal was to determine if exposed to constant noise will cause rapid weight loss, loss of appetite and aggression. In order to answer these questions, I decided to conduct my scientific experiment using Mus musculus (mice). <b>Methods/Materials</b> Separate 24 mice into four groups: 4 female and 4 male for the control groups and 8 female and 8 male for the test groups. The control groups will only bare the ambient noise and be placed in separate fish tanks. The exposed groups will be subjected to between 55 and 80 decibels (dB) of noise using the metronome for 1 hour, each day, but no more than 90 dB of sound to ensure their humane treatment. Place each group in a wire cage. Since the mental state of the mice can not be determined, observe their physical behaviors. This will include the amount of exercise, along with the amount of food eaten. Weigh each mice everyday, for 10 days, to ascertain any other physical changes. <b>Results</b> The exposed male group became aggressive. The female ambient group had an 8.6% weight loss; the female exposed group had a 2.2% weight gain and no sign of aggression. The male ambient group had a 16.0% weight gain, and the exposed male group had a 6.9% weight gain with no sign of aggression. <b>Conclusions/Discussion</b> After my testing, the exposed male mice did become aggressive, but they did not drastically lose weight. As I predicted, the exposed female mice did lose weight from days 5 through 8, but ended up gaining weight by the end of the experiment. The female ambient group also lost weight.  Various factors may have caused my data to be inaccurate due to preexisting conditions of the mice and my scale may not have been precise.	
<b>Summary Statement</b> This project was conducted to determine if constant noise will stress the Mus musculus by observing their physical behavior and change in weight.	
<b>Help Received</b> My mother showed me how to use the Excel program and transported me to buy the necessary supplies. Mrs. Fusco allowed me to borrow her sound level meter. Dr. Chevront approved and certified my experiment. Lastly, Mrs. Cox, my biology teacher, helped me figure out my project idea.	



# CALIFORNIA STATE SCIENCE FAIR 2008 PROJECT SUMMARY

<b>Name(s)</b> <b>Helena (Hao) Wu</b>	<b>Project Number</b> <b>S1116</b>
<b>Project Title</b> <b>Comparison between Alcoholic and Nonalcoholic Liver Using CT Phantom Calibration</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective is to engineer a noninvasive methodology for precisely determining the volume, mass, and density of the liver. The secondary goal is to apply this method to obtain an accurate calculation of the average mass, volume, and density of nonalcoholic livers compared to alcoholic livers (patients who consume 1 to 3 drinks per day). Previous techniques for finding organ measurements relied on autopsy and blood tests were used to detect liver disease.</p> <p><b>Methods/Materials</b> This study innovates a medical imaging method that focuses on the use of Computed Tomography (CT) and Phantom calibration, which creates a standard for evaluating the fluctuations on the scanner and electric current. Anonymous CT scans with full-body Phantom for 60 non-alcohol consuming patients and 35 alcohol consuming patients were obtained from CT database. Image results were analyzed using software program Reformat. Histograms and two sample t-tests were created for statistical analysis.</p> <p><b>Results</b> The data collected from the patient population revealed that both consistency and accuracy were achieved using the Phantom calibration and differences in averages between normal and alcoholic measurements were successfully determined. Results indicate that alcoholic livers are larger in volume compared to nonalcoholic livers and the fat content is also higher in the alcoholic group. No significant difference in density was found. In regards to other measurements, alcohol consuming patients demonstrate a higher ratio for liver mass, volume index, and mass index.</p> <p><b>Conclusions/Discussion</b> It was concluded that Phantom calibration in CT scans produced more accurate results than autopsy or CT alone. The liver measurements can be utilized as a guideline to detect abnormalities in volume, mass, and density of the liver, which can be the first signs of alcohol related disease such as cirrhosis and fatty liver. The contributions of this project may be utilized for future research in assisting doctors in making early liver disease diagnosis for patients.</p>	
<b>Summary Statement</b> An innovative and noninvasive method for the early diagnosis of liver disease was engineered by using CT Phantom Calibration to compare volume, mass, fat content, and density measurements in alcoholic and nonalcoholic livers.	
<b>Help Received</b> Used lab equipment at Harbor UCLA Medical Center under the supervision of Dr. Budoff; funded by the Southern California Academy of Sciences.	





**CALIFORNIA STATE SCIENCE FAIR  
2008 PROJECT SUMMARY**

<b>Name(s)</b> <b>Macy Yang</b>	<b>Project Number</b> <b>S1117</b>
<b>Project Title</b> <b>The Sound of Music</b>	
<b>Objectives/Goals</b> The main objective of the experiment was to see which type of music (blues, classical, hip-hop, rap, and rock) would increase and decrease heart rate. Hypothesis: If you were to listen to fast rhythm music, like rap, then your heart rate will increase.	
<b>Abstract</b> <b>Methods/Materials</b> 1. Have volunteers rest for 20 minutes. 2. Ask the first volunteer to sit in the comfortable chair and relax. 3. Take the volunteer's pulse using a heart rate monitor, simply read the display and record the rate. Record in your notebook under the heading "No Music: Resting Heart Rate." 4. Place the headphones or earphones over the volunteer's ears, and play the first song you selected. Make sure the volume is comfortable and the same for all the songs. 5. Take the volunteer's pulse twice during the song: halfway through the song and right after the song ends. Record the two heart rates in your notebook. 6. Let the volunteer relax for 2 minutes before playing the next song. 7. Repeat the steps 4 through 6 for the rest of the songs. 8. Repeat the whole experiment with the rest of your volunteers. The materials I used were 10 Volunteers, Comfortable Chair, Heart-Rate Monitor, Stopwatch, Headphones or Earphones, CD player or I pod or mp3, Pens and Pencils, Notebook, 1 Blues Song, 1 Classical Song, 1 Hip-Hop Song, 1 Rap Song, and 1 Rock Song.	
<b>Results</b> The results of this experiment show that listening to hip-hop and rap music causes your heart rate to increase and listening to classical and blues decreases and/or steadies your heart rate. My results supported my hypothesis because the overall volunteers scored higher heart rates in fast rhythm music than in slow, steady music.	
<b>Conclusions/Discussion</b> Throughout this project, I found out that it is not the kind (style) of music but the pace (Is the beat fast or slow?), since sometimes classical can cause your heart rate to beat faster and sometimes rap can cause your heart rate to beat slower, it mostly depends on the pace of the song. So, when choosing songs for this project make sure to choose rap with fast rhythm beats and classical with slower beats.	
<b>Summary Statement</b> Basically, my project is on the different types of music affecting the heart rate, either by increasing or decreasing heart rate.	
<b>Help Received</b> Sister helped me cut my board's title; Brother loaned me his mp3; Biology Teacher helped me with my graphs; STAPLES and my mother helped me with the printing the work.	