



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Hannah H. Andrade	Project Number S1401
Project Title Pick a Turn, The Fastest Turn	
Abstract Objectives/Goals Which turn is the most efficient for the transition between Backstroke to Breaststroke: the "Dropdown" turn, the "Swivel" turn, of the "Flip" turn? Methods/Materials Materials needed were: pen/pencil, data sheets, swimmers, and a stopwatch. The Methods were: 1) Obtain materials listed above; 2) Have swimmers perform the "Dropdown" turn; 3) Record time on data sheets; 4) Have swimmers perform the "Swivel" turn; 5) Record time on data sheets; 6) Have swimmers perform the "Flip" turn; 7) Record time on data sheets; 8) Repeat steps 2-7 as many times as necessary; 9) Compare the averages of the turns; 10) Conclude Results The "Dropdown" turn proved to be the fastest transition turn when compared to the "Swivel" turn and "Flip" turn. Conclusions/Discussion The "Dropdown" turn was found to be faster overall, when compared to the "Swivel" turn and "Flip" turn. Originally, it was thought that the "Flip" turn would be more effective, and that height and/or body mass differences would effect teh times. Not only were both disproved, but it was additionally found that more or less oxygen did not effect the results. The swimmers stayed around the same time after a strenuous workout as with an easier one.	
Summary Statement This project was on testing which transition turn from Backstroke to Breaststroke was the most efficient for swimmers: the "Dropdown" turn, the "Swivel" turn, or the "Flip" turn.	
Help Received My parents gave me the idea for this project and woke up at five in the morning to drive me to the pool; my sister, Olivia, for doing the same turns over and over again; Genie Chung, who performed the turns; Jenna Adams, who performed the turns; and Will Prier, who performed the turns.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Candice Bentley; Emily Dolson	Project Number S1402
Project Title Anthropogenic Influences of the California Sea Otter (<i>Enhydra lutris nereis</i>)	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals 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. In Phase I of this project it was established that otter behavior is significantly different in the presence of humans. Phase II goes on to examine whether or not this poses a risk to the otters by attempting to determine exact caloric costs of human encounters. Additionally, it attempts to generalize prior results by expanding the range of study.</p> <p>Methods/Materials Sea otters in various locations along California's coast were observed over a duration of fourteen 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>Results Pre-existing estimates of the caloric costs of various activities were used to establish average daily caloric expenditure projections for otters in close proximity to humans, otters over 100 yards away from humans, and otters with no humans present. Additionally, a chi-square test was used to compare the differences between the time budgets of otters living in an area with much human disturbance and those of otters living in an area with little human disturbance.</p> <p>Conclusions/Discussion The data support the hypothesis that human interaction could potentially have a significant impact on otter survival. Worst case estimations suggest that human-induced energy expenditure could necessitate that each otter consume the equivalent of an additional abalone per week. In a food-limited environment, this is a serious concern.</p>	
Summary Statement This project seeks to determine whether or not human-induced behavior changes are having a significant effect on the survival of the California sea otter population.	
Help Received Marissa Veins of Monterey Bay Aquarium oversaw project design, Jane Orbuch (teacher) provided further guidance	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Charles D. Dewey	Project Number S1403
Project Title Use of High Frequency Sound to Detect NIHL	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To Determine influence of Noise induced hearing loss v. presbycusis caused by direct application of sound, ie listening to more than an hour of loud music per day.</p> <p>Methods/Materials I used an oscillator to generate the high frequency tones, ultrasound, and a Fender Passport 250 to produce the tones on the 41 high school test subjects. the experiment was repeated three times for precision and accuracy.</p> <p>Results The Noise induced hearing loss that occurs in the subjects that are exposed to over an hour of loud music per day was starkly evident.</p> <p>Conclusions/Discussion The Noise induced hearing loss that the subjects experience is significantly greater than the hearing loss of the subjects that experience only presbycusis. If students listen to over an hour of loud music a day the shall become significantly more deaf than those students who do not listen to loud music.</p>	
Summary Statement Determining the Influence of Loud music through Noise induced hearing loss.	
Help Received Micheal Talley provided Oscillator; Mr. Ruggieri provided Fender Pasport 250 and music room usage	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Shayson C. Edwards	Project Number S1404
Project Title Detecting Median Mononeuropathy and Carpal Tunnel Syndrome through Radiometric Thermal Imaging	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this study is to see if a radiometric thermography can detect Median Mononeuropathy in the articulation radiocarpalis and to establish the efficiency of thermal imagery as a viable technique for establishing the trends of Carpal Tunnel Syndrome and Median Mononeuropathy.</p> <p>Methods/Materials A double blind test was performed. Participants completed a medical history about general health, height, weight, diabetes, smoking, blood pressure, occupation, and acknowledged if pain in the wrist area. After 10 minutes acclimating to a controlled room temperature of 68° F ±2° a preliminary image was recorded of the predominate hand; palmar and dorsal views. The test exercise was preformed with a rotating extended arm while applying pressure with a pliable ball repeated 20 times. Radiometric thermal images were recorded of palmar and dorsal views of the predominate hand.</p> <p>Results Thermal imaging was used to identify Median Mononeuropathy of the predominant wrist among 69 participants. Eighteen participants with reported wrist pain 85% were identified with elevated temperature in the palmar and dorsal hand of which 70% were comprised of diabetics. These results suggest that patients with diabetic neuropathy necessitate exceptional deliberation with regard to the evaluation of suspected carpal tunnel syndrome. I also have reported in my data that smokers have a higher rate of detected elevated heat in their wrist area giving credence to the theory that smokers and diabetics have a higher incident rate of median Mononeuropathy.</p> <p>Conclusions/Discussion Whereas an x-ray indicates structural anomalies, thermography can point out functional anomalies. Sufficient heat was emitted in the palmar and dorsal views of the predominate hand. Swelling and or injury to the articulatio radiocarpalis region was identified and significant prevalence of carpal tunnel and Median Mononeuropathy appeared in participants with compromised (diabetics and smokers) circulatory systems contrary to popular belief of frequency in repetitive motion. The data from the test supports my hypothesis that thermal imaging can be a used to identify Median Mononeuropathy.</p>	
Summary Statement This research proves that thermal imaging can be used effectively to identify prevalence of Median Mononeuropathy not related to repetitive motion.	
Help Received Imager on loan from Southern California Edison; R. James Seffrin	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Charles S. Fausto	Project Number S1405
Project Title Vision Therapy: Measuring Prescription Percent Improvement among Visually Impaired Patients Undergoing Vision Therapy	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals While there are many quick fix procedures open to the general public, such as Lasik Eye Surgery, Visual Therapy is an available branch of alternative medicine for the visually impaired. My hypothesis proposes that vision therapy will increase eyesight performance and specifically decrease impairment by at least 30% in less than four months.</p> <p>Methods/Materials I have collected data from three local certified professionals who supervise my fourteen subjects# optical needs by means of vision therapy. Physically, I returned to visit each therapist on a monthly basis. No researcher to patient interaction ever occurred. The only human interaction taken place was between that of the patient and doctor. Moreover, the identities of the subjects used in the research was kept anonymous for confidential reasons. Over a three month period, data was collected in a bi-monthly fashion. No direct materials were personally used on my behalf to determine the prescription values among the patients. The duty in action belonged to the visual therapists, whom I had a chance to observe performing visual therapy sessions.</p> <p>Results Based on my overall analysis of the subjects, the visual impairments of the subjects averaged a prescription decrease of 41.38% over a span of three months. In addition, each subject averaged a 6-10% prescription change each week within the first three months of beginning vision therapy.</p> <p>Conclusions/Discussion Within my research, the value of vision therapy is no discarded matter. In only three months, a 41.38% impairment decrease was observed among fourteen diagnosed visual therapy patients. The subjects proved to religiously continue their visual therapy procedures during the three months and finish with an unconsciously clearer view of the world near the study#s end. While a handful of variables were not accounted for in this particular experiment, future research of vision therapy may include gender, age, specific eye diseases, time spent on strenuous eye labors, and even environment. While a few months period is relevant, a year-long study would be even stronger. With a year-long amount of data collections, I would be able to delineate the possible plateau beginning to develop. Moreover, a deeper comparison between surgical eye procedures and alternative visual therapy may exist in a qualitative light.</p>	
Summary Statement As an alternative route to surgical procedures, my project focuses on the efficacy of visual therapy to, potentially, society at large.	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Tedford W. Fong	Project Number S1406
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Project Title
Effects of CMS Change of Lowering Hgb Threshold for ESAs in Cancer Treatment on Blood Transfusions in OC Cancer Centers

