



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Varun Agarwal	Project Number J1101
Project Title Sweet n' Deadly	
Abstract Objectives/Goals A study of type 2 diabetes, and the effect of high glucose intake on cells. Methods/Materials Vacuum aspirator, Propidium Iodide 100mg/mL (fluorescent dye), Centrifuge tubes, 10ml sterile disposable pipettes, Sterile culture plates, Pipette-aid, Pipette tips, Phosphate buffered saline, Culture hood, Incubator, Inverted microscope Liver cells, Culture medium, Glucose, Thick gloves (used to take out cells from liquid nitrogen). I cultured liver cells in a laboratory and tested them with Varying amounts of glucose. I diagnosed two set of cells with 4.5mM (control), 10mM, and 20mM. One set I kept for 24hrs one I kept for 96hrs. At the end of the experiment I compared the results observing the effect of every higher amount of glucose and longer time period. I used an inverted microscope to view the cells in different fields and lights. I drew the percentage of cell death from each group of cells. this experiment can become tedious because to draw a percentage you must count the cells Results Percentage of cell death for 4.5mM in 24hrs was 5.7% in 96hrs it was 18.75%. The percentage of cell death for 10mM in 24hours was 12.3% in 96hrs it was 32.4%. The percentage of cell death for 20mM in 24hrs was 16.3% in 96 hours it was 39.1%. This showed that with every increasing value of glucose and longer time period the percentage of cell death was higher. This proved my hypothesis correct. Conclusions/Discussion In my conclusion I explained that the cell death was caused by two distresses type two diabetes and oxidative stress. Diabetes type 2 is caused by insulin resistance. Insulin resistance happens when there is a constant intake of glucose. The pancreas produces insulin and puts it in the blood stream so the cells can use the glucose and it is out of the blood stream. When there is higher glucose constantly the insulin has to be dispersed in higher quantities. The cells then become insulin resistance and can no longer take in the glucose so the glucose stays in the bloodstream. This is diabetes. Oxidative stress is when there is an imbalance between the reactive oxygen and the cells ability to repair itself. When there is a lot of glucose oxidative stress is what it results in. The final outcome is the cells dying because they literally are split apart. This is what happened in my experiment.	
Summary Statement My project is about studying diabetes, and along with that doing an experiment which simulates the affect of type 2 diabetes on living cells.	
Help Received I used the type 2 diabetes lab in UC Davis to conduct my experiment. I used the laboratory there to run my experiments and used the equipment supplied there. I used the help of my father to help me design the board.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Tanner E. Akol	Project Number J1102
Project Title Hypertension in the Veterinary Office	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals In the doctor's office, doctors have had trouble testing some patients' blood pressure because they had been suffering from anxiety during their visit, thus making their blood pressure artificially rise. This has been documented as White Coat Hypertension (WCH). Veterinarians suspect that pets also suffer from WCH. The purpose of this experiment was to determine whether WCH occurs in dogs when they visit the veterinary hospital. The hypothesis was that WCH does exist in dogs in the veterinary hospital.</p> <p>Methods/Materials 22 healthy adult canine volunteers were recruited. Heart rate and systolic blood pressure using Doppler ultrasound technology were measured in their own homes and at a veterinary hospital. Behavioral observations were made.</p> <p>Results 5/22 (23%) dogs had elevated systolic blood pressure at home. 10/22(45%)dogs had elevated blood pressure at the veterinary hospital. Average blood pressures were 134 mmHg at the hospital compared to 123 mmHg at home. Elevated heart rates and behavioral displays of anxiety could be correlated with the hypertension in many, but not all cases.</p> <p>Conclusions/Discussion A significant number of dogs do suffer from anxiety related hypertension in the veterinary hospital. Some dogs with hypertension show elevations in heart rate or appear anxious, but not all. So, you cannot predict which dogs will have blood pressure elevations based on heart rate or behavior. The WCH can be eliminated in about half the dogs by taking the measurement at home , but the other half will still suffer anxiety from the parocedure itself.</p>	
Summary Statement This experiment was designed to determine if anxiety artificially raises the blood pressure of dogs making accurate measurement difficult for a veterinarian.	
Help Received Pacific Veterinary Specialists provided me with the Doppler equipment for testing. Dr. Kelly Akol showed me how to use the Doppler equipment and drove me to test dogs at their homes.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Maya Z. Angelo	Project Number J1103
Project Title Animals vs. Humans: pH Balance	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of my project was to find out weather an animal#s pH balance is higher than a humans throughout the day so that I could prove that an animal's pH balance is higher than a human's throughout the day.</p> <p>Methods/Materials I used a Litmus Paper pH Testing Kit showing the range of color from yellow to blue measuring the pH level (5.0 - 9.0) of saliva . I tested (10) subjects,(5) humans and (5) animals (combination of omnivores, carnivores, and a herbivore) for five different trials. I used surgical gloves for cleanliness. The litmus test strip was placed on the tongue of each subject. The test was done every two hours starting at 8:00 AM until 8:00 PM. I also interviewed a veterinarian, Dr. Javier Nolasco, DVM and Tarini Fernando, Veterinary Assistant, VCA Parkwood Animal Hospital. Also, I interviewed a dentist, Dr. Joe Sciarra, DDS, Pediatric Dentistry.</p> <p>Results After testing my animal and human subject#s pH levels on five separate trial test days, I concluded that my five animal#s pH levels were, in almost all cases, higher than the human's throughout the testing. I even studied the pH levels before and after eating. The final test analysis proved that my hypothesis of an animal#s pH level being higher than a human#s is correct.</p> <p>Conclusions/Discussion I learned that the animals test results were reading in the alkaline range regardless of eating or drinking. The final test analysis proved that my hypothesis of an animal#s pH level being higher than a human#s is correct.It's important that animals and humans have a healthy pH balance. The pH level shows how the enzymes in your stomach, liver, pancreas are working. A low pH (below 6.5) level can cause germs and disease to grow. A high pH (over 6.8) level can end up being bad too because it causes too much gas & constipation. When the saliva is not acidic or alkaline, it is balanced. It is better for the body to be a little alkaline (over 7.0). If I used vegetarians, a rabbit, or cows, their level would be in the high pH range. After my interviews, I learned animals, overall, do have a higher alkaline then humans. Of course, wild animal#s and herbivore#s pH would be different because they eat differently. I learned that animals don#t really have a cleaner mouth than humans (human#s brush their teeth everyday). I learned animals don#t have a special chemical in their saliva to help heal their wounds, they only lick their wounds to clean them.</p>	
Summary Statement I think the pH balance of an animal is higher than a human#s throughout the day.	
