



CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s) Etinosa J. Agbonwaneten	Project Number S1001
Project Title The Characterization of Dental Papillae Mesenchyme (DPM) Cell Lines	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To show that several types of DPM cells are present in the tooth where only some are able differentiate into odontoblast, leading to dentine formation.</p> <p>Methods/Materials Cell Culture: The cells were first grown at 33oC in 60-mm Petri dishes with permissive media containing <i>f#</i>-interferon so the cells become confluent. This is important because this media induces the production of H-2Kb Promoter, which in turn makes SV40 T-Large Antigen and allows the cells to grow ad infinitum. Cells were then incubated at 39oC with differentiating media containing <i>fO</i>-glycerophosphate and L-ascorbic acid. This differentiating media was essential in promoting cell mineralization. RNA Isolation and Reverse Transcription: My DPM E-16 cell lines were grown at 0, 5, 10, 15, 20, and 25 days while the DPM G005 cell lines were grown at 7, 14, 28, and 36 days. RNA at each day increment was isolated from these cells. In order to determine the concentration of the RNA, a small sample placed in a spectrophotometer and the absorption was read at 260nm. The concentration is important because it helps determine the volume needed so that each experiment sample will have the same RNA quantity. RNA was then converted into cDNA. PCR (Polymerase Chain Reaction): PCR was used to amplify the cDNA for viewing. Makes billions of copies of cDNA strand in short amount of time. Agarose Gel Electrophoresis: In order to view cDNA amplification after PCR is run. If bands are seen, the gene was expressed.</p> <p>Results Many of the same genes were expressed by my DPM G005 and DPM E-16 cell lines. However, Osteocalcin and DMP-1, both important in assisting dentine formation was shown to be expressed in my G005 samples while they were not expressed at all in my E-16.</p> <p>Conclusions/Discussion This finding has suggested that these two cell lines, though the same kind of cells, have two destined paths. The G005 will later go on to differentiate in to odontoblast, resulting in dentine while the E-16 will not.</p>	
Summary Statement Determining if all DPM cells are destined to differentiate into odontoblast and later form dentine	
Help Received Used lab equipment at University of Southern California under the supervision of Dr. Magarita Zeichner-David.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Sophia M. Benevento	Project Number S1002
Project Title The Effect of the Amount of Grain on the Strides of a Horse	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My project was to determine if the amount of cob a horse eats affects the number of strides (level of activity) that the horse takes. I feel that if more cob is fed, then the horses number of strides, or level of activity, will increase.</p> <p>Methods/Materials Two horses were used for this expirement. On the last three days of each week, lunge horse for three laps around the arena at a lope, recording the number of strides for all three laps. on the first four days, nothing happens. At the end of day seven, each horse gets 10 oz of cob fo the rest of that week. The next week each horse gets 15 oz, and on the last week 20 oz.</p> <p>Results Each of the horses strides increased more as each week went by and more cob was fed</p> <p>Conclusions/Discussion My conclusion is that all grains, not only cob, can make a horse hyper and change his personality a little. The amount of cob fed will cause an increase in mthe level of activity of the horse.</p>	
Summary Statement To determine if the amount of grain a horse eats affects how hper he is.	
Help Received Teacher helped to determine dependant and independant variables	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Nils Carlson; Matthew D. Maxson	Project Number S1003
Project Title The Sixth Sense	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The object of our project was to determine if animals can sense natural disasters. We believe that animals do have the ability to predict some of these events.</p> <p>Methods/Materials Materials List</p> <ol style="list-style-type: none">1. 3 Jars2. Cardboard dates to determine the 10 random dates3. A car to get to the Stanford Library4. Microfilm Newspaper of the San Jose Mercury News <p>Methods</p> <p>Step 1. Look up 10 dates of earthquakes with a magnitude of 4.5 or greater and within 50 miles of a major metropolitan newspaper. And using 3 jars and cardboard dates, we selected 10 random months, 10 random days, and 10 random years to get our dates.</p> <p>Step 2. We attended the Stanford Library and looked up the dates of the earthquakes and the random dates. We then counted all the lost pet ads of cats, dogs, and others.</p> <p>Step 3. We made a chart of all the lost pet ads for the days and compiled our data.</p> <p>Conclusions/Discussion We are going to re-conduct our experiment before we arrive in Los Angeles</p>	
Summary Statement To discover if animals can detect natural disasters.	
