CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Ananta Amin; Ronak Mody

Project Number

S1401

Project Title

Allium sativum vs. Agrobacterium tumefaciens

Abstract

Objectives/Goals

After completing research on the widespread Crown gall disease, we wished to help find a way to cure the disorder. Therefore, by using common knowledge that garlic is often used to alleviated human biomedical problems, we created this experiment. In this project, we tested what effect the application of Allium Sativum, commonly referred to as garlic, has on plants injected with Agrobacterium Tumefaciens.

Methods/Materials

To carry on the experiment, we first injected 2 white-clover plants (broad-leafed plants which are easily affected by the bacteria) with 1 c.c. of A. tumefaciens, and waited two weeks for the galls to develop. Before treating one of the plants, we made a small hole/wound in the plant root using a small needle. Next, we injected 1 c.c. of A. sativum into the wound of the variable plant (wounded plant), and waited 2 weeks. Lastly, we compared the amount of galls initially in the plant, and amount of galls alleviated or reduced in size. By analyzing this data, we were able to create a final conclusion.

Results

Approximately 25% of the crown galls were either completely eliminated or partially alleviated.

Conclusions/Discussion

After performing fifteen trials, we have analyzed that the application of A. sativum does in fact have a beneficial effect on the bacteria-infested plants, yet not to the extent we had hypothesized. A major error which could#ve tampered our results was the use of store-bought garlic with preservatives rather than purely strained garlic. Perhaps these preservatives could#ve had an effect on the plant, and therefore the use of pure garlic juice would be more accurate. Also to further carry on the experiment, we can test the application of curry powder, which similar to garlic, is known to have beneficial effects on the human body, and perhaps also on plant biology.

Summary Statement

To determine what type of effect the application of A. sativum (garlic) has on plants infected with A. tumefaciens, a bacteria which causes a disease.

Help Received

Mothers drove us to the convenient stores; Professor at Loma Linda University which supplied us with the bacteria

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Risha R. Bera

Project Number

S1402

Project Title

Examining the Effects of Organic Chemicals Present in Vehicle Exhaust on Wound Healing

Abstract

Objectives/Goals

Smoking hand studies have revealed that toxins in the smoke negatively affect surface wound healing process. The goal of this project is to examine the wound healing process with the influence of vehicle exhaust. It was hypothesized that the hazardous chemicals present in vehicle exhaust and in secondhand smoke will hinder the wound healing process because the rate of cell migration will significantly decrease.

Methods/Materials

The first step to testing the hypothesis was to collect vehicle exhaust in a medium that could be exposed to mice epithelial cells. A 1999 Chevrolet Suburban was used to collect emissions into a sterile liquid media by a plastic tube. A second tube leading out of the solution was connected to a small pump to ensure the flow of non-soluble gases out of the solution. Different concentrations of the solution was applied to various samples of cells, and then tested with a dye. The dye revealed that the ideal concentration of solution for the experiment was 1:10. The diluted solution was finally applied to test epithelial cells. Only untreated media was applied to control epithelial cells. Initial positions were marked and used to compare final positions.

Results

Migration distances were measured with the use of a light microscope. The migration distances of control cells were found to be nearly twice the migration distances of treated cells.

Conclusions/Discussion

Cells in close contact with vehicle exhaust have a slower migration rate than normal. This poses a problem in healing. As cells slow down, the cells are less likely to close the wound and allow full healing to occur across the wound surface. Cells in contact with vehicle exhaust are also more likely to accumulate at the edges of a wound, thus causing excess scarring by a buildup of connective tissue.

Summary Statement

This project showed that extreme amounts of vehicle exhaust negatively affect the rate of epithelial wound healing.

Help Received

Used lab equipment at University of California, Riverside under the supervision of Dr. Manuela Martins Green

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Arsen Beremesh

Project Number

S1403

Project Title

Reproductive Inhibition Potencies of Naturally Derived vs. Synthetically Manufactured Antibiotics: A Study of E. coli

Abstract

Objectives/Goals

The objective is to determine the potencies of natural antibiotics in relation to one another as well as to their synthetically manufactured counterpart. My ultimate goal is to demonstrate substantial data that will contribute to the increase of naturally derived commercial pharmaceuticals such as antibiotics.

Methods/Materials

The naturally derived antibiotics were melaleuca oil, linden tree honey, olive leaf extract and grapefruit seed extract, while the synthetically manufactured antibiotic was ampicillin. The E.coli was obtained from Ward#s catalog and cultured on agar medium. Potency of each antibiotic was determined by the area of inhibition. Trials were conducted at different concentrations and masses of antibiotics. Water-soluble antibiotics ranged from concentrations of 100-500 mg/5mL of distilled water and the water-insoluble antibiotics ranged from masses of 100-500 mg.