Help Received My mom checked grammer and board. She also drove me to the veterinarian & dentist offices so I could interview them. My parents supervised me when I tested my animals.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Emily J. Boone	Project Number J1104
Project Title Is the "Mosquito Tone" an Example of Selective Teenage Hearing?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals In 2006, the 'Mosquito Ring Tone' became the buzz. Invented in Britain, this 'uniquely created tone' was claimed to be heard only by teenagers. Believing they could possess a cell phone that neither parents nor teachers could hear, thousands paid to download 'The Mosquito' ring tone. In my study, I investigated whether the rumors regarding the 'Mosquito' were true: that this tone could only be heard by teenagers. Also, I was curious whether this Mosquito Tone was truly a scientific break-through, or merely a sound which takes advantage of other phenomenon.</p> <p>Methods/Materials 46 subjects were recruited: 12 teenagers, 10 adults ages 20 to 29, 8 adults ages 30 to 39, 8 adults ages 40 to 49, and 8 adults ages 50 +. Using the internet, the 'Mosquito Tone' was loaded onto a computer. Frequency tone generating software was also obtained over the internet. Each subject was tested to see if they could hear the 'Mosquito Tone'. The volunteers were then examined to determine whether they could hear sounds of various pitches at the same volume.</p> <p>Results While 100% of teenagers could hear the Mosquito sound, older subjects did poorly. 40% of those persons in their 20s could detect the tone, while a very small minority of persons in their 30s and 40s (12%) could do so. No one in their 50s and beyond could hear this tone. To determine whether this 'Mosquito Tone' was truly unique, the same 46 subjects were tested to determine the highest frequency sound they could detect at the same volume as the 'Mosquito'. As my data reveals, the ability to detect high frequency sounds decreased significantly with increasing age. Being able to detect sound frequencies higher than 17,000 Hz, and their ability to hear the 'Mosquito Tone' were essentially identical.</p> <p>Conclusions/Discussion As claimed by its inventors, The 'Mosquito Tone' is easily heard by teenagers, and poorly by older individuals. Although advertised as being unique in its design, my study showed that the 'Adult-Proof Mosquito Tone' appears to be little more than a very high pitched sound at approximately 17,000 Hz. My data showed that the decline in the ability to detect this ring tone was associated with the inability to detect similar high pitched noises in persons of increasing age. This unique technology seems to take advantage of nothing more than the normal physiologic decrease in the ability to detect very high frequency sounds as we age.</p>	
Summary Statement Is the 'Mosquito Tone' unique in its ability to be selectively heard by teenagers?	
Help Received Father helped find sound generating software on the internet.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Benjamin D. Borges	Project Number J1105
Project Title Walk Your Way to Better Health	
Abstract Objectives/Goals The purpose of my science fair project was to see how walking affects a diabetic's blood glucose levels. I was interested in learning if a Type II diabetic could benefit from a short walk. Methods/Materials I asked three Type II diabetics, who control their diabetes with Glucophage medicine, to participate in my experiment. I had them check their blood glucose levels before and after walking approximately 2500 steps in 20 minutes after a light meal. I recorded their results for one week. Materials used: blood glucose meters, lancets, test strips, pedometers, and a timer. Results Most of the results were as I predicted, but I discovered a few unexpected results. I found out that walking does lower blood glucose levels in most circumstances, but if the levels are too low before walking, they actually rise. I also learned that the higher the levels are before walking, the more they decrease. Conclusions/Discussion Throuh my experiment, I learned that Type II diabetics who take Glucophage can benefit from taking a short 20 minute walk each day. Although, it's very important to check your blood before walking to make sure you're at a healthy level before you proceed.	
Summary Statement My project tested blood glucose to see whether or not a Type II diabetic could benefit from a short walk.	
Help Received Susan Yoshimura, diabetes educator at Tulare District Healthcare provided pamphlets and answered questions about diabetes for me. My mom shopped for my supplies (posterboard, report folder, and paper).	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Riley A. Callahan-Mayo	Project Number J1106
Project Title How Long Can You Hold Your Breath?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of this experiment is to determine if an individual can hold their breath longer in warm water, cold water, or on land.</p> <p>Methods/Materials 60 total individuals participated in this experiment, 20 in each category: 10-20; 21-40; 41+. Three environments were also needed, a pool heated to 21.1C (70F), a jacuzzi heated to 36.6C (98F), and a room heated to room temperature, 25C (77F). Three stop watches were also needed to keep time.</p> <p>Results The results proved that every age group did better in warm than on land and both environment were better than the cold water. The 10-20 age groups' overall average for warm water was 48.35 seconds, for land it was 42.7 seconds, and for cold water it was 28 seconds. The 21-40 age groups' overall average for warm water was 62.35 seconds, for land it was 51.55 seconds, and for cold water it was 37.15 seconds. The 41 and over age groups' overall average for warm water was 69.9 seconds, for land it was 59.45 seconds, and for cold water it was 44.3 seconds.</p> <p>Conclusions/Discussion The hypothesis in this experiment was proven correct. The results were that an overall average of 100% of the subject performed better on land than in cold water, and 71.66% of the subjects performed better in warm water than on land.</p>	
Summary Statement The focus of this experiment was to determine if an individual could hold their breath longer in warm water, cold water, or on land. This could help coaches and swimmers train more efficiently.	
