# CALIFORNIA STATE SCIENCE FAIR
## 2006 PROJECT SUMMARY

**Name(s)**
Julie Baker; Karen Nichols

**Project Number**
**S1001**

**Project Title**
## Circumference of Thigh vs. Force of Kick

**Abstract**

**Objectives/Goals**
This project will test whether or not the circumference of each person#s thigh, will affect the amount of force that each participant applies to the ball. The larger the circumference of the thigh, the higher the ball in rotations will be, thighs that contain large circumferences will have a larger force,and have a larger number of degrees. Male participants will apply a larger force to the ball opposed to women.

**Methods/Materials**
Materials:A mini soccer goal,a chain,a new soccer ball, sand bags, measuring tape, an enlarged protractor, and data tables to record the information. Before testing each participant, they had to get a signed consent form informing each participant about the project. Once the participant was cleared to go, their dominant leg was measured. Their leg was then measured four inches above the knee cap. After measuring the four inches up their circumference of their thigh was measured. After recording the circumference, each participant would stand at the tip of the pole that goes across the bottom of the soccer contraption. Each participant got a trial run, to make sure they knew how it worked. Standing at the tip of the pole, each participant would strike the ball. The numbers of rotations were counted as the ball went around the contraption. As the ball slowed down, and could not make it around another full rotation, the excess angles were measured with the enlarged protractor. The protractor#s flat bottom was vertical and right against the contraption, as the semi circle of the protractor measured the excess angle. Then the data was recorded. When doing the calculations for the kick results, each full rotation was three hundred and sixty degrees, and then multiplied by how many full rotations, and then the excess angle we sited from our protractor to the other numbers was added. One hundred participants were tested.

**Results**
As predicted,results showed that as the circumference of the thigh increased,so did the rotations of the ball. For the most part the male adults dominated for the highest amount of force. Both female and male children had a lower force on the ball,and the youth that tested were wide spread. The female adults as well, were in the higher end of the graphs.

**Conclusions/Discussion**
In the conducted experiment,the results supported that the circumference of someone#s thigh does affect the force that each individual has when kicking a soccer ball.

**Summary Statement**
The project was simply to support the prediction that the larger the circumference of someone#s thigh, the larger the force that they can apply to a soccer ball.

**Help Received**
Help that was received during the project would include the hundred participants, parents, and the teachers Mrs. Lewis, and Mr. Grubb for their input to improve the project, and Mr. Holmes for ideas on suspending the soccer ball from the mini goal, and using a #new# soccer ball. Thank you!

# CALIFORNIA STATE SCIENCE FAIR
## 2006 PROJECT SUMMARY

**Name(s)**
Sarah L. Barr

**Project Number**
**S1002**

**Project Title**
# The Effect of Age at First Menstruation on Ovarian Cancer Development

**Abstract**

**Objectives/Goals**
The purpose of this experiment was to test whether there is any correlation between the age of first menstruation in a girl who develops ovarian cancer, and the girl's age when the cancer develops.

**Methods/Materials**
I gathered data for my project by using the Internet to contact ovarian cancer support groups and message boards. I created a simple questionnaire to gather specific pieces of data which included the age at first menstruation, the age at cancer development, type of cancer, and whether or not the subject had given birth. All responses to the questionnaire were anonymous and received via email or message board postings. The questionnaire was posted on six different websites, and responses either came back as a reply to the posting, or were sent to the Hotmail account I specially created for data collection. Materials used in the project (other than the display board) were a computer connected to the Internet and a printer with, of course, ink and paper.

**Results**
The data collected implied that the later a girl first menstruated, the earlier the age at which she would develop ovarian cancer. And conversely, the data implied that the earlier the age of first menstruation, the later the age of ovarian cancer development. However, possibly because of the limited amount of data, these results were not statistically significant.