Results

Ampicillin had the greatest area of inhibition at a concentration of 100mg/5mL distilled water. Grapefruit seed extract had the greatest area of inhibition at 300mg/5mL distilled water. Olive leaf extract had the greatest area of inhibition at 200mg/5mL. Linden tree honey had the greatest area of inhibition at 100 mg. Melaleuca oil had the greatest area of inhibition at 500 mg. Amongst all of the antibiotics, natural and synthetic, grapefruit seed extract was overall the most potent antibiotic agent.

Conclusions/Discussion

E.coli possesses receptor protein EnvZ, which becomes activated once the extracellular environment becomes greatly hypertonic in relation to the cytoplasm. In turn, the activation transduces the signal for the synthesis of OmpF, a protein that prevents the solutes from traversing the cellular membrane through the specialized pores. This mechanism accounts for the low average potency of linden tree honey that functions antibiotically by means of plasmolysis. Grapefruit seed extract possesses phenols which cause disorganization of cytoplasm and leakage of cellular particles of low molecular weight. Olive leaf extract contains oleuropein, which disrupts production of essential amino acids. Melaleuca oil contains terpene, which targets bacterial species of specific electrical charges. Ampicillin functions by disrupting the synthesis of cell walls.

Summary Statement

My project is about establishing the relative potencies of naturally derived antibiotics and their potential in the pharmaceutical industry.

Help Received

The completion of this study was facilitated by the efforts of fellow classmates, teachers, and friends. Those who have aided me in this study have done so by guiding me through the process of purchasing materials and allowing the use of materials.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Sarah S. Bermudes

Project Number

S1404

Project Title

Shampoo: Friend or Foe? Discovering the Damaging Effects of Shampoo Chemicals on Hair

Abstract

Objectives/Goals

My objective was to find how great the effect is of the popular shampoo chemicals Sodium Laureth Sulfate, Ammonium Lauryl Sulfate, Cocamidopropyl Betaine and Selenium Sulfide upon the strength of a woman#s hair.

Methods/Materials

After designating five brands of shampoo that contained four different main chemicals, or lack there of, to five groups of five stands of hair, I began washing each set in their own respective plastic containers. Subsequent to washing, I would let each group air dry while lying on a towel for three hours. After washing the hair over the course of five days, I tested the five groups of hair, including a sixth control group, by clipping the hair to a ruler and attaching a paperclip through a knot in each set of hair. After gradually applying fishing weights upon the paperclip, the hair would break and I would count how many ounces each group could withstand being pulled with.

Results

The shampoos that preformed the worst were the ones with ingredients that were considered most drying of the hair#s natural oils. Sodium Laureth Sulfate preformed the worst, only allowing the hair to be pulled with 5.775 ounces. The shampoo that preformed the best contained no harsh chemicals, withstanding 8.525 ounces of weight. However, the group that held the most weight was the control group with 8.65 ounces.

Conclusions/Discussion

My experimentation showed that shampoos containing chemicals considered more #harsh# caused the hair to break easier in relation to the hair exposed to less #harsh# chemicals. This illustrates that hair treated with any type of chemicals foreign to the hair#s natural composure will break easier as a result of the ingredients# drying properties than if the hair was kept unwashed.

Summary Statement

My project demonstrates the damaging effects of common shampoo chemicals upon a women#s hair.

Help Received

Father helped attach weights onto paperclips for each group of hair.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Michael S. Berriman

Project Number

S1405

Project Title

Manganese Sulfate Supplemented Caenorhabditis elegans Display Increased Resistance to Oxidative Stress

Abstract

Objectives/Goals

To observe the effects of Manganese Sulfate (MnSO(4)) upon C. Elegans roundworms under Heat Stress, temperature set at 35 Degrees C.

Methods/Materials

Place 20 Gravid worms of desired strain(s) on an agar plate, 1 plate per strain, with a platinum wire pick. Place the plates in the 35 degree incubator for 2 hours, check deaths under microscope and document. Repeat process, but every 1 hour from then on.

Results

The variable data set of worms, which was the MnSO(4) supplemented population, showed increased longevity under the circumstance of increased temperature.

Conclusions/Discussion

Worms treated with MnSO(4) displayed increased thermotolerance, as they were better able to internally neutralize ROS.

Summary Statement

I treated C. elegans with MnSO4 in order to reduce Oxidative stress, and the Heat Stress Assay performed helped to display that MnSO4 does increase the worms' lifespan.

Help Received

Used lab equipment at Cal State Fullerton under Dr. Srinivasan ; Father edited report; Jessica Hessom of CSUF Biochemistry Department helped with protocol and poster

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Tierney R. Burke

Project Number

S1406

Project Title

Anti-Tumor Action of Indole-3-Carbinol by Suppression of NF-kappa B Activation

Abstract

Objectives/Goals

Indole-3-carbinol (I3C) is a compound occurring naturally in Brassica species vegetables (e.g., cabbage, broccoli). In vitro, I3C has been shown to suppress the proliferation of various tumor cells, and, in vivo, it has suppressed tumorigenesis. This project examines a possible mechanism of anti-cancer action at the molecular level for I3C by interference with the nuclear factor-kappaB (NF-kB) activation pathway that is a critical determinant of the inflammatory response, immune response, and apoptosis.