Help Received The experimenter's mother and father helped gather materials and provided the testing environments. Also the experimenter would like to give a big thanks to all of the subjects that took time out of their schedule to help with this experient.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Samantha A. Cutrone	Project Number J1107
Project Title I've Got Your Back...Pack: The Effect of Backpack Use on Students' Spines	
Abstract Objectives/Goals I wanted to see if I could show that increasing the amount of weight of books placed in a student's backpack would increase the amount of pressure placed on the student's lower back and to see if different styles of backpacks made a difference in the amount of pressure on the back. Methods/Materials Three different styles of store bought backpacks were used: Two fat strap with front buckle style (#1); single cross strap style (#2) and two skinny strap style (#3). Each of three subjects (seventh grade students) had MRI examinations of the lower back in the upright position in a Stand Up MRI machine both without backpack on (control) and with each backpack with 10 pound book weight and 20 pound book weight. The amount of compression of each intervertebral disc in the lower back was measured on each MRI examination. Results With 10 pounds of book pressure on the spine, on average the discs compressed 22% while at 20 pounds of pressure, on average the discs compressed 30%. The upper portion of the lumbar spine (T12-L1 through L2-3 levels) compressed more with lower weight (10 lbs) than the lower part of the lumbar spine (L3-4 through L5-S1 levels) which compressed more with higher weight (20 lbs). The single cross strap backpack style caused the least compression while the two skinny strap style caused the most compression. Conclusions/Discussion Increasing the amount of weight of books carried in a typical student's backpack increases the amount of pressure on the intervertebral discs of the spines. Since an increasing number of children report back pain as a complaint, backpack use may be a cause. Different styles of backpacks cause different amounts of compression. More styles of backpacks should be studied to find the method of carrying books that causes the least amount of pressure on the spine.	
Summary Statement Increasing book weight carried in student's backpacks causes more compression of intervertebral discs.	
Help Received Used StandUp MRI machine at TrueMRI with MRI technologist and radiologist (my father)	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Isabella S. Escalante	Project Number J1108
Project Title Get a Grip	
Abstract Objectives/Goals My objective is to show that girls and boys at age eleven and twelve will have the same physical hand strength. I base this on data from government growth charts, hormonal development in children this age, and similar physical activity levels in this age group. Methods/Materials Materials: Information forms and notebook, digital scale, measuring stick, pencil, and dynamometer. Methods: Twenty-five random girls and twenty-five random boys between the ages of 11 and 12 years, 9 months were measured, weighed, and had their age recorded. Using a dynamometer, three grip strength test were given. The highest score was used for results. The subjects assigned were assigned numbers 1 to 25 based on their strength, with 1 being the lowest and 25 being the highest. The approved Jamar Dynamometer testing procedure was used. Testing was done at setting number 2. Results pounds. The boys average I observed that the twenty-five eleven and twelve year old girls in my study group appeared physically more mature than the twenty-five eleven and twelve year old boys in my study group. The average age of the girls was eleven years eight months. The average age of the boys was twelve years. The girls were slightly taller at sixty-one inches and boy#s height was 59.47 inches. The girls were significantly heavier, averaging 106.56 pounds and the boys average weight was 91.06 pounds. The girls grip strength was slightly greater averaging 27.56 grip strength was 26.24. Conclusions/Discussion I was able to show that boys and girls age eleven and twelve in my control group had approximately the same hand grip strength. The girls seemed to be showing the effects of estrogen, but the boys testosterone has not reached high enough levels to give them more muscle strength yet.	
Summary Statement Based on hormone development, boy and girls ages 11 and 12 have the same strength base on the hand grip test.	
Help Received Grandmother helped with appropriate Web sites and typing bibliography. Parents bought supplies and dynamometer.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Lindsay P. Giebel	Project Number J1109
Project Title Horses and Sugar	
Abstract Objectives/Goals The objective of my project was to discover if horses have a preference as to which type of simple sugar they eat, if they will eat any at all. Methods/Materials My experiment required 10 to 15 horses, paper bowls, a 30 gram plastic scoop, powdered sucrose, glucose, fructose, lactose, and maltose, and a data sheet. I put different types of sugars into the paper bowls, and offered them to the horses in turn. Results In the end, the horses would not eat glucose or lactose. They were undecided on fructose, but leaning towards dislike. They enjoyed sucrose and maltose. Conclusions/Discussion I concluded that they did not eat the glucose because it smelled disgusting. Lactose is milk sugar, which horses are not exposed to after they stop nursing, so their refusal was not a surprise. The only surprise is that they refused the fructose, which is fruit sugar, and horses like most fruit. They ate the sucrose, which is just regular table sugar. Their favorite was the maltose, which is made from grains. Grains are the major staple in horses# diets, which is most likely the reason for this choice.	
Summary Statement My project determines that horses prefer certain simple sugars over others.	
Help Received My mother took pictures and carried supplies, my friends, Ekila and Mandy, helped record data, Gloria let me use her horses, and Mrs. Vodraska encouraged me.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Emily L. Hoyt	Project Number J1110
Project Title Do Environmental Sounds Affect Blood Pressure?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my project is to determine if environmental noises affect blood pressure. If they do, there might be a link between noise and stress.</p> <p>I believe that sounds with high pitches and inconsistent rhythms will raise blood pressure the most and specifically, that a baby's cry will raise blood pressure the most because of its high pitch and inconsistent rhythmic pattern.</p> <p>Methods/Materials The materials I used were a blood pressure monitor, survey and measurement forms, a CD player with a sounds CD and headphones, and a pen to record the survey answers and results.</p> <p>My procedure involved the scheduling of a person to test. When I met the individual participant, I discussed my problem and purpose and had him/her fill out a questionnaire that I handed out. I then measured the participant's blood pressure and pulse to obtain a baseline for my test and recorded it. The participant then put on a set of headphones which were connected to a CD player that had a CD with 10 sounds on it (each sound played for 30 seconds and there was a 5 second gap between each sound). The sound played for 30 seconds and the CD was stopped after the sound completed. The participant's blood pressure and pulse was re-measured and the results were recorded. For each of the 10 sounds played, the blood pressure sleeve was removed and the participant had a rest period of two minutes. In general, the sound was played, the blood pressure was measured, the results were recorded, and the wait period was repeated. The tests were performed on 25 people between the ages of 18 and 59.</p> <p>Results My results showed that three sounds raised blood pressure in 16% of the participants. In some cases (20%), the participants baseline blood pressure measurement was higher than the measurement for any of the 10 sounds. Each of the 10 sounds caused a highest blood pressure reading in at least one participant.</p> <p>Conclusions/Discussion In conclusion, I believe that different people react to different environmental sounds. 48% of my experimental group had their highest blood pressure measurement from the sounds of a phone's busy signal, an angry cat, or a home smoke alarm.</p>	
Summary Statement My project involves the playing of environmental sounds and the measurement of blood pressure to determine if there is a link between noise and stress.	