**Conclusions/Discussion**
Ovarian cancer is the fifth deadliest cancer for females, and has been called the silent killer because its symptoms are similar to other symptoms females experience on a monthly basis (e.g. abdominal swelling, bloating, indigestion, back pain, fatigue, constipation...) Although the limited data was not statistically significant, the results imply a possible inverse correlation between age of first menstruation and age of ovarian cancer development. At minimum, these findings suggest a direction for further study.

**Summary Statement**
My project examined the possible relationship between the ages a girl first menstruates and ovarian cancer develops, and the results implied that as the age at first menstruation increased, the age of ovarian cancer development decreased.

**Help Received**
My science teacher guided me; my dad assisted me in making sure I was safe when I posted on the Internet; people at the American Cancer Society told me where to go for data; and teachers, peers, and parents helped edit my drafts.

# CALIFORNIA STATE SCIENCE FAIR
## 2006 PROJECT SUMMARY

**Name(s)**
Shay C. Edwards

**Project Number**
**S1003**

**Project Title**
# Thermographic Assessment of Cold Stimulation on Autonomic Vascular Reactions

**Abstract**

**Objectives/Goals**
The objective of this study is to determine the potential usefulness of thermal imaging technology to evaluate and monitor autonomic vascular reactions, and to establish whether thermal imagery can be used to effectively detect pre-clinical stages of circulatory problems.

**Methods/Materials**
To test my hypothesis as to the effectiveness of thermography as a useful tool for assessing autonomic vascular reactions a cold stimulation test was preformed on 60 participants using a radiometric thermal imager. The participants included diabetics, smokers, and a normal/control group (no known health issues). The test consists of participants placing their left hand in 62ºF ± 2º water for 20 minutes while the right hand was placed on a wood surface. The participants were also asked to keep the left hand moving while it was submerged in the cool water. Participants were also asked to keep their right hand in a flat comfortable position and to keep movement to a minimum. A thermal image was recorded of the right hand every 5 minutes starting with a preliminary test image.

**Results**
Three groups of people were clearly defined by the thermal imager. The diabetic group had no visible thermographic finger tip change while the overall average temperature did decline slightly by an average of 2°F. The smoker group had an extremely mottled and uneven thermographic appearance of all fingers and hand with a slight decline initially in temperature while rising 2°F and holding constant until the end of the 20 minute test period. The normal/control group thermographic assessment of the circulatory system showed that the right hand was significantly affected, with a steady decline in surface temperature as much as 10°F (average of 8°F± 2°) and beginning with very visible thermographic finger tips to almost non visible appearance at the end of the 20 minute test period.

**Conclusions/Discussion**
Using three defined groups amazingly showed clear differences in circulation. The data from the test supports my hypothesis that thermal imaging can be a useful tool for examining circulation.

**Summary Statement**
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 circulatory problems.

**Help Received**
So Cal Edison loaned me the thermal imager.

# CALIFORNIA STATE SCIENCE FAIR
# 2006 PROJECT SUMMARY

**Name(s)**
Vivian R. Feig

**Project Number**
**S1004**

**Project Title**
## The Effect of Depriving Activity on Dendritic Spine Development

**Abstract**

**Objectives/Goals**
My project looked at whether or not blocking the sodium channels in neurons that are used for synaptic activity has an effect on the development of synapses in the brain.

**Methods/Materials**
Using cultured embryonic rat brain cells, we first established a positive correlation between time and synaptic growth. All cells were transfected with GFP, a protein that codes for a jellyfish gene that makes the cells take up fluorescent light, at 3DIV (days in vitro). The cells in part one grew up in normal conditions, and were fixed and stained at 7DIV and 16DIV. Then, we ran a test using three conditions: the first was a control, with the cells growing in normal conditions as in the first part of the experiment; the second group was treated with TTX (tetrodotoxin) from the time of GFP transfection, and the last was treated with TTX from 10DIV to the time it was fixed. All groups were fixed and stained at 12DIV. These were imaged using microscope imaging software, and density was found by dividing the number of spines on a dendrite by the dendrite length.