Help Received Used the microfilm library at Stanford University	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Ariel M. Daly	Project Number S1004
Project Title The Effect of Food on Saliva's pH	
Abstract Objectives/Goals The object of my experiment was to determine whether or not the foods we eat effect the pH of our saliva. I believe that acidic foods will cause the pH to decrease, and that alkalinic foods will cause the pH to increase. Methods/Materials Materials: bottle of water, strips of blue and red litmus paper, and strips of pH paper. Methods: After having each of the test subjects rinse out their mouths with water (to get the saliva to its normal pH) they would eat a few bites of one specific specific food, and after swallowing, gather some saliva in their mouths and press the papers onto their tongues, allowing them to react with the saliva. Results In every trial performed, the foods caused the pH of the saliva to change, by either increasing or decreasing, proving that salive does react with the foods we eat. Conclusions/Discussion My conclusion is that the levels of acidity and/or alkalinity in our foods do effect our saliva's pH, and cause it to change as the foods are being broken down before being swallowed.	
Summary Statement My project was meant to determine whether or not different foods react with saliva and cause its pH of 7.4 to change, by either increasing or decreasing.	
Help Received Mrs. Taliaferro helped revise report, and Chloe Smith, Tim Lamphier, Jamie Lofton, Lisa Wells, and all members of my immediate family served as my test subjets.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Caitlin E. Ellrott	Project Number S1005
Project Title Bones and Balls	
Abstract Objectives/Goals My objective is to find out if dogs have a color preference by sight.(They are not color blind) Methods/Materials To test my theory, I chose 10 dogs, 4 colored tennis balls, and 4 colored food bowls, with dog bone treats inside each one. I chose to use the colors red, green, orange, and purple for the purpose of my tests. I did a "ball test" and a "bowl test" 6 times each with all of the dogs. For the bowl test, I set the four bowls in a horizontal row ten feet from the dog and its owner. Then released the dog. For the ball test, I rolled all four balls then the owner released the dog. Recorded the results. Do this test 4 times. Take the top 2 colors and repeat twice more. Results The results for the bowl test were...red was chosen 4 out of 60, green was chosen 8 out of 60, orange was chosen 3 out of 60, and purple was chosen 45 out of 60!! The results for the ball test were...red was chosen 4 out of 60, green was chosen 10 out of 60, orange was chosen 3 out of 60, and purple was chosen 43 out of 60!! As you can see, the dogs preferred the color purple over all of the other colors. Conclusions/Discussion As you can see by the results, the dogs preferred the color purple over all of the other colors. I did some research and found that the dogs chose the color purple not because it was their favorite, but because they could see it the best and the clearest out of the four choices they were given due to smaller amount of photoreceptors(cones)in their eyes. This lets them see colors as we see pastels.	
Summary Statement My project experiment was to find out if dogs have a color preference by sight since they are not color blind as many people think them to be.	
Help Received Mom took the pictures, and the owners held their own dogs while I performed the test.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Georgina E. Hartzell	Project Number S1006
Project Title What Is the Effect of Diet Type on the Amount Blood Pressure Can Be Lowered?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To find out if non-vegetarians have their blood pressure lowered more easily than vegetarians. Both groups underwent the same methods for lowering their blood pressure, however the groups started out with different means for their blood pressure (vegetarians had lower blood pressure than non-vegetarians). However even vegetarians may need to lower their blood pressure to prevent risk of heart disease, and I speculated that methods of changing diet would be less effective on the vegetarians.</p> <p>Methods/Materials In this experiment, I conducted a laboratory study with high school students as subjects. The goal was to find out if the non-vegetarian subjects were able to lower their blood pressure more than the vegetarians. The method of lowering blood pressure was to consume two oranges a day. One group of six vegetarians and one group of six non-vegetarians ate two oranges each day for six weeks. The other groups of six vegetarians and six non-vegetarians did not change their diet over the course of six weeks; they were the control. To take the initial blood pressure of my four groups (before the six-week period), I used the physiology lab in my school. I was supplied with a sphygmomanometer and a stethoscope, and I measured all 24 subjects' blood pressure myself. I checked with my subjects during the course of the six weeks to assure that they were correctly following the procedure. At the end of six weeks I took everyone's blood pressure again.</p> <p>Results The amount of change in blood pressure was most significant for the non-vegetarians who ate oranges. With a t-test (a measure of variance) this group ranked in the "very significant" category. The vegetarians who ate oranges had a "somewhat significant" amount of change. The two control groups saw no significant change in their blood pressure. All subjects who ate oranges said that they enjoyed it and would prefer eating oranges to changing other parts of their diet or increasing exercise to lower blood pressure.</p> <p>Conclusions/Discussion I found that my hypothesis was right. The vegetarians started with lower blood pressure, but their's did not have as much change over the course of six weeks. However, the effectiveness of oranges for lowering blood pressure was demonstrated by the lack of any change in the control group. I would recommend oranges for anyone with high blood pressure.</p>	
Summary Statement A study of oranges as a method for lowering blood pressure in vegetarians vs. non-vegetarians.	