Help Received Neighbor (nurse practitioner) taught me how to take accurate readings of blood pressure; Mom helped with idea for board; Dad took pictures;	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Charlie J. Hughes	Project Number J1111
Project Title Which Sense Will Help a Rat Finish a Maze the Quickest?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of my project is to test which sense, of smell, vision, or hearing, will help a rat get through a maze the fastest.</p> <p>Methods/Materials My materials were nails, cardboard, pegboard, rubber bands, a sheet of clear plastic, #Perfect Choice# rat food, a towel, purple and white duct-tape, and rats. I created my maze by poking the nails up through the holes in the pegboard, stretching two rubber bands between the nails (one at the top, one at the bottom), and sliding a piece of cardboard between the rubber bands. I repeated this until I had created a maze, then set the clear sheet of plastic on the maze. I tested smell by spreading a trail of food on the towel, taking the same trail as the correct trail of the maze, then set the maze onto the towel, so that the trail of food and the correct trail of the maze were lined up. For vision, I taped the correct trail of the maze in the same color as the current rat's food bowl. When I was testing hearing, I laid at the end of the maze and called my rats by name.</p> <p>Results My results were that hearing was the quickest, then vision, then smell. In hearing, the high was three seconds, the low was five hundred-forty seconds, and the average was fifty seconds. In vision, the high was six seconds, the low was four hundred-fifteen seconds, and the average was fifty-one seconds. In smell, the high was seven seconds, the low was over one thousand seconds, and the average was sixty-seven seconds. In my control, the high was seventeen seconds, the low was one hundred-eighty nine seconds, and the average was seventy-five and seventy-five hundredths of a second.</p> <p>Conclusions/Discussion I think that the reason smell was last even though it is their strongest sense is because they were not smart enough to relate the smell of the food to the trail it took, and follow it. I think they searched for the food instead. I believe that vision is second because rats only see in blues, greens, and ultra-violets, and do not have very clear vision. However, I think that they could still see a color change between the brown pegboard and the white/purple tape that I used on the correct trail of the maze. I deduce that hearing is the quickest sense to help my rats get through the maze because they are very used to my voice and used to me calling them by name. I usually call them by name before I bring them out of their cages to play, or else before I feed them, so they come in search of my voice.</p>	
Summary Statement I am testing to see which sense, of smell, vision, or hearing, will help a rat finish a maze the quickest.	
Help Received Teacher helped edit papers and correct format.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Jonah Kaye	Project Number J1112
Project Title Taste Buds vs. Ice	
Abstract Objectives/Goals I set out to determine if lowering the temperature of the human tongue would affect the taste buds' ability to recognize the different tastes of sweet, sour, bitter and salty. I hypothesized that lowering the tongue's temperature would negatively affect the taste buds' ability to determine the various tastes. Methods/Materials Twelve subjects, 6 males and 6 females ranging in age from 9 to 74 years, each tasted liquids comprised of distilled water and increasing concentrations of another component representing one of the four major tastes: sweet (sugar), sour (lemon juice), bitter (coffee grounds) and salty (salt). Each subject sampled the solutions until he/she could identify each specific taste. After the results were recorded, each subject proceeded through the same testing again after first lowering the temperature of his/her tongue by holding ice on the tongue for 15 seconds. Results Surprisingly, the overall results did not show a difference in the subjects' ability to taste sweet, sour, bitter and salty after lowering their tongue's temperature. However, after looking at the specifics of the data, I was able to see a slight difference between male and female subjects. The male subjects actually had a slightly heightened ability to recognize the various tastes with a lower tongue temperature. The female subjects' ability to do so was negatively affected by lowering their tongues' temperature. Also, there was no difference between older and younger subjects. Conclusions/Discussion Sadly, my hypothesis was incorrect. Overall, this experiment suggests that lowering the temperature of the human tongue does not affect its ability to taste. This result may not be completely accurate, however, for several reasons. There may have been flaws in the experiment's design. For example, sample size, method of lowering tongue temperature and external influences on the subjects may have contributed to possible inaccurate results. In any case, I was impressed by the tongue's ability to taste despite subjecting it to adverse conditions.	
Summary Statement Does lowering the temperature of the human tongue affect the taste buds' ability to taste?	
Help Received My father helped proofread and type the written parts of my exhibit.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Taylor L. Kerr	Project Number J1113
Project Title How Does Grooming Affect a Horse's Heart Rate?	
Abstract Objectives/Goals To observe the effect grooming has on heart rate after exercise as compared to no grooming. Methods/Materials I took each horse's heart rate before exercise using a stethoscope. I then exercised each horse for 3 minutes, waited one minute, and took the heart rate again. Next, I repeated the previous steps, but this time I worked each horse for 30 seconds and groomed each horse for one minute after exercising before taking their heart rate. I repeated this experiment with all horses 3 times. The materials I used were a stethoscope, 8 horses, round pen, stopwatch, paper, pen/pencil, and a clipboard. For Trial 2, at the judges' suggestion, I plan to repeat the experiment, but will exercise them for 3 minutes instead of 30 seconds. Results The results of this project indicate that when a horse's heart rate is high, and you groom it, the horse will relax and the heart rate will slow down more quickly than with rest alone. The average heart rate before grooming and exercise is 45.88. The average heart rate after exercise and grooming is 53.38, and the average heart rate after exercise and no grooming is 73.33, which gives a difference of 19.95 heart beats per minute. This data shows that grooming a horse after exercise acts as a way to cool them down faster than just rest alone. Conclusions/Discussion My hypothesis was supported because grooming causes a horse to relax, which in turn causes the heart to beat less often. While this is common knowledge when grooming horses in general among most horse owners, these results show that it should also be applied as a method of cool down after exercising horses. In order to cool a horse down quicker it is better to groom them than letting them rest without grooming. Grooming horses after exercise is a much more efficient way to reduce heart rate, and cool a horse down.	