**Results**
We found that the chronic TTX and two day TTX groups were significantly less dense the group that grew up under normal conditions, but that there was a very small difference between both groups that had been treated with TTX.

**Conclusions/Discussion**
Activity deprivation in early development significantly reduces the strength of neural connectivity in the brain by decreasing the amount of dendritic spines present. Moreover, deprivation for temporary periods of time during early development are similar in terms of damage to long-term deprivation.

**Summary Statement**
I tested the effect of activity deprivation on the generation of dendritic spines in the developing brain.

**Help Received**
Used lab equipment at UCSD under the supervision of Dr. Anirvan Ghosh; UCSD student Natalie Shanks taught me how to use lab equipment

# CALIFORNIA STATE SCIENCE FAIR
# 2006 PROJECT SUMMARY

**Name(s)**

**Miriam C. Glicksberg**

**Project Number**

**S1005**

**Project Title**

## Is Rhythm Sensing a Scalar Property?

**Abstract**

**Objectives/Goals**

In my experience in nonprofessional orchestra and dance groups, I notice that some members do not stay on the beat. I am trying to understand if such individuals are unable to synchronize or continue a beat, or if they fail to recognize the musical rhythm. I hypothesized that if rhythm sensing is a scalar property (i.e. subjects who are rushed or delayed in maintaining a beat will have proportional variations from the mean at different test speeds), then individuals in the extremes of the distribution will have impaired rhythm sensing ability with musical passages.

**Methods/Materials**

I obtained informed consent from 43 participants (25 teens and 18 adults). I devised tests to measure subjects' ability to maintain 3 different beats (metronome continuation test, MCT) and to recognize the tempo in 7 musical passages (rhythm sensing test, RST), with 3 replicates for each test. Tapping results were recorded with a stopwatch and also on a digital recorder, for computer analysis. Subjects completed a questionnaire about other aspects of time keeping (circadian rhythm, morning routine, and pacing on short-term assignments) and I measured pulse rate and time sensing for 8 and 21 seconds (interval timing, a known scalar property, was a control). I analyzed the data with Voice Editing and Excel programs.

**Results**

Tempo matching is not scalar at the group level and is barely proportional at the individual level. Sorting by scores from the slowest MCT (40 beats per minute), subjects at the fast end of the distribution have faster RST scores and decreased interval timing. Interestingly, subjects with the slowest MCT scores did not lag in the RST, possibly because they have more musical training. Subjects without musical training performed more poorly in sensing rhythm in music, and teens had more difficulty in recognizing waltzes and slow classical music.

**Conclusions/Discussion**

Although tempo matching is not a scalar property, my hypothesis is partially correct. Individuals at the fast extreme of the MCT tend to rush the beat in music while those in the slow extreme are more accurate in musical rhythm sensing, possibly related to their musical training.

**Summary Statement**

I discovered that individuals at the extremes of the distribution in a metronome continuation test have differences in rhythm sensing in music.

**Help Received**

I thank my participants, my Science Fair advisor for providing a testing room at school, my parents for purchasing equipment and driving me to subjects' homes, and my mother for help with typing and giving me tips in using Microsoft Excel.

# CALIFORNIA STATE SCIENCE FAIR
# 2006 PROJECT SUMMARY

**Name(s)**
Jillian D. Gluck

**Project Number**
**S1006**

**Project Title**
## Weighting for Strength

**Abstract**

**Objectives/Goals**
My hypothesis was that right-handed, active students' weight will determine the strength in their arms. As the weight of each consecutive student increases, the strength in his or her arms will also increase proportionally. My reasoning for this is that a relatively heavier person will be a) carrying around more weight and therefore should be stronger or b) would be stronger and carry more muscle which would explain their weight.

**Methods/Materials**
In my experiment, I tested 16 to 17 y.o. who have had some athletic involvement and are right-handed. I first recorded all these specifics and then measured their height and their weight. Next, I had my subjects push on a countertop with their right and left hands and recorded their weights respectively. Then I divided the number of pounds that they lifted with each arm separately by their original weight to figure out the percentage difference between the strengths of their arms relative to their weight. Then I averaged the two percentages to create charts of all my findings and organized them by 1) increasing weight, 2) increasing average strength, and 3) increasing total pounds lifted.