Abstract

Objectives/Goals

To measure the effects of the Centers for Medicare and Medicaid Services, CMS, policy change that lowered the erythropoiesis stimulating agent, ESA, utilization threshold from a hemoglobin of 12 g/dl to 10 g/dl on the utilization of red blood cell transfusions in Orange County community cancer centers.

Methods/Materials

Monthly red cell transfusion records from 2005, 2006, 2007, and 2008 were obtained from Orange County's two largest cancer care providers, St. Joseph Hospital and Hoag Memorial Hospital: City of Hope (National Cancer center control); and three Kindred Hospitals (chronic care facility controls).

The monthly rbc transfusions during the 14 months before the CMS policy change of July 1, 2007 were compared with the monthly rbc transfusions for 14 months after the policy change for each study facility, all Orange County facilities; and all cancer facilities combined.

These changes were compared with the historical growth in rbc transfusions between 2005 and 2006 for each facility and the before versus after CMS policy change in the control chronic care facilities, Kindred Hospitals.

Results

St. Joseph Hospital had a historical growth in red blood cell transfusions of 1.9% (-2% deviation) versus 4.6% increase in transfusions(-6% deviation) after the CMS policy change. Hoag Hospital had a historical red cell transfusion growth of 0.1% (-3.7% deviation) versus a 19.3% increase (-8% deviation) after the CMS policy change. As a whole, Orange County Cancer Center had a 1% historical increase in transfusions versus an 11.5% increase after the policy change. The National Control had a historical increase of 9.5% versus a post policy change of 10.0%. The non-cancer controls, Kindred Hospitals, experienced a 16.4% increase before and after the policy change.

Conclusions/Discussion

There was a definite increase in red blood cell transfusions in Orange County's community cancer centers following the CMS policy change that could not be explained by the historical growth in the cancer population. The study illustrated the unintended consequence of the CMS National Coverage Determination on erythropoiesis stimulating agents,ESAs, that lowered their threshold for utilization from a hemoglobin of 12 g/dl to 10 g/dl: the restriction led to a significant increase in red blood cell transfusions in Orange County community cancer centers.

Summary Statement

How CMS's decreasing the ESA use affected red blood cell transfusions in Orange County cancer centers.

Help Received

Medical Oncology Association of Southern California sponsored project.