Summary Statement My project is about how grooming affects a horses heart rate after exercise as compared to regular resting.	
Help Received My mother gave ideas, Mrs. Coffing helped with data, Jan Reid let me use her horses, stethoscope, and round pen, Lori Uhler let me use her horses, my dad helped me with the design of the board, my sister helped collect my data after I worked the horses, Chelsea Reid helped me deal with the rowdy horses.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Jennifer L. Kim	Project Number J1114
Project Title How Does a Hamster's Gender and Senses Affect Its Time through a Maze?	
Abstract Objectives/Goals To figure out how a hamsters senses and gender affect its time through a maze. Methods/Materials A hamster maze was made of wood glue, a jenga set, and cardboard and was used to test a male's and female's time through it using each no, visual, smell, taste, sound, and touch cues. The hamsters would be timed on each time he/she went through the maze using a stopwatch. The cues were changed as the experiment progressed. Results In this experiment the females had the least amount of time in each set of cues, the females had the least time starting with taste, then sound, then touch, then none, then visual and greatest time was smell, then males had the lest time starting with taste, then none, then visual, then touch, then sound, then smell, and the greatest time was visual.	
Summary Statement This project investigates which senses a hamster uses the best to navigate through a maze, and also to find out which gender uses them better.	
Help Received Teacher looked over my papers and made comments.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Oren R. Lee	Project Number J1115
Project Title Are Rats Smart Eaters?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Rats are known to display a behavior known as socially transmitted food preference in which observer rats display a similar food preference to demonstrator rats. The hypothesis of this experiment is that a rat's socially transmitted food preference will be demonstrated in the rat's ability to obtain that food in a dual lever Skinner box.</p> <p>Methods/Materials A dual lever Skinner box was built providing identical levers offering two different food sources from two different shoots. Ten rats were used to determine their socially transmitted food preference of Cheerios over alfalfa by placing each rat in a cage with the two food options for 10 minutes and counting the food pellets eaten during that time. Each test was repeated seven times for each rat. After each rat was trained to use the Skinner box, it was tested in the dual lever box for ten, 10-minute sessions counting the number of pieces eaten from each of the two shoots.</p> <p>Results The rats preferred Cheerios over alfalfa 98.36% of the time when allowed to eat freely. In the dual lever Skinner box, the rats pressed the Cheerios lever an average of 23.81 times per testing session, compared to 1.92 times for alfalfa. An ability to press the lever for Cheerios over alfalfa was seen 92.54% of the time.</p> <p>Conclusions/Discussion The rats clearly demonstrated a food preference and were able to translate this preference into performance in a dual lever Skinner box in order to press the lever that produced their favorite food. The small difference of 98.36% food preference in a cage versus 92.54% ability to press the favorite lever in the Skinner box demonstrates the rat's quick learning and strong desire to obtain the food they like. This study could be strengthened by adding more rats, more food variables, and seeing if the rats would still prefer one lever over the other if the food source was alternated from the two shoots</p>	
Summary Statement 10 rats were tested to see if their socially transmitted food preference would be demonstrated in the rat's ability to obtain that food in a dual lever skinner box.	
Help Received Father helped build skinner box. Mother helped with graphs and board.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Mariah Lopez; Eliza Munger	Project Number J1116
Project Title Super Tasters: All in Good Taste	
Objectives/Goals Taste is one of our most important senses. Our tongue is covered with hundreds of papillae. Each papillae is covered with tiny taste buds. Through complicated chemical reactions, our taste buds help us detect very specific taste sensations. Everyone has papillae and taste buds, but some people have more than other people. The people who have the most taste buds are called #super tasters# and they are much more sensitive to taste sensation then the rest of the population.	
Abstract We wanted to know if Chefs were more sensitive to taste and if they had a higher probability of being super tasters versus people who don#t like to cook. Our hypothesis is that Chefs are more likely to be super tasters compared to people who don#t like to cook.	
Methods/Materials We discovered that a simple test, called a PROP test, could be used to measure a person#s sensitivity to taste. We carefully measured out 1/32 of a teaspoon of Propylthiouracil (PROP) powder with one pint of water, and then soaked absorbent coffee filters in the solution. The filters were dried, cut into small pieces and placed into zip lock baggies. We then developed a questionnaire to carefully identify Chefs and non-cookers. Chefs had to be people who studied cooking for a career and "non-cookers" had to be people who said they disliked cooking. We then had each person put the PROP paper in their mouth and measured their reactions. Non tasters will not taste anything, tasters will detect a slight bitter taste, and super tasters will experience a very bitter taste. We recorded our observations and then analyzed our data.	
Results We found that 22.2% of the Chefs were super-tasters, versus only 9.1% of the non-cooks. 51.9 % of the Chefs were non-tasters and 77.9% of the non-cooks were non-tasters. We were able to prove our hypothesis that chefs were more likely to be super tasters compared to people who don#t like to cook. Although we were surprised that over half of the Chefs were non-tasters, our experiment did demonstrate that the Chef group had a much higher percentage of taste sensitivity to PROP strips when compared to people who don#t like to cook.	
Conclusions/Discussion Scientists are using information on super tasters and peoples sensitivity to taste to study obesity, colon cancer, heart disease and a number of other important health related disorders. We learned a tremendous amount about the tongue, taste and flavor!	
Summary Statement Using a procedure that measures sensitivity to taste, we tested whether chefs were more sensitive to taste than people who don't like to cook.	