**Results**
I made observations based on these charts. My experimental variables were 1) the subjects were of varying heights making the countertop at different heights relative to their own height, 2) the subjects kept shaking when they were relieving some of their weight so I was forced to average the readings, and 3) I could not minimize constants without greatly affecting my amount of test subjects. The dependant variables were represented in the charts that I made. These include their weights with the help of their left or right hands, the percentage differences of their hands, their average strength, and the total number of pounds that they were able to lift.

**Conclusions/Discussion**
I found that in my range of test subjects, weight (and height) is not directly related to average arm strength, though there seems to be a pattern of increasing total pounds lifted. My intended hypothesis was incorrect. What I meant by my hypothesis was that as weight increased, so would average strength. I was incorrect in thinking this. In truth, it is a valid statement to say that as weight increases, so does total pounds lifted, although this was not my original hypothesis.

**Summary Statement**
My project compares a subject's weight with their arm strength.

**Help Received**
Two friends helped measure subjects' heights.

# CALIFORNIA STATE SCIENCE FAIR
# 2006 PROJECT SUMMARY

**Name(s)**
Kevin R. Kocher

**Project Number**
**S1007**

**Project Title**
## The Beat Goes On

**Abstract**

**Objectives/Goals**
The objective of this experiment was to determine whether or not the genre/tempo of music (calm, upbeat, intense) had an effect on heart rate and blood pressure.

**Methods/Materials**
Three test subjects (ages 14, 44, and 53)sat for two minutes and had their resting heart rate/blood pressure recorded. Each subject then listened to three minutes of clam music through head phones, then had their heart rate/blood pressure recorded while they continued to listen to the music. This process was repeated for the upbeat and intense music and the experimentwas run for two more trials.

**Results**
In general, the test subjects' blood pressure dropped with the calm music and had a somewhat increase with the upbeat or intense music. Test subject 1's heart rate (during trials 1 and 3) rose greatly as music intensified, but the other subjects did not react very much.

**Conclusions/Discussion**
Calm music, though not very effective in reducing heart rate, can help lower blood pressure, which can reduce the risk of heart problems. Intense music, though not consistent, can cause heart rate and blood pressure to rise.

**Summary Statement**
My project is about determining the effect music has on heart rate and blood pressure.

**Help Received**
mother helped cut background paper

# CALIFORNIA STATE SCIENCE FAIR
## 2006 PROJECT SUMMARY

**Name(s)**
Jeannie J. Lee

**Project Number**
**S1008**

**Project Title**
## You Can't Believe What You See: A Blind Spot

**Abstract**

**Objectives/Goals**
My project is to determine if age affects the size of the human blind spot. I believe that as people grow older, the size of their blind spots will increase.

**Methods/Materials**
For this project, 100 test subjects based on 5 different age groups (20 test subjects per group) were tested by using my blind spot testing device. I measured the size of each test subject's blind spot by finding the difference between the points of disappearance and reappearance of a specific dot marked on the device. Each test subject was tested three times, and the average of the three differences represented that individual. The final average of an age group was represented by the average of the 20 test subjects' differences.

**Results**
For Group 1 (ages 6 to 12), the average difference was 6.4. For Group 2 (ages 13 to 18), the average difference was 8.6. For Group 3 (ages 19 to 40), the average difference was 9.9. For Group 4 (ages 41 to 64), the average difference was 11.0. For Group 5 (ages 65 and above), the average difference was 11.4.

**Conclusions/Discussion**
The results of this experiment show that as people age, the size of their blind spots increase. Along with other parts of the body, the human eye goes through physical changes that affect the proportions of the eye. As the blind spot grows, it narrows the spectrum of what one can see, affecting the overall vision of the individual.