Help Received Science teacher, Ms.Hackworth, helped me find subjects.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Cody R. Lewis	Project Number S1007
Project Title Utilizing Counter Movement Medicine Ball Throws to Increase Counter Movement Vertical Jump Heights	
Abstract Objectives/Goals Throughout the course of history, many athletes have been forced into early retirement due to knee injuries and joint inflammation. The constant pounding on knee joints of athletes, in volleyball especially, can lead to an abrupt career end. This project was designed to increase an athlete's counter movement vertical jump (CMVJ) height by using repetitions of counter movement medicine ball throws (CMMBT). These throws decrease the pounding on the joints while increasing the subjects' CMVJ heights and maximum power output (MPO) index. Methods/Materials The project began 15 weeks ago and consisted of 19 experimental group subjects and 6 control group subjects. All were non-elite high school athletes in grades 9-12 with one exception. The experimental group threw a 4 kg rubber medicine ball, 20 times in a high school gym, 3 times a week for a total of 60 throws per week. Week 1 was used as practice only, to minimize the learning curve. The subjects' initial weight, age, standing vertical reach, CMVJ height, and CMMBT were measured at the beginning of week 2 (the first official "workout" week). During Weeks 2-4, 5-7, 9-11, and 12-14, all experimental subjects completed 9 sessions of CMMBT (approximately 900 CMMBTs). Weeks 2, 5, 7, 12, and 14 included data collection on all experimental and control participants, measuring weight, CMMBT, and CMVJ height. Results All male experimental subjects exhibited increases in both their CMVJ height and their MPO. As a group, the males averaged a 2.0 inch increase in their CMVJ height and an 8.4 kg ² m increase in their MPO within a 14-week period. The female experimental subjects increased 1.8 inches in their CMVJ height and 7.5 kg ² m in their MPO within a 14-week period. All control group participants decreased in their CMVJ and all but one decreased in their MPO. Conclusions/Discussion Overall, the data did support the hypothesis. The results show that it is possible to increase a non-elite athlete's CMVJ height and MPO utilizing an exercise regime that includes throwing a 4 kg medicine ball 20 times, 3 times a week.	
Summary Statement Utilizing counter movement medicine ball throws to increase non-elite high school athletes' counter movement vertical jump height.	
Help Received Mrs. Lewis and Vanessa Marroquin helped set up equipment (vertex), and helped measure and record data on various test days.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Brandon Mendoza	Project Number S1008
Project Title Fetal Lung Maturity: Maternal Diabetes' Impact on Lamellar Body Count	
Abstract Objectives/Goals The goal of this project was to compare a fetal lung maturity test, lamellar body counts (LBC) in diabetic and non-diabetic pregnancies. Methods/Materials The experiment involved testing amniotic fluid samples on the Bayer Advia-120 hematology analyzer. A non-diabetic control for each identified diabetic case was selected by matching gestational age. Results There was no statistically significant difference of the LBC between diabetic and non-diabetic cases over the gestational ages studied. (32-39 weeks). Conclusions/Discussion This experiment supports the hypothesis that LBC does not vary between diabetes and nondiabetes cases during pregnancy.	
Summary Statement Comparing fetal lung maturity testing in diabetic and non-diabetic pregnancies.	
Help Received Used the lab instruments at Sharp Memorial Hospital under the supervision of the supervisor Darlynn Lafler, MT (ASCP); help with statistical analysis from Deb Poelter, RN, PhD, research nurse at Sharp Mary Birch Hospital for Women; Mother and Father helped type report; Dr. Susan Domanico, AP	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) William J. Milcovich	Project Number S1009
Project Title Is Mus musculus Capable of Developing a Cognitive Map of Its Environment?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this experiment was to determine if Mus musculus has an ability to form a cognitive map of an elevated maze in order to recognize and recall each pathway to receive a reward of food and/or water.</p> <p>Methods/Materials I utilized two sets of mice, six male and six female mice and I was able to test my hypothesis. My hypothesis states: After each mouse is tested several times to each individual platform, they would naturally learn and memorize certain paths leading to food or water, thus forming a cognitive map of the maze and environment. After teaching them to follow a specific route for a specific reward, I wanted to find evidence that Mus musculus was able to put two pathways together as an alternate route, when the direct route was obstructed. Over a period of two weeks, every other day, I timed and recorded each individual mouse as it crossed the tubing to reach a platform. Before doing this, I deprived them of food and/or water the night before. This process was repeated three times for each platform on different days.</p> <p>Results The mice achieved their goal of food and water from their memory of the textures on each platform. After analyzing the data results, my hypothesis was proved. The average trial times for both males and females progressively decreased, showing the ongoing learning and memorizing of the elevated maze, thus forming a cognitive map. The results show that the mice in the first series of trials traveled at a rate of 1 cm/sec, but by the final series of trials, they traveled on the average over three times as fast! All 12 mice were successful in combining the two pathways to create an alternate route to the goal of food and water in the final series.</p> <p>Conclusions/Discussion My conclusion is that Mus musculus is capable of learning to form cognitive spatial maps to help them find food and water in a maze.</p>	
Summary Statement The purpose of this experiment was to determine if Mus musculus has an ability to form a cognitive map of an elevated maze in order to recognize and recall each pathway to receive a reward of food and/or water.	