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) April Jianto; Tzu-Ting Wu	Project Number S1407
Project Title Dancing to the Music: Lefty Canines Groove to Tunes	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of our project was to find out if dogs, like humans, have a paw preference for their daily activities; and if dogs do indeed have a paw preference, does it correlate to their reactions to music just like humans? Human hand dominance indicates which side of their brain is more developed. Right-hand dominance leads to a more developed left side brain and vice versa. The right brain controls the artistic and creative part while the left brain controls logic and reason. Therefore, right-brain-dominant people are more likely to be musicians and artists. We wanted to see if this was also true with dogs.</p> <p>Methods/Materials We acquired our data by distributing surveys/release forms to the owners regarding their dog. Then for each dog, a series of three tests were each performed five times. The first was a handshake test: We asked the dog for a handshake. The second was a tape test: A small piece of masking tape was stuck on the dog's nose. The last test conducted was a treat test where a piece of a dog treat was placed underneath a low-laying piece of furniture. Then after all these tests to figure out the dog's paw preference, the music test was initiated. Two song genres were chosen-- pop and classical and we observed what reactions the dog had to them.</p> <p>Results From our data, the results yielded were that for the first test, the handshake test, 16 dogs (53%) of dogs used their right paw; the Tape Test had 22 dogs (73%) use right paw; and the Treat Test had 12 dogs (40%) use right paw. Through the second part of our experiment, the Music Test-- having dogs listen to two different genres of music-- we had 5 left pawed dogs react to the classical music and 6 left pawed dogs react to the pop music.</p> <p>Conclusions/Discussion Out of the thirty dogs tested, for each of our tests, more than 50% of the dogs showed right paw preference indicating that our hypothesis is correct. Left pawed, or right brained dominant dogs, do show a greater response to music compared to the right pawed, or left brain dominant dogs. This proved that dogs, like humans, have hemispheric lateralized behavior that matches the theory of lateralization of function of brains. The information gained may help in selection of service dogs or hearing dogs, as left brained dogs with better logic may respond to physical commands better while right brained dogs may respond to sounds better to alert their partner.</p>	
Summary Statement Our project was to determine a dog's paw preference, its correlation to dog's brain dominance, and then whether or not it effected their musical reactions.	
Help Received Borrowing friends' dogs to use as our subjects.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Drake J. Lasley	Project Number S1408
Project Title Can You Take the Pressure?	
Objectives/Goals Is it possible to breathe with an extended snorkel at a depth of 396.24 cm (13 feet). If not, what depth and pressure will restrict the ability to breathe?	
Abstract Methods/Materials 1 snorkel, length 396.24 cm (13'), diameter 1.27 cm (1/2"); 1 snorkel, 396.24 length (13'), diameter 2.54 cm (1"); Pressure meter; Weight belt; Meter stick; Calculator; Camera; Glass jar; Pool, with a depth of 396.24 cm, (13') 1. Starting at the top of the pool, get a pressure reading, record the number. 2. Continue down the pool in 30.5 cm (1') intervals, attempting to breathe at each interval. 3. Return to the surface, record results. 4. After recording all data, take the pressure readings and calculate barrier depth. 5. Repeat steps 1-4 with the larger diameter snorkel. 6. To calculate the effect of pressure on a fixed amount of gas, I will fill a glass bottle with air and move down the pool in the same intervals, observing the changes in the amount of water in the bottle.	
Results 1. 30.5 cm (1')-Pressure 782.4 mmHg (15.12 PSI). There was no difficulty breathing. 2. 61 cm (2')-Pressure 804.8 mmHg (15.56 PSI). Breathing was possible, but it was difficult. 3. 91.4 cm (3')-Pressure 827.3 mmHg (16 PSI), resulting in extreme difficulty breathing. 4. 121.9 cm (4')-Pressure 849.7 mmHg (16.4 PSI), and it was no longer possible to breathe. 5. 109.22 cm (3' 7") Pressure 840.3 mmHg (16.24 PSI). I was able to get an 1/8 of a breath. 6. While at these depths, I had a pain in my diaphragm, which was trying to initiate Boyle's Law. 7. I did not feel any difference in the two different diameters. 8. While experimenting with the glass jar and the fixed volume of air, I saw that even at the 30.5-cm (1 foot) level, the air was already being compressed	
Conclusions/Discussion After finishing, I learned that the depth a person can no longer breathe is 109.2 cm (3' 7"). The pressure at this depth was only 840.3 mmHg, or only 16.24 PSI. The difference between the surface pressure and depth pressure was 80.3 mmHg, or 1.55 PSI. When experimenting to see what effects pressure had on a fixed volume of gas, I learned that even at 30.5 cm (1') level the amount of air was already starting to be compressed. When the bottle of air was at the 304.8 cm (10') level, the volume of air was almost reduced by half!	
Summary Statement This experiment will seek to examine if water depth will inhibit the ability to breathe with an extended snorkel.	
Help Received Former Physiology teacher helped provide accurate depth measurement.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Amy H. Lee; Thomas T. Wooding	Project Number S1409