**Summary Statement**
My experiment proves that as people age, the size of the human blind spot enlarges.

**Help Received**
Science teacher, Mrs. Olivares, helped me create the test subject categories;

# CALIFORNIA STATE SCIENCE FAIR
# 2006 PROJECT SUMMARY

**Name(s)**
Katie A. Lewis

**Project Number**
**S1009**

**Project Title**
## Eating Right Makes a Difference

**Abstract**

**Objectives/Goals**
The objective of my project is to see how much weight I can lose in one week by altering my eating habits to healthier ones. My goal is to lose up to, but no more than, five pounds by following this procedure. I think this project will benefit me by helping me to find more alternatives to junk food.

**Methods/Materials**
During week one, I kept a food diary to find out my regular habits in eating and exercize. Every night during week one and two, I went online to a food pyramid website, entered my foods, and kept a record of the analyzed nutrients. During week two, I tried to eat healthier, according to what nutrients I needed to recieve more or less of. I also tried to exercize more.

**Results**
I lost five pounds in week two by following my procedure. I Learned what I am not eating enough of and what I am eating to much of. I also learned more about the nuttrition facts panel on food labels. I think the biggest challenge in this project was trying to find healthy foods for me to eat because there are not many healthy foods that I enjoy eating.

**Conclusions/Discussion**
This project did in fact help me to find more alternatives to junk food. This purpose can also benefit other kids around the state or country. The school systems are taking out snack vending machines and soda machines more and more. This can help kids realize that there are more options out there. Lastly, this project can help with obesity around the nation. This project was very helpful.

**Summary Statement**
My project is about finding out more about safe weight loss and healthy foods.

**Help Received**
My neighbors, Tim and Tammy Babcock, let me borrow their computer to print out my supplies.

# CALIFORNIA STATE SCIENCE FAIR
## 2006 PROJECT SUMMARY

**Name(s)**
David E. Lluncor

**Project Number**
**S1010**

**Project Title**
# Factors Affecting Balance and PCP Disorders: The Influence of Natural Stimuli in Mice Utricles, Year 2

**Abstract**

**Objectives/Goals**
How the tissues that form several organs maintain their proper planar cell polarity (PCP) organization is an important question in the vestibular system. One otolithic organ, the utricle, has otoconia which acts upon the hair cells distinct polarization of cilia, called the morphological polarization vector (MPV). This project examines the effect of otoconia as stimuli upon the MPV orientation.

**Methods/Materials**
The het/het and tlt/tlt mutation inhibits otoconia formation. When compared to the wild type and het/+ mice, otoconia is the experimental variable. The tissue was prepared and imaged for confocal microscopy. A highly analytical and unique methodology was created to assess precise MPV orientation and its distribution along the utricle using the polar coordinate method.

**Results**
The data was collected from twelve mice utricles, totaling 5837 traced MPV angles. Using the independent variable two sample t-test, 78.5% of the 28 het/het and het/+ regions and 68.5% of the 35 tlt/tlt and wild type regions had equal MPVs.

**Conclusions/Discussion**
The majority of angle distributions were equal, suggesting MPV organization is stimuli independent. This experiment is one of the largest analyses of quantified hair cells, which might have specified a class of factors contributing to MPV maintenance.

**Summary Statement**
I documented the affect that otoconia had upon the sensory epithelial cells, or hair cells, in one of the balance organs, the utricle.

**Help Received**
Used lab equipment at University of Los Angeles, California under supervision of Dr. Hoffman; Participant in Victor Goodhill Research Fellowship

# CALIFORNIA STATE SCIENCE FAIR
## 2006 PROJECT SUMMARY

**Name(s)**
Ruby Marron

**Project Number**
**S1011**

**Project Title**
**Higility**

**Abstract**

**Objectives/Goals**
The purpose of my investigation was to figure out the relationship between height and agility. My hypothesis was that tall athletes have the ability to run better on long distances, and short athletes would have a better performance on short distances.