Help Received Mr. Otterstedt, who is the Chair of Guidance Services for my school helped me focus, organize and fine tune my ideas. Mr. and Mrs. Oyama helped me to organize my charts, and fine tune my graphs as well as design the graphics for the project board.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Soquel M. Schafer	Project Number S1010
Project Title Does Everything Go with Age? A Study Testing Tactile Sensitivity Relative to Age	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to learn whether there is correlation between a person's age and their tactile sensitivity, using the two-point discrimination test.</p> <p>Methods/Materials Twelve subjects, from 13 to 65 years of age, were asked to identify with their eyes closed whether they felt one or two points touching their fingertip. Then the test was repeated on the back of their hand. A paper clip bent in a u-shape was used to create the sensation.</p> <p>Results Tests showed there is a difference between sensitivity of the fingertip and back of the hand. The fingertip was able to detect a narrower point separation than the back of the hand, but there is no general or common trend when comparing older subjects to younger ones. By averaging, it seems that the younger group (13-15 years old) was more sensitive than the older (42-65 years old). But, when you look at it individually, the numbers do not show correlation of age with sensitivity.</p> <p>Conclusions/Discussion I conclude that there is no trend in relation to age. My sample number (12) was too small to show true correlation. Just as your eyesite is proven to deteriorate with age, and muscle strength diminishes with age, perhaps there is a skin sensitivity peak-point correlating to age, where afterwards you go down hill. It would be important to have criteria to know what to expect at a certain age. To find this out, I would need to increase the number of participants in this study.</p>	
Summary Statement This project tests tactile sensitivity relative to age.	
Help Received Dr.Fern Russak told me about neurological testing, and referred me to websites on the subject. My mother and Briana Burns edited my rough draft.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Leslie L. Sheu	Project Number S1011
Project Title A New Measurement for Locomotor Behavior: Recovery from Spinal Cord Injury in Human Stem Cell Transplanted Mice	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objectives are to suggest the importance of and come up with an appropriate scoring method for quantitative ladder beam testing (rather than the widely used qualitative BBB locomotor test) as researchers get closer to finding a cure for spinal cord injury (SCI), and the possibility of using stem cell transplants to help SCI patients (stem cells are undifferentiated cells that may replace the injured cells). I also hope to show a relationship between successful proliferation of human stem cells and locomotor behavior through histology.</p> <p>Methods/Materials I began by recording normal C57BL6 mice (mice most often used in research) and normal Nod-Scid (immunodeficient) mice run across a ladder beam apparatus (17 animals per strain, 3 trials each). Afterwards, 18 injured Nod-Scid mice, half of which had human embryonic stem cell grafts, were recorded. I analyzed the locomotion of each mouse by downloading the clips onto a computer program and then compared this ladder beam data to BBB test data (the higher the ladder beam or BBB score, the better the locomotion). I compared ladder beam scores of control injured mice with those that received stem cells, and further compared the proliferation of stem cells in transplanted mice to ladder beam scores with a light microscope.</p> <p>Results All SCI mice have worse behavior than normal mice, but mice that received stem cells functioned more like normal mice than those that did not receive stem cells. There is a positive correlation of BBB and ladder beam scores in injured mice, but ladder beam scores have a much higher range around BBB scores of 8-10. The ladder beam data is much more detailed and reproducible. Histology showed a very strong positive correlation between stem cell count and ladder beam score among stem cell transplanted mice.</p> <p>Conclusions/Discussion Stem cells can be a potential treatment for SCI patients if injected properly and accepted by the host organism. The new quantitative ladder beam test is more sensitive to small changes in locomotion than the currently used qualitative BBB test; thus, it can differentiate recovery of small animals in more detail than the BBB and should be used in locomotor recovery studies.</p>	
Summary Statement Assessing the affect of stem cells on locomotion of immunodeficient mice by comparing results from two different behavioral tests (new ladder beam and current BBB) and histological evidence.	