Help Received Dr. Zata Vickers, Dept. of Food Sciences, Univ. of Minn., for her help with our hypothesis and direction on preparing our testing procedure; Freedom Branch Librarians for their assistance; the Chefs and cooking specialists who participated in our study; our Parents for help with typing and display design; our	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Samantha Y. Lux	Project Number J1117
Project Title How Well Do Horses Learn?	
Abstract Objectives/Goals An investigation was done to determine whether horses can learn to associate geometric shapes with a food reward. The literature reports numerous instances showing that horses can distinguish between different pairs of patterns. Here, the experimental design tested whether a horse can learn to recognize the difference between three different symbols: triangle, circle, and square. Methods/Materials Experimental subjects were 5 horses and ponies selected at a local stable, mature mares and geldings regularly used in riding lessons. Each subject was tested in 2-4 sessions: 10 or 12 challenge trials after 2 familiarization trials. The subject was released 5-6 meters from the buckets at the end of an 8x16 meter paddock. The subject was familiarized with the task by being led to a single, triangle-labeled bucket containing the feed reward, followed by a trial where they were allowed to find the bucket on their own. In the challenge trials, the subject was presented with 3 identical 12 liter buckets placed 2 meters apart; each bucket was labeled with the 12-15 cm black shape on a 8½ x11 inch white background. About 100 grams of sweet feed was placed in the bucket labeled with a triangle as a positive reinforcement. A different random assignment of the 3 different shapes to the buckets was used for each trial, with the same assignments was used for all sessions on a single day. Results In over 50% of the sessions, the correct bucket was selected more frequently than would be expected from chance. One subject chose the correct bucket 75% of the time, which would be expected only 0.1% of the time by chance. Four of the subjects had accuracies over 40%, compared to 33% expected for random selection. Conclusions/Discussion The data show that some horses can learn, but there are significant differences between horses. Qualitative differences between subjects# performance were seen, particularly in the incorrect choices. Some subjects appeared to select on the basis of physical position rather than on the symbol. Some subjects also appeared to use a systematic approach to finding the reward. Additional trials with more horses, as well as more analysis, may provide insight into the nature of learning in horses.	
Summary Statement This research showed that most horses can learn to distinguish between three different shapes for a food reward.	
Help Received Horse trainer loaned horses; Volunteer assisted with handling horses during experiment; Parents reviewed experimental design	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Karolina P. Madden	Project Number J1118
Project Title Do Fingerprint Styles Vary in Families?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals In this project fingerprints from five families were compared among themselves. If this is done, then it will prove that children inherit their fingerprint styles from their parents.</p> <p>Methods/Materials I was able to fingerprint each member of five families to determine if fingerprint styles are inherited from parent to child. I then examine them and compare the styles of the fingerprints among families.</p> <p>Results The fingerprint styles in families were very similar. The parents in each family passed down their fingerprint styles to their children. Children's fingerprint styles are similar to parent's fingerprint styles because the traits are passed down through DNA.</p> <p>Conclusions/Discussion The styles of fingerprints among family members are similar and are therefore passed down from parents to children.</p>	
Summary Statement In my project I compared fingerprints of children to their parent's to see if the styles were similar.	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Kelly M. McGinnis	Project Number J1119
Project Title Domestic Cat (Felis catus) Responses to Bird Sounds	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of my experiment was to find out if domestic cats would recognize all bird sounds as coming from potential prey or only ones that the cats were familiar with.</p> <p>Methods/Materials Thirty-two domestic cats were tested to see if they would respond to three different bird sounds. Two of the sounds were from non-local birds and the other was from a local bird. Each call was played on a computer in random order for three minutes or until the cats responded. I considered the cats to be responsive if they searched for the birds. Student t-tests were performed to find out if the ages in the cats that did or did not respond to the local bird were significantly different and if there was a significant age difference between the male and female cats.</p> <p>Results My study supports my hypothesis that domestic cats are attracted to local bird sounds and not to non-local bird sounds.</p> <p>Conclusions/Discussion I think the reason that cats responded to the local bird sounds and not to the non-local bird sounds is that to recognize them as potential prey, cats have to come into contact with the bird.</p>	
Summary Statement The purpose of my project was to find out if cats would respond to all bird sounds or only ones that they had heard before and I found that more cats responded to the local bird than the non-local birds.	
Help Received My father taught me how to use the scientific method and statistics, and my mother and father helped edit my paper.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Amber L. Moenich	Project Number J1120
Project Title Blood Pressure, Pulse, and Body Mass Index	
Abstract Objectives/Goals My objective was to determine which gender has higher blood pressure, pulse, and body mass index. Methods/Materials I sent home student permission slips to all 30 5th/6th grade students in my class. Informed consent was obtained from 18 students. I weighed each student, measured the student's height, and took their blood pressure and pulse. I charted my data, and I calculated the body mass index (BMI). I then calculated the mean, median, mode, and range for the blood pressure, pulse, height, weight, and BMI. Finally, I compared all data to find out which gender had higher results. Results The females had a higher pulse than males by 5 beats. The males had a higher systolic blood pressure by 22 mm Hg, higher diastolic blood pressure by 11 mm Hg, and they were taller by 2 inches, weighed more by 29 pounds, and had a higher BMI by 4 kg/m ² . Conclusions/Discussion I was able to prove my hypothesis for pulse and blood pressure, but was not able to prove my hypothesis for BMI. The BMI was higher in the males because 58% of the males were overweight, and by definition, BMI tells us body fatness.	
Summary Statement I compared blood pressure, pulse, and body mass index of 5th and 6th grade boys to girls.	