Methods/Materials

Two cell lines (Jurkat and GTL-16) were pretreated with I3C (10, 30, 60, or 100 µM) in culture media (DMEM or RPMI 1640) for 24 hours at 37°C (5% CO_2) in T75 culture flasks. Three different activators of the NF-kB pathway were added individually to separate cell cultures: 20 ng/mL TNF-alpha for 5 minutes; 100 ng/mL PMA for 10 minutes; or 10 µg/mL LPS for 1 hour. Cell extracts were prepared per extraction kit manufacturers instructions. Sample measurements were performed with three ELISA assays: NF-kB; IkBa-Phospho-specific; and IkBa-Total per manufactures instructions. ELISA plate reading and data analysis was preformed on Molecular Devices reader and software.

Results

Through ELISA measurement of cell extracts for: 1) NF-kB, 2) IkBa-[pS32], and 3) IkBa-Total, this study found that I3C suppressed NF-kB activation by various agents (TNF-a, PMA, LPS) in two cell lines (Jurkat and GTL-16). NF-kB inhibition correlated with suppression of IkBa phosphorylation, IkBa degradation, and NF-kB nuclear translocation in a dose dependent manner. For Jurkat cells treated with 20 ng/mL TNF-a for 5 minutes, the 100 µM I3C dose produced: 1) NF-kB values of 150 ng/mL (vs 327 ng/mL with no I3C); Phospho-IkBa values of 207 units/mL (vs 336 units/mL with no I3C); and Total IkBa values of 3.84 ng/mL (vs 2.19 ng/mL with no I3C).

Conclusions/Discussion

Overall, the results demonstrate that I3C is an effective inhibitor of NF-kB activation, which may explain its antiproliferative, proapoptotic, and antimetastatic effects. Studies that monitor individuals diets and their health have found links between certain types of food and cancer risk. To explain the connection how certain foods protect against cancer, it is necessary to understand the process at a molecular level. Continued research is uncovering how crucial cancer genes can be influenced by compounds in the things we eat.

Summary Statement

Indole-3-Carbinol found in Brassica sp. vegetables mediates anti-tumor activity through NF-kappa B modulation in a dose dependent manner.

Help Received

Used laboratory equipment at BioSource; Dr. John DeSimone provided training and guidance in ELISA testing and cell culture handling.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Gina Grace Catalano

Project Number

S1407

Project Title

Investigating Dispersion Patterns of Leukemia and Seizure Disorder in Monterey Co. Public Schools by Geographic Location

Abstract

Objectives/Goals

The purpose of this study was to investigate health issues in the public school student population by investigating whether cases of cancer, specifically leukemia, and seizure disorders were distributed throughout Monterey County or clustered in certain areas. If a link between geographic location and the likelihood of a child to have cancer or a seizure disorder is found and can be proven, further investigation would be strongly advised.

Methods/Materials

Specific ailments and school districts were selected. Letters were sent out to districts asking them for their seizure and cancer data. Data analysis, calculations, and comparisons between the data were then made.

Results

From these results, seizure disorders in the student population appear to be well distributed throughout Monterey County. However, there is an evident disparity in leukemia cases in the student population between the Salinas Valley and the Monterey Peninsula.

Conclusions/Discussion

With such a small population being studied, proving clustering in one area over another is problematic. There is the possibility that the clustering of leukemia and other childhood cancer cases in the Salinas area could be attributed purely to chance. Other possibilities include the socio-economic differences between the two areas, as well as the fact that the Salinas Valley is a predominantly agricultural region with heavy pesticide use. A longer time frame along with a more complex design and the cooperation of all districts is needed to do a more extensive study.

Summary Statement

This study was designed to determine if, within Monterey County, there was any clustering by area in incidences of cancer, specifically leukemia, and seizure disorders within the public school student population.

Help Received

My mentor critiqued my project design and provided helpful insight.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Jeffrey Chen

Project Number

S1408

Project Title

Alternative Termite Prevention Methods

Abstract

Objectives/Goals

This experiment was designed to test whether or not certain odorous household items such as vanilla extract, various liquid air fresheners, catnip, hydrogen peroxide, rubbing alcohol, garlic, and lemons could effectively block a termite#s pheromone trail and/or deter the termites from home invasion.

Methods/Materials

The controls of this experiment were the pheromone mimicking inks of Bic and Papermate pens. The termites were placed on a paper mat that contained a four-inch circle of ink control and with a deterrent placed across the ink path.

Results

In summary, the data yielded that out of the ten materials used, catnip as well as lemon and rubbing alcohol, were effective three out of six trials in effectively deterring the termites to various degrees ranging from medium to strong reactions.