Project Title Lead Bullets Poisoned the Condors. Are Grizzly Bears Next?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this project is to determine if lead from a hunter's bullet is absorbed in condor, bear, and human digestive fluids.</p> <p>Methods/Materials To represent typical bullets and shot used by hunters, lead bullets from a 30-06 and a .22 rifle and steel and lead shot from a shotgun were fired into separate boxes of dense paper. Then stomach solutions were simulated at a pH of 1 and 2 for a bear, 3 and 4 for a human, and 1.9 for a condor. The bullets and fragments [and paper with embedded fragments, referred to as simulated tissue] were collected and placed into the respective simulated stomachs and heated on a hot plate to 37 degrees C for appropriate digestive periods. The fluids were then filtered through acid-free filter paper and a potassium chromate test was conducted for the condor stomach, and sodium sulfate tests were conducted for the bear and human stomachs. For the condor fluid, a qualitative test was performed, but for the bear and human fluids, quantitative tests were performed where the amount of lead that was absorbed in the digestive process was calculated. The process was repeated three times for accuracy.</p> <p>Results For the condor digestive fluids, the steel shot contained no lead, but indicated a positive test result for absorption. The steel shot pellets were a bright gray color, but after the experiment, they became a dull gray color. The copper bullets showed a negative test result. The lead fragments with the simulated tissue was slightly yellow, indicating a low lead presence in the solution. The .22 fragments with simulated stomach tissue turned slightly yellow also. They tested positive and had the second brightest yellow result. The lead fragment results were positive and were the brightest yellow, indicating the highest lead content. For the bear stomach, the pH 1 was ver faint white color. The pH of 2 showed on opaque color which represents a high amount of lead. For the human, the pH of 3 was a pale shade of white. The pH of 4 had a significant opaque color within drops of the sodium sulfate.</p> <p>Conclusions/Discussion The hypothesis that condors, bears, and humans absorb lead from hunter's bullets was supported.</p>	
Summary Statement This project is to determine the presence and amount of lead and corrosion in bullet fragments absorbed in simulated digestive fluids of a condor, bear and human.	
Help Received Mr. Cosner, our science teacher helped us run the project ; Mr. Eric Wooding assisted us in shooting the bullets.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Joseph S. Levenson	Project Number S1410
Project Title Psychometric Comparison of the ADAS with a Computerized Measure of Reaction Time among Alzheimer's Disease Patients	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Alzheimer's Disease can only be diagnosed clinically by documenting the presence of dementia. The Alzheimer's Disease Assessment Scale (ADAS) has become the de facto gold-standard for assessing the efficacy of anti-dementia treatments. Another test is the Perception-Response Evaluation (PRE), which was essentially developed by CMINDS as a warm-up test to the ADAS. Importantly, the PRE provides a measure of simple nonverbal reaction time (RT), simple verbal RT, and reversed verbal RT. This study set out to discover, Is the PRE test more sensitive to decline in cognitive function in Alzheimer's patients than the traditional ADAS test?</p> <p>Methods/Materials The purpose of the current investigation was to conduct a longitudinal, psychometric comparison of the ADAS with the administration of the Perception Response Evaluation Test (PRE), among a representative sample of nineteen patients with Alzheimer's disease. The data to be analyzed in the current project included participants' scores on the computerized ADAS and the reaction time (RT) measures from the PRE. These data were compared for longitudinal trends across a study period of roughly 12 months in duration. Specifically, the experimental hypothesis was tested by comparing the slopes of these respective measures across time.</p> <p>Results The study showed that both the ADAS and the Reversed Verbal (RV) Measure of Reaction Time (RT) have similar reliability, but the RV showed more sensitivity to decline. Test-Retest Reliability was measured, using Pearson's R Correlation. The R for the ADAS was 0.77 and 0.79 for the RV test with both p values less than 0.001. However, when correlation was measured between the two tests, it was shown that there was no significant correlation between performance on the ADAS and performance on the Reaction Time test, which may indicate that these two tests may measure fundamentally distinct cognitive processes.</p> <p>Conclusions/Discussion The study has shown that both the ADAS and the RV-RT task are reliable and sensitive measures of decline, but that the RV-RT may provide a more sensitive measure of executive functions. Based on the current results, it may be reasonable to suggest that the RV-RT task may have potential for supplementing current best practices for evaluating cognitive decline associated with AD, and for assessing the putative efficacy of experimental treatments for this disorder</p>	
Summary Statement My project determined that a measure of reaction time can supplement current best practices of assessing Alzheimer's disease.	
Help Received Mother/Father helped drive me to Irvine; Aaron S. Kemp taught me about different methods of statistical analysis	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Diane M. Marcus	Project Number S1411
Project Title Perception and the McCollough Effect	