**Methods/Materials**
Materials:
1. Stopwatch
2. Measuring tape
3. Pencil &paper
4. A group (10) of short teenage athletes (1.5 meters and lower). [girls]
5. A group (10) of tall teenage athletes (1.65 meters and higher). [girls]
6. A track

Procedures:
1. Measure and record athlete#s height.
2. Make 2 groups: each with 5 tall and 5 tall people.
3. Race and time the first group, one lap (400 meters),
4. Next race and time the second group.
5. Repeat 2 more times with resting periods in between each trial.
6. Race and time the first group again, only 5 yards this time,
   however, they have to go slide from side to side
   (Goal: Go up and back twice).
7. Next race the second group.
8. Repeat 2 more times with resting periods in between each trial.

**Results**
From both the short and long distance tests, the shorter people had a better averaged time overall.

**Conclusions/Discussion**
My hypothesis was that tall athletes have the ability to run long distances, and short athletes perform better in shorter distances. My hypothesis was incorrect; from my results it showed that shorter people are better at both long and short distances. I believed that taller people had a better stride, and that it would take shorter people two or more steps for their stride to equal that of a tall athlete. However, in both my long distance and short distance races, the short peoples' averages were the best.

**Summary Statement**
The purpose of my project was to figure out what group, tall or short people, would have a better performance on long and/or short distances.

**Help Received**
My friend Denise helped with the title, Dad helped with materials, Mr. Callaway helped me with the thinking process.

# CALIFORNIA STATE SCIENCE FAIR
# 2006 PROJECT SUMMARY

**Name(s)**
Phu-Phuc Phan

**Project Number**
**S1012**

**Project Title**
## Practice Schedules to Enhance Motor Learning

**Abstract**

**Objectives/Goals**
A stroke is when blood supply to the brain is interrupted by a hemorrhage or occlusion causing damage to the brain. Stroke is the leading cause of disability among American adults. Post-stroke individuals often need to learn or re-learn many tasks. Determining practice schedules that optimize the learning of motor tasks is important for rehabilitation. Studies have found a benefit of random practice over massed practice in both word and motor learning in healthy adults. The purpose of this pilot study was to determine if an expanded practice schedule could be applied to the learning of several motor tasks simultaneously. This will allow us to see if the expanded schedule, which has both random and massed schedule traits, could beneficial in motor learning in healthy and post-stroke subjects.

**Methods/Materials**
1)Subjects were randomly assigned to one of three practice groups defined by practice schedule: Massed, Random, or Expanded.
2)Subjects learned to match a specified pattern of force for three tasks defined by grasp: Full Hand, Precision, and Overhand.
3)Practice took place over 2 consecutive days; 50 trials per task per day (100 trials total per task). Feedback was provided after every practice trial based on peak force.
The materials used were a laptop, grasping sensor appartus, and a program called Matlab for statistical analysis.

**Results**
1) The acquisition period between the three practice schedules revealed not much of a difference in learning between the three schedules based on error readings.
2) Expanded schedule revealed the highest confidence reading as it had the greatest "constant" increase in his slope.
3) Expanded schedule had the best learning effect overall during the retention test.

**Conclusions/Discussion**
1) All subjects improved over two days of practice. There were no difference in error measurements among 3 groups during acquisition phase.
2)As practice progress, subjects in Expand Schedule appeared to have greater increased in confidence level than other 2 groups.
3)Subjects in Expand Schedule group seemed to have lowest error measurement in retention tests.
4)Our preliminary data supports our hypothesis since it demonstrated that people working in an expanded

**Summary Statement**
I am trying to find a practice schedule that will help with the rehabilitation of motor functions in post-stroke patients.