Conclusions/Discussion

In conclusion, the results support the hypothesis in that certain odorous household items deterred/blocked a termite#s pheromone trail. Catnip, lemons, and rubbing alcohol were effective in blocking the termite#s pheromone trail and deterring it from the ink pheromone trail.

Summary Statement

This experiment was designed to test whether or not certain odorous household items could effectively block a termite#s pheromone trail and/or deter the termites from home invasion.

Help Received

Family supported me during long nights spent experimenting; Father helped come up with idea, photograph the experiment, and be my lab partner; Ward#s Natural Science supplied subterranean termites; Mrs. Carothers lent me equipment and guided me through the experimental process.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Sam Coleman; Josh K. Woods

Project Number

S1409

Project Title

Yew Killed It

Abstract

Objectives/Goals

To develop and test two different environmentally friendly organic herbicides that will succeed in killing the invasive nonnative Himilayan blackberry plant.

Methods/Materials

Extracts were taken from the needles and leaves of the Pacific Yew tree and the California Bay tree. The extracts were diluted with water and applied to established blackberry plants in a controlled laboratory. Water only was used as a control. Materials Needed: Yew and Bay leaves, blender, filter and ringstand, funnel. Various beakers and graduated cylinders. Spray bottles. Established blackberry plants.

Results

There were three groups, the Yew group, the Bay Group and the control group. After three days the plants with the Yew treatment showed curling leaves and discoloration in the stems. After 7 days the Yew treated plants were completely dead. After 3 days the Bay trees showed no change. After 7 days the plants show slight discoloration and had some growth retardation in comparison with the control group, which flourished during the testing.

Conclusions/Discussion

We were successful in formulating one herbicide, the Yew treatment, that killed the blackberry plants. We would like to move our experiment next to the outside to a semicontrolled environment and test again to see how the extracts work. We think it is very important to have strong, safe, environmentally friendly herbicides that can be used.

Summary Statement

We formulated two organic herbicides from Yew extract and Bay extract and tested them on their ability to kill blackberry plants.

Help Received

My dad helped us with driving to collect leaves.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Krystina Daniels; Adeline Wong

Project Number

S1410

Project Title

Multi-Factor Optimization of Gene Expression in Saccharomyces cerevisiae

Abstract

Objectives/Goals

The goal was to determine optimal conditions for the induction of native soluble Ste7 and Kss1, proteins involved in the Saccharomyces cerevisiae pheromone pathway.

Methods/Materials

Factors identified as likely to improve solubility were IPTG induction level, induction temperature, ethanol, and NaCl. Orthogonal arrays were used to design the experiments so that all four factors could be varied simultaneously. A stastical method was used to find a robust, high-output combination of levels of factors. The initial conditions were 1mM IPTG at 30^C, without ethanol or NaCl. We predicted that decreasing the induction temperature and IPTG level, anad adding NaCl would increase the expression of soluble protein. This hypothesis was tested by inducing E.coli under the sets of conditions dictated by the orthogonal array. The amount of protein produced was quantified via spectrophotometry of SDS-PAGE gels and Western blotting membranes.

Results

The best conditions for Ste7 were 0.1 to 0.5mM IPTG at 25^C, without ethanol or NaCl. Analysis of variance showed that 70.5% of the increase in soluble protein resulted from changing the IPTG level and 9.6% from induction temperature. Ethanol and NaCl were ineffective at increasing solubility. Bradford protein assays showed that purification of a 100-mL culture increased by 240% when conducted at 0.1 mM and 30^C. Kss1 was difficult to express, but after changing to ER2256 strain, a small amount of Kss1 was detected.

Conclusions/Discussion

Additional testing should be done to refine levels of factors to better understand signal transmission and amplification by cells.

Summary Statement

The goal was to determine optimal conditions for the induction of native soluble Ste7 and Kss1, proteins involved in the Saccharomyces cerevisiae pheromone pathway.

Help Received

The team used lab equipment at Molecular Sciences Institute under the supervision of Dr. Myron Williams.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Ankita Dhar

Project Number

S1411

Project Title

The Effect of the Early Introduction of Nutritional Saturated Fats in Chicken Embryos and Young Chicks on the Lipid Prof

Abstract

Objectives/Goals

The fetal and early life nutritional programming has important non-implications on evolution of disease states in later life. Dietary fat and disease states is well established particularly for cardiovascular disease including hypertension and coronary heart disease. This study proposed to study the effect of the early introduction of nutritional saturated fats in chicken embryos and young chicks on the lipid profile of the chicken (Gallus Domesticus).

Methods/Materials

Eighteen fertile eggs were incubated in a series of three sets of trials. The incubation period was carried on for twenty one days which is the normal hatching cycle for chicken. In the last week of incubation, half of the developing embryos were injected with 0.5 ml of saturated fat in the form of butter for a period of 5 consecutive days. These days corresponds to the last trimester of human pregnancy. After hatching, the intervention group of newborn chicks, was continued to be fed on a high fatty diet for another period of 5 days. The control chicks were given normal diet. Lipid profiles were evaluated by measuring cholesterol levels in both the groups.