Abstract Objectives/Goals The purpose of this project was to determine the effect of pre-induction gratings in perception of the McCollough Effect, and to establish where in the visual cortex the Effect is processed. Methods/Materials Students grades 9-12 were tested for color blindness and then split into groups. Students were given pre-induction gratings according to their group for a ten minute period, then the induction gratings for ten minutes. A test of perception followed immediately on achromatic gratings, and after a ten minute rest period with a one minute refresher, students were tested again. Four tests total were conducted. Materials required included gratings and a stopwatch. Results The pre-induction gratings had a drastic effect on perception of the McCollough Effect. Students in group two had the highest initial perception without decay, followed by students in group one with slight decay. Students in group five closely paralleled those in group one, while students in group four perceived the weakest Effect and students in group three initially perceived the reversed Effect and by the final tests perceived either no Effect or the McCollough Effect. Conclusions/Discussion The perception of the reversed Effect by students in group two supports the idea that the Effect is processed in V-1 where cells are orientation specific, and the results of group five support the idea that the visual color channels are independent of one another. Pre-induction gratings clearly play a large role in perception of the McCollough Effect.	
Summary Statement This project investigates the effect of pre-induction gratings on the McCollough Effect in the attempt to discover where the Effect is processed in the brain.	
Help Received The Villa Park AP Psychology teacher, Mr. Hart, permitted me to test all of his students in order to obtain my data.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Mingmei Niu	Project Number S1412
Project Title Slow and Steady Won the Race: Surprising Findings about GABAA-mediated Synaptic Inhibition in Brain Slices	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Neuronal processing critically depends on the timing of synaptic inhibition. Gamma-aminobutyric acid (GABA) is the major inhibitory neurotransmitter in mammalian brain circuits. In the hippocampus, several types of GABA-mediated synaptic inhibition appear to play different roles in inhibiting pyramidal cells in the CA1 region. Furosemide, a GABAA fast antagonist, was used to investigate the time course of GABAA fast inhibition, which provides insight into the cell's total inhibition and into the hippocampus's roles in learning, memory formation, and maintaining consciousness. This is the first study to measure the duration of depression resulting from different forms of inhibition in the CA1 circuit.</p> <p>Methods/Materials The brain slices used in these experiments came from adult Long-Evans rats weighing from 150-220 grams and were cut either coronally or horizontally into 450 μm slices and kept on top of filter papers inside a humidified O₂/CO₂ (95%/5%) chamber along with ACSF at 22°C. Bipolar tungsten microelectrodes placed in the stratum radiatum layer of the hippocampus electrically activated Schaffer-collateral fibers. Glass microelectrodes filled with ACSF placed in stratum pyramidale/oriens border recorded evoked population spikes. Latency experiments (using Igor Pro 6 software) measured population spike amplitudes from peak negativity to positivity. The duration of inhibition is the time the wave of the greatest magnitude took to return to 80-90% of the magnitude of the control wave.</p> <p>Results Control: the average period of inhibition was 25 ms for coronal slices, and 40 ms for horizontal slices. Since furosemide blocks GABAA fast inhibition, a second population spike was visible within 10 ms of the first one in all of these experiments. Blocking GABAA fast inhibition with furosemide (1 mM) produced a small increase in CA1 neuron discharge visible for only a short time period (<20 ms). A minimal change in population spike amplitude occurred when furosemide was present.</p> <p>Conclusions/Discussion The experiment showed that GABAA fast contributes only briefly to overall circuit inhibition. GABAA slow inhibition lasts up to 200 ms after the initial stimulus and thus plays the major role in regulating circuit level signaling. In addition, blocking GABAA fast inputs appeared to increase the amount of inhibition indirectly by uninhibiting GABAA slow neurons that synapse onto pyramidal cells.</p>	
Summary Statement This project focused on finding the duration of inhibition using furosemide to block GABAA-fast inhibition and the relative importance of GABAA-slow over GABAA-fast, contributing to a more complete understanding of the hippocampus.	
Help Received Used lab equipment at Stanford University under the supervision of Dr. M Bruce MacIver	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Katelyn R. Paxton	Project Number S1413
Project Title Soy: Carcinogen or Prevention?	
Abstract Objectives/Goals This project is to determine if isoflavone phytoestrogens found in hormone replacement therapies may promote the development of breast cancer tumor cells in menopausal women. The hypothesis is that phytoestrogens will stimulate the overproduction of the hormone estrogen through a surge in the lutenizing hormone level. Methods/Materials Four female mice that were given daily oral supplements of hormone replacement therapy treatment, and four separate female mice were not exposed to soy products of any kind were tested. Each mouse had its own individual cage with half paper shreds, and half wax paper. All subjects received the same amount of food each day at the same time over the trial period. Both received 2 fl. oz. of distilled water a day, and manipulated subject were also given crushed hormone replacement therapy tablets in their water. Every night, urine samples were taken and distributed on an ovulation test that gave the exact lutenizing hormone level. Results After the first 72 hours, the controlled group's LH level remained steady at a rate of 7.0, while the manipulated group rose from an average of 7.3 to 11.4. Subject 1 experienced an LH surge from days 4 to 6, but returned to normal two days later, which could have been due to natural circumstances. At the conclusion, the controlled group's level was still constant at 7.5, while the manipulated group's had surged to 23.6. The manipulated group also experienced negative physical effects, such as loss of appetite and fatigue. Conclusions/Discussion The hypothesis was supported by the data collected. Over the ten-day trial period, the mice's hormone level jumped about 16 points and grew at a constant rate to levels abnormally high. Research suggests that the hormone level will continue to rise long-term and tumor cells have a greater chance of developing due to the decreased effectiveness of cancer alpha-blockers.	