**Help Received**
Used lab equipment at USC under the supervision of Dr. Schweighofer and Ph.D. student Hui-Ting Goh

# CALIFORNIA STATE SCIENCE FAIR
## 2006 PROJECT SUMMARY

**Name(s)**
Elaine K. Phillips

**Project Number**
**S1013**

**Project Title**
# Effects of Lunar Motion and Position upon the Birth and Death Rates of Human Beings

**Abstract**

**Objectives/Goals**
The objective was to determine if motions and positions of the moon affect the birth and death rates of human beings. It was believed that birth rates are affected by the moon's phases and by its perigee and apogee, and that death rates are influenced by the moon's perigee and apogee but not its phases. It was believed that lunar and solar eclipses have no affect upon human births and deaths.

**Methods/Materials**
In order to determine if lunar motion and position affect the birth and death rates of human beings, a two-year period of over 9,000 birth and death certificates in San Luis Obispo County were studied. The number of births and deaths per date were then aligned and complied according to the respective moon phases, lunar and solar eclipses, and the moon's perigee and apogee. These graphs were analyzed to determine if any pattern or singular occurrence regarding the number of births and deaths reflected the moon's motion.

**Results**
The births and deaths in San Luis Obispo County happen randomly; the rates do rise and fall over time, yet these fluctuations do not correspond with lunar movement. Although the total number of births and deaths increases as each lunar cycle progresses, this ascension is so slight that it hardly yields positive results. Furthermore, in spite of the overall increase in the number of births and deaths during the moon's apogee, too often is the number of births or deaths on a particular day significantly lower than the average day. Only ten eclipses occurred in the two years studied, hence the result in this aspect were inconclusive.

**Conclusions/Discussion**
Although it was believed otherwise, it was found that human births and deaths occur in complete independence of lunar motion and position.

**Summary Statement**
The number of births and deaths per day during a time period consisting of one hundred moon phases was studied to determine if the various motions and positions of the moon influence the birth and death rates of human beings.

**Help Received**
Mother helped gather data from birth and death certificates at the San Luis Obispo County recorder's office.

# CALIFORNIA STATE SCIENCE FAIR
## 2006 PROJECT SUMMARY

**Name(s)**
Edward R. Rajasingham

**Project Number**
**S1014**

**Project Title**
# The Response of Airflow Resistance with Exercise in Treated Asthmatics and Non-Asthmatics

**Abstract**

**Objectives/Goals**
The objective of my project is to see if asthmatics, who regularly take their asthma medications, can perform at the same level during exercise as people who do not have asthma. The level of performance is determined by each subject's airflow resistance, or peak-flow, measured in liters per minute, taken and recorded before and after exercise.

**Methods/Materials**
For this experiment the following materials were necessary: a group of treated asthmatics, a group of non-asthmatics, peak-flow meter, peak-flow breathing tubes, slide rules for determining body mass index and acceptable peak-flow values, and a course of approximately 644 yards for running or jogging. Each subject's peak-flow was recorded before and after completing the course. The subjects completed the course at no particular pace, but to the best of their ability. Information on acceptable peak-flows for each subject, body mass inex, and asthma were provided by my mentors; these people were all certified physicians. They are Marla Abrolat, C. Balakrishnan, Jack Gogolok, Richard Rajaratnam, Christiana Rajasingham, and Winston Rajasingham.

**Results**
Each subject was able to fully or nearly complete the course. In almost all cases, the peak-flow was higher in each subject after exercising than before exercising. In some cases, a higher body mass index reflected a lower peak-flow.

**Conclusions/Discussion**
With the data obtained from this experiment, it seems that in most cases treated asthmatics could perform at the same level or better than non-asthmatics with exercise. In both asthmatics and non-asthmatics, higher body mass indexes indicated a lower peak-flow in most cases.

**Summary Statement**
My project is an attempt to discover if treated asthmatics can perform at the same level or better with exercise than non-asthmatics.

**Help Received**
The following people are doctors who taught me about asthma and provided me with useful materials. They are Marla Abrolat, C. Balakrishnan, Jack Gogolok, Richard Rajaratnam, Christiana Rajasingham, and Winston Rajasingham.