Help Received Used lab facilities and specimen at the University of California, Irvine, under the advisement of Dr. Brian Cummings.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Rebekah M. Silva	Project Number S1012
Project Title The Effects of Weight Training and Aerobic Exercise on Body Measurements	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Experiment combined isotonic exercises, a type of weight training, with aerobic exercise on a treadmill to assess whether lighter weights used with more repetitions or heavier weights used with fewer repetitions would be more effective for losing inches (millimeters) and improving overall body measurements.</p> <p>Methods/Materials Informed consent was obtained from 10 experimental and 2 control subjects, one per age group tested. Seven completed experiment. Upper thighs and upper arms of experimental and control subjects were measured before and after experiment. Weight training 3x/wk consisted of lifting 2 lb (907.2 g) free weights on left arms, 2 lb (907.2 g) ankle weights on left legs, 5 lb (2268 g) free weights on right arms, and 5 lb (2268 g) ankle weights on right legs. Number of repetitions was adjusted so total weight lifted on each side was constant, but repetitions/set were higher with lighter weights. Aerobic exercise 3x/wk consisted of walking on a treadmill at 2.5 to 3.5 mph for 30 min or until the target heart rate was achieved to equalize intensity among subjects, preventing age and metabolism from acting as confounding variables. Stretching exercises to prevent injury were discussed and demonstrated.</p> <p>Results Left upper arms and thighs, which used 2 lb (907.2 g) weights and more repetitions, lost more inches (millimeters) than right upper arms and thighs, which used 5 lb (2268 g) weights and fewer repetitions. Right upper arms and thighs bulked up, showed no change, or decreased in circumference less than left upper arms and thighs. Results are reported in Table 1 and Figs. 1 and 2 as millimeters lost or gained in upper arms and thighs.</p> <p>Conclusions/Discussion Experimental subjects lost or gained millimeters in skeletal muscles in upper arms and upper thighs in the pattern predicted by the hypothesis. Using lighter weights with more repetitions (left upper arms/thighs) was more effective for toning and losing inches than using heavier weights with fewer repetitions (right upper arms/thighs). Results for right upper arms/thighs suggested that heavier weights/fewer repetitions, in most cases, improved muscle size and strength. Follow-up experimentation with a larger sample size and for a longer duration is necessary to confirm validity of initial results.</p>	
Summary Statement Experiment combined aerobic exercise with weight training to assess whether lighter weights used with more repetitions or heavier weights used with fewer repetitions was more effective for losing millimeters.	
Help Received Mom drove me to the UC Riverside Science Library. Dr. Joy Peoples and Dr. Carol J. Lovatt critiqued my Science Fair Board after I had been selected to compete at the RIMS Regional Science Fair.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Denise Y. Veloria	Project Number S1013
Project Title The Fat Attack	
Abstract Objectives/Goals Problem: Does the consumption of food high in saturated fat increase cholesterol? Hypothesis: I think that the consumption of foods high in saturated fat will increase cholesterol levels. Methods/Materials To conduct the experiment I used 3 male rabbits one year old with no prior history of heart problems, regular rabbit feed, Land o Lakes soft butter, and blood testing material. First a baseline cholesterol level has to be established to determine later on how fat consumption affected an otherwise healthy rabbit that did not consume a great amount of saturated fat before the experiment. This is done by feeding all the rabbits the same regular rabbit feed for one week then taking blood from the rabbit's ear and analyzing it in the laboratory. Following this rabbits #1 and #2 were fed # cups of high fat food once mid-morning and evening everyday. Rabbit #3, the control, was fed regular rabbit feed. Each rabbit had daily exercise runs for thirty minutes. Blood was taken approximately every 3 weeks to monitor cholesterol levels. Results The cholesterol levels in the experimental rabbits have increased substantially: Rabbit #1 from 64 mg/dL to 76 mg/dL; Rabbit #2 from 25 mg/dL to 45 mg/dL. The control rabbit (#3) has stayed relatively the same at 10 mg/dL to 12 mg/dL. Conclusions/Discussion The results of my experiment have supported my hypothesis. Since rabbits are physiologically similar to humans the increase in cholesterol has reinforced the fact that foods high in "bad" fat will adversely affect cholesterol levels. Heightened cholesterol has been a major cause of coronary heart disease.	
Summary Statement My project is about the direct correlation between diet and cholesterol levels.	
Help Received Father took blood	