Summary Statement Testing lab mice with Hormone Replacement Therapy (HRT) to determine if the artificial isoflavone phytostrogen may increase the subject's estrogen rate, which stimulates breast cancer tumor cells to develop.	
Help Received Parents supervised treatment of mice	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Madison J. Russell	Project Number S1414
Project Title Determining if Child Proof Containers Are Really Child Proof: Are Child Proof Containers Really Safe from Children?	
Abstract Objectives/Goals My objective was to determine if child proof cleaning products, pill containers, and liquid medicines would really protect kids from successfully obtaining the substances inside the childproof containers. Methods/Materials Materials: Clovis pet hospital pill container, TUMS container, SNO BOL drain cleaner container, normal prescription container, Febreze container, Nighttime cough medicine container, Liquid Plummer container, and Genuine Bayer aspirin container. Method - I tested 50 kids from ages 2-7.(300 kids total) Each kid was given 8 different child proof containers. Each container has a unique way of opening. Test 1 - each child was given 1 minute to open container test 2 - Simulation of parent opening container - No verbal cues were given, kids observed me open containers. They were then given one more minute to open container. Results 2 year olds - 2% of the children could open the child proff containers with no prompt while 8% of the children could open the containers after given a prompt. This age group did the worst of all the age groups. 7 year olds- 60% of the children could open the containers whith no prompt and 74% of the children could open the chold proff bottles after given a prompt. This age group did the best out of the 6 different age groups. Other ages varied inbetween; however every age group improved after given a prompt. Conclusions/Discussion I learned throughout my project, that children are able to open childproof containers and that even children as young as two are able to open the childproof bottles. Also that the children can open the childproof containers better after watching someone open them beforehand. People should be aware that childproof containers are not always safe from kids, especially if they have watched someone open these containers beforehand. In conclusion children are not necessarily safe from substances inside of childproof containers. Many parents and anyone who is around children should not trust that the childproof containers will keep the kids out of them, children are able to open these containers and they are able to open them easier if they have seen someone open the container before.	
Summary Statement My project will help determine if child proof containers are really child proof.	
Help Received Parents helped set up appointments in classrooms and preschool to test the children.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Varun S. Sharma	Project Number S1415
Project Title Does the Inflammatory Cytokine IL-6 Lead to Decreased Muscle Strength?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Introduction- It has been recognized that when a person grows older, they experience a decline in muscle strength and stamina. To this day it is still unknown why this happens. One major theory says that high levels of inflammation may cause the decline. Studies have shown that a specific cytokine that is called interleukin 6(IL 6), when made constantly at high levels, either marks or causes a 40% decline in the muscle strength and stamina.</p> <p>Question: Do aged IL 6KO aged mice have the same motor coordination and stamina as non-affected aged mice or improved motor coordination and stamina. Hypothesis: Aged IL 6KO mice have an increased stamina rate and improved motor coordination ability because these mice have shown considerable amounts of extra lifespan.</p> <p>Methods/Materials Materials: Rotarod, Mice-(9 Wildtype, 10 IL 6), Wipes, Timer, ethanol alcohol Methods: Get required Animal Training.; Train mice to get used to the Rotarod.; Place mice on Rota Rod and start motor and timer.; Do both Acceleration test(motor coordination) and steady speed test(stamina).; When a mouse falls, hit timer to stop the time and record the time.; After each mouse is done, wipe rod and area around mouse.</p> <p>Results I found that there was about a 9.919 second difference between the IL 6 KO mice compared to the Wildtype mice, in favor for the IL 6 KO mice. However we cannot deem these findings as completely accurate due to the high standard deviation and error.</p> <p>Conclusions/Discussion Conclusion: I found from the data, that there was a trend in muscle function in favor of the IL 6 KO mice. There was an increase in the time on the rotarod for the IL 6 KO mice compared to the wildtype mice. However the differences in average time between the wild type mice and IL-6 knockout mice turned out to not to be significantly different due to a high standard error. Therefore the differences in the times could have been due to chance.</p>	
Summary Statement My purpose is to see if the inflammatory cytokine IL-6 may in fact progress sarcopenia faster in mice, and maybe even in humans.	
Help Received I used the lab equipment at the University of California San Diego under the supervision of Dr. Laura Dugan; Researcher in Geriatrics	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Eridin R. Sheffey	Project Number S1416
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Project Title
Ascertaining the Effect of Multiple Moons or No Moons on the Menstrual Cycle of Female Planetary Explorers