# CALIFORNIA STATE SCIENCE FAIR
## 2006 PROJECT SUMMARY

**Name(s)**
Karis R. Tang-Quan

**Project Number**
**S1015**

**Project Title**
# Bioartificial Heart Tissue: An Electroactive Polymer for Cardiac Patches

**Abstract**

**Objectives/Goals**
Tissue engineering seeks to replace heart infarcts with functional engineered heart tissue. The project aimed to study the effects of mechanical and electrical stimulation for engineering cardiac patches. The project investigated further the effectiveness of a polymer and scaffold for cardiac tissue engineering.

**Methods/Materials**
Electrospinning of polyurethane (PU) created an elastic scaffold. An electroactive polymer was developed to provide stimulation. Eleven trials of 30 samples of human foreskin fibroblasts (HFF) and neonatal rat cardiomyocytes were cultured. Immunofluorescence and scanning electron microscopy (SEM) were used to collect images.

**Results**
The design of the polymer is novel but unstable. Morphology and directional orientation of the layers of cells indicate proper cell signaling. The properties of PU are unique to the needs of cardiomyocytes because the fibers participate in contraction with the cells, instead of inhibiting it.

**Conclusions/Discussion**
The effects of electrical and mechanical stimulation on cardiomyocytes using an electroactive polymer could not be studied. However, a greater discovery was made in the second part of the project objective - the application of PU as a scaffold. Electrospinning brought out novel advantages to using PU in engineering cardiac patches.

**Summary Statement**
An electroactive polymer and electrospun polyurethane scaffold were developed to engineer cardiac patches using neonatal rat cardiomyocytes.

**Help Received**
Used the lab facilities at the University of California, Los Angeles, under the mentorship of Dr. Ben Wu

# CALIFORNIA STATE SCIENCE FAIR
# 2006 PROJECT SUMMARY

**Name(s)**
Samantha M. Williams

**Project Number**
**S1016**

**Project Title**
## Does Varying Feed Affect the Milk of Lactating Caprines? A Two Year Study

**Abstract**

**Objectives/Goals**
The objective of this project is to see that if we change the protein in the diets of dairy goats if that will affect the pH, EC or TDS of the milk.

**Methods/Materials**
Clean and calibrate the pH, EC and TDS meter using the calibration fluids supplied by the pH manufacture. Put the first goat on the stand with one pound Nutrina Dairy Goat Feed in the feeding bucket. Clean the teat off with the teat cleaner, then wipe with a towel. Squirt a few drops of milk in to the milk bucket, to make sure that you have taken off all of the cleaning chemicals off of the tip of the teat so it doesn#t affect the pH. Then take the 4 ounce glass measuring cup, and squirt milk into it until it is about half full. Record the pH level of the milk sample. Measure out one pound of Nutrina Dairy Goat Feed in to the feeding bucket on the milk stand and add one cup of dried black eye peas and one cup of dry corn oats and barley and put that also into the feeding bucket. Mix well. Repeat steps 3-12 with each goat.

**Results**
Results from the pH tests on the treated goats showed a decrease in pH 72 hours after the feed was adjusted. This was consistent with the results with the results in 2004. The EC from the treated goats showed a slight increase of about .25 EC for only 24 hours. Within 48 hours the EC readings returned to average readings before feed adjustment. The results in TDS of total dissolved solids with the goats that had their feed adjusted showed again a reduction in TDS for 24 hours with the milk returning to pretreatment readings with in 48 to 72 hours.

**Conclusions/Discussion**
The hypothesis was correct. The goats that had their feed adjusted with higher protein had the acidity of their milk lower for about 24 hours. The total dissolved solids of the milk for the goats that had their feed adjusted lowered for about 24 hours. The electoral conductivity of the milk on the goats that had the feed adjusted showed a higher EC reading again for about 24 hours.

**Summary Statement**
This project is to see that if we change the protein in the diets of dairy goats if that will affect the pH, EC or TDS of the milk.

**Help Received**
This Project was under the supervision of Dr. Selgrath, Mrs, Jennifer Wilke and Mr. Roger Williams