Help Received Mother helped type my charts and graphs and helped with type formatting.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Gretchen E. Monke	Project Number J1121
Project Title How Does Aerobic Training and Body Position Affect Heart Rate Recovery after Exercise?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The rate at which heart rate returns to resting level after exercise (heart rate recovery) is a good indicator of aerobic fitness. The effect of participation on school sports teams on heart rate recovery was studied in nineteen females ages 12-13. The effect of body position on heart rate recovery was also examined.</p> <p>Methods/Materials Each subject remained quiet in a supine position for twenty minutes, and a resting heart rate was recorded. A two-minute aerobic step test was performed. The time it took for the heart rate to return to resting levels was measured. The experiment was repeated with each subject resting and recovering while seated in a chair. A Polar heart rate monitor and transmitter were used to measure heart rate.</p> <p>Results Athletes had significantly faster heart rate recovery after exercise than non-athletes, regardless of body position. Body position, however, was also a determinant of heart rate recovery time. Both athletes and non-athletes recovered faster in the supine position than the sitting position. Athletes also had significantly lower resting heart rates than non-athletes.</p> <p>Conclusions/Discussion In the current study, participation on school sports teams is associated with faster heart rate recovery among school students ages 12-13. These results are important in light of recent studies demonstrating that adults with slower heart rate recovery times have a higher incidence of mortality. Considering the problem with childhood obesity in the United States today, a heart rate recovery measurement is an inexpensive tool that could be used as an indicator of aerobic fitness by teachers and parents.</p>	
Summary Statement Measuring heart rate recovery after exercise can be an effective way to determine aerobic fitness in youth, considering heart rate recovery is significantly faster in athletes than non-athletes.	
Help Received Father helped edit writing. Father and mother helped design board. Ken Aldrich helped with experimental design.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Heather K. Morris	Project Number J1122
Project Title Who Has the Greater Vital Capacity: Musicians Who Play a Wind or Brass Instrument, or Athletes?	
Abstract Objectives/Goals The goal of my project was to determine whether musicians, who play a wind or brass instrument, or athletes, have the greater vital capacity, or the amount of air that can be taken into the lungs. Methods/Materials An incentive spirometer was used to test 100 students, 50 athletes, and 50 musicians in sixth, seventh, or eighth grade. Each student would sit up strait in their chair, and then exhale all of the air they can. Then the student would put their mouth on the mouth piece of the incentive spirometer, and inhale as much as possible. The gauge in the incentive spirometer would elevate measuring the student#s vital capacity in milliliters. Each student was tested three times with a small break in between. The best trial of the student was then taken and averaged along with the other musician, or athletes. Results The average vital capacity of an athlete in the sixth, seventh, or eighth grade is 2,938 milliliters. The average vital capacity for a musician in the sixth, seventh, or eighth grade is 2,362 milliliters. This shows that athletes have a greater vital capacity than musicians, who play a wind or brass instrument. Conclusions/Discussion Being involved in activities such as playing a wind or brass instrument, or playing a sport can affect your lungs vital capacity. Though athletes have a greater vital capacity than musicians, they both may affect vital capacity.	
Summary Statement The purpose of this project was to see who has the greater vital capacity, musicians, who play a wind or brass instrument, or athletes, and also to see how these activities affect the lungs.	
Help Received A friend donated the incentive spirometer.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Linsey R. Murphy	Project Number J1123
Project Title Moos in Motion	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of my project was to determine if the age of a cow affects how active it is .</p> <p>Methods/Materials To archive this I attached pedometers to cows of different ages for 24hr and recorded the number of steps. The cows ID tags were used to confirm their ages.</p> <p>Results With the exception of very young cows, ages did not seem to have much of an affect on the activity level.</p> <p>Conclusions/Discussion The age did not really affect the activity of the cows as much as other things in their environment. Things causing changes in activity level are; foot warts, weather, feeding times, milking patterns.</p>	
Summary Statement does the age of a cow affect how active it is	
Help Received My Mom heled me to find reasherch and put to geather my bord My Dad helped me to put the pedometers	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Rachel E. Richey	Project Number J1124
Project Title How Does Age Affect the Human Eye's Ability to Adapt to Darkness? Why Can't Grandma Find a Seat at the Movies?	
Objectives/Goals My project is to determine whether the age of a subject has a significant effect on how quickly their eyes can adapt to the dim light in a darkened room and read a prepared sentence.	
Abstract Methods/Materials A small, hand held eyes chart for visual screening A large, dark closet(without windows) with 2 light fixtures(4 60 watt light bulbs) A small night light containing a 4 watt clear bulb, wrapped in a capsule of white material desired dimness taped into place on a high shelf A printed passage of two basic sentences to read in large type(font 18) A standardly positioned chair A stop watch The subject sits in a well lit closet for three minutes, filling out an information sheet and having their vision screened. The lights are then turned off and the door closed. Only a small very dim night light remains on. They are timed as to how fast they can read a passage of 2 sentences in large type from a card they turn over on their lap when the room is darkened. Results The group of subjects over 40 had a very difficult time adapting to the dim light compared to the younger subjects. The dramatic change occurred with the over 40 age group where it took an average of 12 minutes and 34 seconds to be able to read the sentence. Conclusions/Discussion Based on the results of this experiment, age definitely has a significant effect on how the eyes adapt to darkness. Particularly after 40 years of age, it takes a subject a much longer time to adapt and be able to read in a darkened room.	
Summary Statement I tested how age affects a person's ability to read written text under extremely low light conditions.	
Help Received Parents helped recruit subjects, Grandmother gave me the idea	



CALIFORNIA STATE SCIENCE FAIR 2007 PROJECT SUMMARY

Name(s) Ryan A. Robie	Project Number J1125
Project Title Spirobics: Airflow Resistance and Its Response to Exercise	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of my project was to determine if the changes in airflow resistance that occur in breathing conditions such as exercise-induced wheezing can be objectively measured. I hypothesize that a screening procedure that combines pulmonary function testing with an aerobic exercise challenge can identify children who experience airflow limitation during aerobic exercise.</p> <p>Methods/Materials To test my hypothesis I first obtained completed surveys from 21 eighth grade students about how exercise affects their breathing. The respondents pulmonary function flow rates were measured with two trials of spirometry testing before and after a six minute aerobic exercise challenge. The spirometry measuring system included disposable mouthpieces/flowsensors and printed test results. A stopwatch timed the exercise period. Pulse oximetry was used to obtain heart rates. All results were recorded on a data chart for analysis.</p> <p>Results The final data analysis represented 16 of the participants tested that had valid spirometry results per review by the medical research advisor, a pulmonologist. The forced expiratory volume in one second (FEV1) was the primary outcome variable used in determining the presence of exercise-induced air flow limitation expressed physiologically as airway resistance. Results were then compared with the initial screening questionnaires to determine any correlations. Three students who subjectively screened positive on their survey for "wheezing with exercise" and "exercise limitation", also met the objective criteria defining airflow limitation in their test results.</p> <p>Conclusions/Discussion The correlation obtained from the data in my testing results when compared with the initial survey screening validates my hypothesis. It suggests that a subjective survey of how exercise affects ones breathing would prove more beneficial in screening for exercise-induced airflow limitation if it is substantiated with the results of an objective testing regimen. In conclusion, a simple verifiable testing procedure that combines spirometry testing with an aerobic exercise challenge ("Spirobics") might prove useful to objectively identify students who experience airflow limitation during aerobic exercise. Information obtained from evaluations using this methodology might aid pediatricians or school health clinics in the early intervention of suspected exercise-induced airway reactivity in children.</p>	
Summary Statement My project demonstrates that an objective testing method combining pulmonary function spirometry testing with an aerobic exercise challenge ("Spirobics") can be used to identify children with suspected exercise-induced airflow limitation.	