Abstract

Objectives/Goals
The menstrual of placental Mammals is speculated to be related to the gravitational effect of the moon. The moon is theorized to regulate the menstrual cycle and trigger ovulation, thus an important factor in human fertility. This project explores the issues facing female planetary scientists who explore the planets. If a female astronaut were on Mars with it's two moons, will she experience two menstrual cycles? If she were on Venus, which has no moons, would she not menstruate at all? Research on this topic is extremely limited, because no female astronaut has ever been outside the gravitational influence of the moon. This project used the "thought experiment" protocol to elicit from physicians and planetary scientists their ideas regarding the impact of planetary moons on the menstrual cycles of female astronauts, colonists and explorers. Rubrics were created, circulated and analyzed. Qualitative data was collected and analyzed.

Methods/Materials
This is one experiment that cannot be conducted on Earth, the Space Shuttle, or on the Moon because we only have one moon, and the female Shuttle astronauts are under the influence of the Moon. Therefore, I am using the "thought experiment" protocol to explore my hypotheses. In order to capture thoughts from physicians, a survey was created and distributed to several local physicians. The survey is comprised of three yes or no questions, and three open questions requesting comments and thoughts. The results were tabulated and the comments collected.

Results
The following are the results from the surveys:
First question: Yes=1; No=5
Second question: Pulling ions can increase menstrual cramps.
Third question: Yes=1; No=5
Fourth question: Can cause fluctuations of the hormone levels and cause breakthrough bleeding.
Fifth question: Yes=5; No=1
Sixth question: Decreases irregularities, decreases cramps.
Additional comments:
Excellent survey.
I feel internal clock of menses not affected by moons.

Conclusions/Discussion
Based on the results of the surveys, my hypotheses were disproven. All but one of the physicians indicated that the Moon and planetary satellites have no effect on the human female menstrual cycle.

Summary Statement
This project is about whether or not the human female menstrual cycle is affected by multiple moons or no moons when female astronauts explore other planets.

Help Received
Mentorship from Dr. Maureen Clemmons; Mother and Father for covering expenses; Dr. Stephen Chang, M.D. for resources; Kaiser Permanente's doctors for taking a survey.