Results

Of the 9 eggs in the control group (3 per trial) only 7 eggs hatched and grew into healthy chicks. These 7 hatched chicks included, 3 chicks from Group A, 2 chicks from the 3 eggs of Group B, and lastly 2 chicks from the 3 eggs of Group C. Of the 9 eggs in the intervention group (3 per trial) only 4 hatched and grew into healthy chicks. The four hatched chicks included two from Group A, 1 from Group B, and 2 from Group C.The mean cholesterol result for the control group of chicken was 91.0 mg/dl with an average deviation of 8.00 and % deviation of 8.79 %. The mean cholesterol level for the intervention group was 191 mg/dl with an average deviation of 13.0 and % deviation of 6.81 %. The data showed that the mean cholesterol of the interventional chicks higher than that of the control chicks.

Conclusions/Discussion

These observations may have important implications in the nutritional programming of fetus#s and young children which may condition future metabolism as to have a strong influence on the manifestations of disease later on in life. This process may have an important role in the development of disease conditions in later life, particularly of the cardiovascular system.

Summary Statement

The project was designed to validate Barker's hypothesis describing the fetal and early childhood programmming for the origin of adult disease.

Help Received

Father helped gather materials and give injections; Jugdeish Hemberjani helped print report; Margaret helped provide eggs and give clear instructions on hatching technique

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Eric R. Dilley

Project Number

S1412

Project Title

Pollution and the Heart

Abstract

Objectives/Goals

The objective is to determine how carbon dioxide pollution affects the heart, specifically exercise heart rates, resting heart rates, and blood pressure.

Methods/Materials

Seven people were tested, two in their forties and five the age of seventeen. The seventeen year olds varied in physical shape and weight (three were athletes from different sports). These seven people had their resting heart rate and blood pressure taken before exercise and then exercised till they reached that range. Once there, the gas mask was placed over their face for 2:30 minutes. The subjects were then allowed to rest for five minutes before their resting heart rate and blood pressures were taken again. An ECG was used during the experiment to find the heart rates of the test subjects.

Results

All seven of the subjects exercise heart rates went up by a range of 2-16 beats per minute. Also the resting heart rates went up significantly as well by 10+ beats per minute. The blood pressure measurements had no significant changes or patterns, but for the most part they were relatively similar before and after.

Conclusions/Discussion

The experiment produced results that showed carbon dioxide raised the heart rates of the test subjects. Carbon dioxide is known to raise heart rates especially during exercise but the experiment exposed that it also affects the resting heart rates of human beings even more dramatically. This is interesting because it takes approximately one minute for blood to flow from the heart, through the body, and back. It would seem that the carbon dioxide would be rid of after five minutes, but as my experiment exposes, it leaves a lasting effect.

Summary Statement

The affect of carbon dioxide pollution on the human heart.

Help Received

Borrowed ECG from Dr. Richmond; Borrowed digital blood pressure moniter from a neighbor.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Maggie Do; Joan Khuu

Project Number

S1413

Project Title

In Vitro Combinatorial Effect of Bio-Active Plant Extracts

Abstract

Objectives/Goals

We set out to find if combining medicinal plant extracts would increase its potency. We chose plants that we were able to acquire from around our school such as garlic, eucalyptus, and sequoia. We chose to use E. Coli instead of yeast because it has a weaker resistance towards the plant extracts, allowing us to get a more concise result.

Methods/Materials

Materials:

Assay disks, agar, Petri dishes, scissors, weigh boat, LFH, methanol, auto pipetter, electronic balance, culture tube, sharpie, garlic, eucalyptus, mint, sequoia, E. Coli, positive and negative controls, forceps, incubator, oven, aluminum foil, bacterial spreader.

Procedures:

Cut plants to make a 50% plant tissue to Isopropanol ratio. Drop an assay disk into the culture tube and soak for 24 hours. Prepare Agar and autoclave the sample at 121°C at 30psi. Pour the agar into Petri dishes. Label the agar plates. Spread 200µL of E. Coli cell culture. Allow all pre-soaked disks to dry in an oven before placing onto the agar plate. Using forceps, place the dried assay disk onto the pre-marked locations on the agar plate. Place the Petri dishes upside down in the incubator for 24 hours. Take digital image and computer analysis of the kill zone. Repeat the steps with different combinations of the plant extracts with each combination consisting of 50% of 1 plant extract and 50% of another. Explore all the combinations of 2 plant extracts possible.

Results

We found that garlic alone destroys more bacteria, but when combined with other medicinal plant extracts, such as eucalyptus and sequoia, hinders its overall potency. Combining all three bio active plant extracts did not prevent the microorganisms from surviving as much as we would have liked it to. What surprised us that most was that garlic was the most effective in generating a kill zone.