Help Received Dr. Melvin Selinger was my medical research advisor. My parents, both respiratory therapists, and my P.E. teacher, Emily Howatt assisted me in the testing process at Sunny Brae Middle School. St. Joseph Hospital provided the spirometry testing system and pulse oximeter. My dad was my research director.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Emily M. Russell	Project Number J1126
Project Title Fingerprints: A Family Matter	
Abstract Objectives/Goals My purpose is to determine if members of the same family have any fingerprint characteristics in common. Methods/Materials My methods were first to gather a sampling of family fingerprints on index cards that were identified on the backs of the cards. I sorted the cards by fingerprint pattern without looking at the fingerprint identities. Next, I entered each fingerprint into a table grouped by family noting what type of fingerprint each member had. Finally, I analyzed the data to see if members of the same family had fingerprint characteristics in common. Conclusions/Discussion I discovered that heredity plays a large roll in determining a person's fingerprints. A majority of my sample group had fingerprints that match their parent's.	
Summary Statement Does heredity have an effect on fingerprint characteristics?	
Help Received Mother helped me to create visual aspects of project with spreadsheets and word art and she edited my report.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Amanda C. Schaefer	Project Number J1127
Project Title Which Gender Has a Better Sense of Smell?	
Abstract Objectives/Goals To test if females have a better sense of smell than males. Hypothesis: I think that females will have a better sense of smell and get more answers correct than the males. Methods/Materials My method was to create a hypothesis and then to test subjects and survey their results after they smelled each sample and record what they smelled. My materials used were 5 pharmacy jars, a variety of candies, paper around the jars, and test subjects. Results Consistently both boys and girls were able to determine the correct fragrances 74% of the time. Kids 10 and under smelled the fragrances the best overall. It appears the younger you are the better sense of smell you have. Depending on the fragrance different genders did better depending on the sample. Females did better on the cinnamon jelly beans, the chocolate coffee beans, and the popcorn jelly beans. However, the males did better on the peppermint Altoids and the bazooka bubble gum. Before I began my project I thought teenagers would be able to smell the best and that females would be able to smell better. But unfortunately I was incorrect on both. Conclusions/Discussion In my hypothesis I said that females would overall be more able to smell than males. But my hypothesis was proven incorrect. Females and males both were able to determine the correct fragrances 74% of the time. I also thought that 13 and 14 year old teens would be able to smell better than any other age. I was incorrect again. The 10 and under kids were better than the 13 and 14 year old teens and the 20 and older adults. But the teens did better than the adults. From my test results I found out the older you get the worse your sense of smell is the sense of smell is dependent on the sample being tested.	
Summary Statement My project tests to see if females have a better sense of smell than males.	
Help Received None	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Matthew D. Thompson	Project Number J1128
Project Title Chondrocyte Apoptosis	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Osteoarthritis is the second leading cause of disability in the elderly in the United States. Cartilage injury often leads to osteoarthritis. When cartilage is injured, the cells called chondrocytes begin a programmed cell death known as apoptosis. The objective of this experiment is to see if chondrocyte apoptosis occurs at a faster rate with cells that are injured compared to cells that are not injured.</p> <p>Methods/Materials In this experiment, cartilage explants were removed from a bovine knee that was under the age of one. The explants were divided into two groups (experimental and control). The experimental cartilage explants were injured using the Instron machine. They were cut in half with a scalpel so the inside could be viewed under the microscope. These explants were stained, and over a period of three days, chondrocytes were viewed under a confocal microscope and counted. The dead cells appeared red under the microscope and the live cells appeared green from the stain. After three days, the live and dead cells were counted to determine the rate of cell death in both the experimental and control group.</p> <p>Results Cells that died stained red. Cells that remained alive stained green. On day one after injury, 278 cells (experimental) were counted and 15% were red. On day two after injury, 255 cells were counted and 20% were red. On day three, 248 injured cells were counted and 95% were red. In the uninjured cartilage (control), on day one after harvest, 234 cells were counted and 5% were red. On the second day after harvest, 257 cells were counted and 10% were red. On day three after harvest, 162 cells were counted and 48% were red.</p> <p>Conclusions/Discussion My hypothesis was proven correct. The results showed that injured cells died at a faster rate than uninjured cells. The cells also did not die immediately after injury. Measuring the rate of cell death over time may help scientists determine how long it takes cartilage to die after injury. Cartilage is a unique tissue because it contains no blood supply to help it regenerate. With the information gathered from this experiment, scientists may be able to develop drugs to rescue the cells before permanent death occurs.</p>	
Summary Statement The purpose of this experiment is to see if chondrocyte apoptosis (cartilage cell death) occurs at a faster rate with cells that are injured compared to cells that are not injured using a bovine knee specimen.	
Help Received The experiment was conducted at the Shiley Center for Orthopaedic Research and Education at Scripps Clinic; Will Calvani, Biomedical Engineer, harvested the cartilage explants and served as my mentor; my mother Pamela Pulido, RN helped translate the difficult science terms.	