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Elisenda S. Smith	Project Number S1417
Project Title Increase Your Fitness, Inflate Your Ego	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of this project was to find the difference between an athlete's lungs and those of a non-athlete. I wanted to test the effect that staying active has on one's body, and therefore, I chose to measure the tidal volume and the vital capacity of each of my participants' lungs. My collecting this data, I was able to find out exactly how much of a difference there is between the two groups' lung volume.</p> <p>Methods/Materials Began by gathering 20 athletes and 20 non-athletes, along with about 15 woodwind musicians and proceeded to record their age, gender, height, weight, and activity level (if any). Proceeded to calculate the subjects' expected lung capacity (or, the volume of air contained in the lungs at the end of maximal respiration) with the information provided from their body surface area, using Mosteller's equation. Went on to estimate the subjects' vital capacity by multiplying the products from the person's body surface area by 2500 (for males) and 2000 (for females). After estimating the participants' lung and vital capacities, continued on to perform the procedure of measuring the tidal capacity and the vital capacity of the various people using the "balloon method". Stretched out a round balloon several times (to relax the material) for each new volunteer, and then proceeded to measure the tidal capacity by having the person inhale normally and then exhale normally into the balloon. After pinching the end of the balloon to keep the air in, the diameter of the balloon was measured. After recording the data from three trials, commenced with the second test. Using the same balloon and the same subject, the person inhaled as much air as they could and then exhaled forcefully into the balloon, this measures one's vital capacity. Then, pinching the end, the diameter was measured and data was recorded after three trials. After calculating the average diameter, went on to look at a graph that had lung volumes (in cubic centimeters) in correspondence with the average diameter of the balloon. Then according to the graph, record the volume of the individuals' lungs.</p> <p>Results As predicted, the athletes tested had greater lung capacities than non-athletes, though some participants showed varying results.</p> <p>Conclusions/Discussion This project was interesting and put an emphasis on the different body types of individuals and their abilities.</p>	
Summary Statement Testing the lung capacities of athletes and non-athletes, lung volumes were estimated, measured, and then compared.	
Help Received Father helped organize board; Teacher Julie Haws helped with editing.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Claire K. Waln	Project Number S1418
Project Title Can You Open This?	
Abstract Objectives/Goals This experiment was to try to determine which typically used household products adults ranged from 50 to 90 found hardest to open. The purpose was to find a possible alternative for them to easily open these items of difficult and allow them to be more aware of their difficulty. Methods/Materials I tested as many elderly people I could find through senior citizen housing communities, my neighborhood, and other family and friends. I ended up testing 28 adults above the age of 50 and times how long it took them to open the items. I would give them up to a certain amount of time to open an object, then I would tell them to stop, inevitably giving up. The materials used for my project were Propel water bottles, water bottles, childproof medicine bottles, regular medicine bottles, hairspray can, and pretzel bags. Results Through my experiment i found that as the age increased, so did the difficulty in the persons ability to open the package or container. No sex was found to be commonly stronger than the other; they averaged roughly the same. Conclusions/Discussion I found that with age, difficulty is found most commonly between the ages of 70 and above. I found that both men and women alike found difficulty in their ability to open it, yet not one sex dominated over another. I believe that products with pull off tabs are found easiest to open rather that a twisting motion.	
Summary Statement I tested elder adults ability to open everyday useful products.	
Help Received My mother drove me to the senior citizen housing community.	



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Sara M. Yusufaly	Project Number S1419
Project Title The Effects of Diabetes Mellitus on Sensory Nerve Conduction	
Abstract Objectives/Goals The objective of this study was to determine the effects of diabetes mellitus (abnormal glucose tolerance) on median and ulnar sensory nerve conduction velocity, latency and amplitude of sensory response. My hypothesis stated that having diabetes mellitus would decrease nerve conduction velocity, increase latency, and decrease amplitude. Methods/Materials The hand-held stimulator of the electromyography machine was used to determine the subjects latency and amplitude when the wrist of each subject was in the neutral position. By dividing the latency by .08 meters (or 8 centimeters), a mathematical procedure, the nerve#s velocity was determined. This investigation tested a ratio of 1:1 diabetics to non-diabetics. Results Although the data gathered throughout this investigation illustrated a variety of ideas, my hypothesis was, in the majority of instances, supported. The nerve conduction velocity of non-diabetic subjects was faster than that of diabetics; the latency of sensory response within non-diabetic subjects was also higher. The data gathered from the amplitude of sensory response also supported my hypothesis, as diabetics had a lower amplitude of sensory response than non-diabetics. Conclusions/Discussion My hypothesis stated that the nerve conduction velocity and amplitude of sensory response would be lower in subjects who had diabetes mellitus. It also stated that the latency of sensory response would be higher in non-diabetics. The data gathered supports latency, velocity and amplitude related hypotheses.	
Summary Statement This experiment was an investigation of the effects of abnormal glucose tolerance (diabetes mellitus) on median and ulnar nerve conduction velocity, latency of sensory response, and amplitude of sensory response.	
Help Received Neurologist monitored the use of the electromyography machine; Parents and brother provided guidance, additionally helping construct the board; Subjects agreed to be tested;	