Conclusions/Discussion

At first, we believed that combining more medicinal plant extracts would create a more powerful weapon against bacteria. Nevertheless, our results refuted our hypothesis.

Based on our observation that our assay disks and the kill zones it created, we concluded that the disks were soaked and dried unevenly. The longer the disks were dried in the oven, the more shriveled up the assay disks became. Due to the elliptical-shape of the kill zone areas, we also concluded that the plant extracts were not evenly distributed.

Summary Statement

To determine if combining bio active plant extracts will increase the potency of the medicine and the effect it has on bacteria.

Help Received

Mr. Okuda

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Paige N. Dubin

Project Number

S1414

Project Title

Can a Flavonoid, Quercetin, Be an Effective Topical Acne Medication?

Abstract

Objectives/Goals

To determine if topical Quercetin solution is anti-inflammatory and antimicrobial on acne lesions

Methods/Materials

Methods:

Over a ten month period of time have ten human subjects who have acne apply my topical solution of Quercetin (bioflavonoid plant pigment)to their facial skin, another ten subjects apply only the vehicle two times a day for twenty-one days to facial acne. Photos of subjects' faces were taken and swabs of their facial acne with sterile Q-tips were then applied to Blood Agar plates, which were then incubated to determine bacterial counts. Photos will show if there is a decrease in the inflammation of face papules and the Petri dishes will depict if the antimicrobial count is diminished- all due to my topical Quercetin solution.

Materials:

Quercetin solution consisting of: 134 mg of Quercetin, 5 ounces of distilled water, 2 ounces of alcohol, and one ounce of acetone; 20 Sheeps Blood Agar Petri dishes; 20 human subjects with facial acne

Results

My Quercetin solution group showed a tremendous decrease in facial inflammation due to acne and also a decrease in facial bacterial counts compared to the control group. My vehicle only group showed results similar to my control group, in not improving the facial acne nor decreasing the bacterial colony count.

Conclusions/Discussion

My topical Quercetin solution for acne proved to be a tremendous success in decreasing inflammatory acne lesions and decreasing the bacterial count on facial skin of all my acne subjects. This proved that my Quercetin solution was both anti-inflammatory and antimicrobial.

Summary Statement

I tried to determine if my Quercetin topical solution was anti-inflammatory and antimicrobial on acne inflamed facial skin, thus being effective as a topical acne medication.

Help Received

Tony- director of Unilab at Northridge C.A. supplied Petri dishes and information regarding bacterial growth; Dr. Jankowski- agreed to safety of my project and allowed disposal of my Petri dishes in her biohazardous waste

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Christine Haas

Project Number

S1415

Project Title

The Effects of Aesculus californica on Mosquitoes and the Characterization of Its Larvicidal Compounds

Abstract

Objectives/Goals

Identify parts of the California Buckeye (Aesculus californica) that are effective as a mosquito larvicide and attempt to pinpoint chemical(s) or compound(s) that are behaving as such.

Methods/Materials

a) Create Buckeye toxins from the blossoms, leaves, and stems. b) Test each toxin on Culex mosquito larvae in their second instar. c) Test most effective solution at varying concentrations to determine an LC-50. d) Centrifuge samples to remove particulate matter of the most effective solution and test on Culex mosquito larvae. e) Run a centrifuged sample of the most effective solution through the HP-LC and collect fractions at five minute intervals. f) Test of fractions on Culex mosquito larvae to determine if there is a specific chemical or compound that is behaving as a larvicide.

Results

Experimentation revealed that the California Buckeye blossoms have the most toxic effect at 15% concentration on Culex pipiens quinquefasciatus larvae compared to the buckeye leaves and stems. Further studies showed that concentrations down to 3% seemed to have effects on the mosquito larvae. The Buckeye fractions taken from the HP-LC could not be accurately tested on the mosquito larvae due to the presence of the toxic buffers in all samples that could not be removed using a centrifugal concentrator.

Conclusions/Discussion

This research shows that the blossoms are the most toxic part of the California Buckeye during the spring season, taking one more step forward towards controlling the numbers of disease vectors around the world. More research must be done to identify the toxic substance(s) in the California Buckeye that is affecting the mosquito larvae.

Summary Statement

The testing of California Buckeye blossoms, leaves, and stems on mosquito larvae and the attempt to isolate the chemical compound(s) responsible for causing the toxicity.

Help Received

Conducted "Further Investigations, Year VII" during the Young Scholar's Program at UC Davis; received training on the lab equipment from Tania Morgan while under the supervision of Dr. Walter S. Leal.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Jocelyn S. Ko

Project Number

S1416

Project Title

A Bacterial Test System for the Carcinogenicity and the Global Effects of Ultraviolet Radiation

Abstract

Objectives/Goals

The bacterial system, Escherichia Coli-recA, a strain that has a defect in genes that encode for a DNA repair enzyme, was used to model the effects of increasing concentrations of UVA and UVB radiation. By comparing growth of the bacteria under varied conditions, the effects of global warming and holes in the ozone layer will be inferred. The efficiency of current solutions for cancer prevention under increasing levels of radiation was also analyzed.

Methods/Materials

A diluted solution of the bacteria was spread onto nutrient agar plates and irradiated underneath a lamp. The plates' duration of irradiation and distance from the lamp were varied separately in different trials to examine the effects of increasing radiation. The efficacy of protective clothing to shield the epidermis was studied by covering plates with different materials. Transparent sunscreens of different SPFs were also tested by spreading the surface of plates.

Results

It was found that increasing UV intensity by decreasing the distance or increasing radiation duration decreased the number of colonies present. Protective clothing and sunscreen were effective in shielding some radiation, as growth patterns on those plates were similar to those on plates that underwent no radiation. Plates with UV protective cloth or a higher SPF had more bacterial growth than plates with average cotton cloth or a lower SPF, respectively. However, differences between these plates were not significant, and further research using even more concentrated levels of UV may reveal more information about when certain solutions become ineffective.

Conclusions/Discussion

Data was used in comparative studies to learn more about UV carcinogenesis in humans. Because humans possess DNA repair enzymes with similar functions, the decrease in the growth of E. Coli show that the same deleterious effect of increased UV radiation from global warming can be expected in skin cells. DNA subjected to radiation may be rendered useless through the formation of thymine dimers, and enzymes can only repair so much damage. Moreover, damaged DNA may become even more harmful by hindering the production of other regulatory proteins and needed enzymes, leading to an increased risk of skin cancer. Though the research showed that protective clothing and sunscreen were useful in combating radiation, they may become less effective at even higher UV concentrations.

Summary Statement

Escherichia Coli-recA was used to model the effects of an increase in UV and to study the efficiency of current protective solutions under elevated levels of UV, in order to infer how humans would be affected by global warming.

Help Received

Mr. Daniel Matthews helped me with the initial research process and technical writing. He supervised me during irradiation. Dr. Gary Blickenstaff provided me with advice when I was developing methods of experimentation and data collection. He supervised me when I was handling bacteria.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Michelle R. Kobal

Project Number

S1417

Project Title

Pollution and Brine Shrimp Hatching Numbers

Abstract

Objectives/Goals

To determine the extent of the damage that pollutants do to brine shrimp eggs. (car wash solution, pesticide, fertilizer, motor oil)

Methods/Materials

Ideal environment was created (30 mL sea salt, 1 L distilled water, 2 drops water detoxifier). Then it was altered by the introduction of car wash solution, pesticide, fertilizer, and motor oil separately and in varying concentrations: 1 drop/33.3 ppm, 2 drops/66.7 ppm, and 3 drops/100 ppm. 200 brine shrimp eggs were then put into each environment. Numbers that hatched in each were compared to the numbers of those that hatched in non-polluted water. (All water was kept at a constant temperature of about 24 degrees Celsius)

Results

The most harmful pollutant was car wash solution which resulted in a 100 percent decrease (in hatching numbers, compared to control group). The second most harmful pollutant was pesticide which resulted in a 100, 99.7, and 97.7 percent decrease. The third most harmful pollutant was fertilizer which resulted in a 99.7, 98.2, and 96.7 percent decrease. The least harmful pollutant was motor oil which resulted in a 98.2, 96.4, and 93.6 percent decrease.

Conclusions/Discussion

The hypothesis was disproved in that car wash solution caused the greatest decrease in hatching numbers, not pesticide as was predicted. Also, the smallest decrease in hatching numbers was found to be a 93.6 percent decrease, much higher than the predicted approx. 50 percent decrease.

Summary Statement

Brine shrimp eggs were placed in various polluted environments and the hatching numbers were compared.

Help Received

Parents provided supplies/resources.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Jessica L. Koehler

Project Number

S1418

Project Title

Doped Up Daphnia

Abstract

Objectives/Goals

What is the effect of drugs on the heartrate of daphnia?

Methods/Materials

Daphnia Magna
standard microscope
droppers/ pipettes
5 petri dishes
beakers (to make solutions)
alcohol
instant coffee
cigarettes
cough syrup
warm water
room temp. water
stirring rod

Results

COUGH SYRUP
I observed that the cough syrup drastically decreased the heart rate of the daphnia. It was not hard to see this under the microscope at all.
ALCOHOL
Although not by much, I observed that some daphnia#s increased while others decreased. The alcohol did not seem to change their heart rate as much as I would have like it too.
CIGARETTES
My results for nicotine were somewhat surprising. I was not able too detect any heart beat except for one of my daphnia that beat once and then I was no longer able to detect any other beating.
COFFEE
I observed that each daphnia#s heart rate slightly increased. Although it was a slight increase, I was still able to easily observe the increase under the microscope.

Summary Statement

I observed Daphnia magna under the microscope, drugged and undrugged, and timed their heartrate.

Help Received

Used lab equipment at school under the supervision of Erin Vaccaro and/or Clint Smith; friends helped time

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Natalya Kostandova; Akhila Pamula

Project Number

S1419

Project Title

The Effect of Curcumin on the Synthesis of Leukotriene B4: Phase II

Abstract

Objectives/Goals

The goal of this project is to determine the effect of curcumin, a component in a common South Asian spice, on a chemical that plays a major role in the inflammatory process. Curcumin, which is found in turmeric, has many potential benefits. Most importantly, it is a natrual product, meaning that if found to have beneficial pharmaceutical properties, it will be more readily accessable in terms of quantity and price to the majority of the world's population.

Methods/Materials

ELISA testing was used in order to test the effect of curcumin on human Microvascular Endothelial Cells (hMVEC) and to compare it to a positive control in the form of a known inhibitor of leukotriene B4 (LTB4): nordihydroguaiaretic acid, or NDGA.

Results

Raw data appears to indicate that curcumin inhibits the biosynthesis of LTB4. However, statistical analysis shows that it is not significant.

Conclusions/Discussion

While statistical analysis indicates that we cannot conclude that curcumin inhibits the synthesis of LTB4, there is reason to believe that curcumin does in fact inhibit the process. Over time, for example, the p-values decrease, thus indicating increasing significance. Furthermore, there is still over a 50 percent chance that curcumin inhibits the synthesis of LTB4. Also, it is interesting to note that, according to the ELISA testing and statistical analysis, that curcumin appears to be more effective than NDGA. This is significant in that NDGA is a knows inhibitor of the synthsis LTB4. Thus, it can be stipulated that curcumin is an even more potent inhibitor of the synthesis of LTB4.

Summary Statement

The project analyzes the effect of a natural compound on Leukotriene B4, a moderator of the inflammatory process.

Help Received

Used lab equipment at University of California, Riverside under the supervision of Dr. Martins-Green, Dr. Yan, and Dr. Yao.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Nadia S. Kurd

Project Number

S1420

Project Title

Human Dendritic Cells as a Clinical Tool to Cure Human Brain Tumors

Abstract

Objectives/Goals

None of the currently existing therapies for glioblastoma multiforme (GBM) are curative or significantly increase the lifespan of patients. Can a more effective cure be found in utilizing the immune system? If dendritic cells (DCs) are cocultivated with allogeneic GBM tumor cells, they will show the ability to destroy the GBM cells.

Methods/Materials

A. Develop 4 different in vitro GBM cell lines from surgical resections. GBM cells grow in R-15 growth medium but normal cells die off.
B. Generate DCs from blood of 4 different patients. Through centrifugation, monocytes are enriched for, and then cultivated in AIM-V supplemented with GM-CSF and IL-4, which cause them to become DCs. Presence of DCs is verified using DC specific antibodies.
C. Killing assays: Mix dendritic cells and GBM cells labeled with radioactive isotope tritiated thymidine (H-3). Determine % GBM killed by measuring the release of H-3 into the supernatant by tumor cells after 24 hours and compare to release without addition of DCs. Reproduce 3 times per tumor cell line.
D. Visual killing assays: Label DCs green (with PKH 2 fluorescent dye) and tumor cells red (with PKH 26). Cocultivate DCs and GBM cells in an eight well chamber slide. Observe slide under a florescent microscope and search for presence of dark spots within DCs and uptake of PKH 26 by tumor cells. In addition, observe tumor cells alone.

Results

A. Radioisotope was detected in the supernatant of all 3 trials of all 4 tumor lines. None was detected in the supernatant of the tumor cells alone.
B. After just 24 hours, dark spots were visible within DCs. At 4 days no individual tumor cells remained. Tumor cells alone remained intact.

Conclusions/Discussion

The hypothesis that DCs cocultivated with allogeneic GBM tumor cells will show the ability to destroy the GBM cells was supported in vitro. This was evidenced by the presence of H-3 in the supernatant of the cocultivated cells, which indicated that the DCs had ruptured the cell membranes of the tumor cells. In addition the visual observation of tumor cells within the DCs provided evidence of engulfment. Also, the fact that no individual GBM cells remained after 4 days evidenced the destruction of the cells by the DCs. Further experiments are required to test the integrity of the observation in vivo, beginning with animal models and, if successful there, moving to humans in a clinical trial.

Summary Statement

The purpose of the project is to investigate the ability of dendritic cells to destroy GBM tumor cells; therefore their potential to serve as a cure for GBM.

Help Received

Used lab equipment at Hoag Hospital Cell Biology Lab under supervision of Dr. Patric Schiltz.Idea for project came from previous research of Dr. Schiltz. Due to safety regulations, some procedures were carried out by lab technicians under my observation. Dr. Mauzy-Melitz of UCI helped edit abstract.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Nitish Lakhanpal

Project Number

S1421

Project Title

Turmeric: The Miracle Spice? A Study on the Anti-mutagenic Effects of Turmeric

Abstract

Objectives/Goals

The objective of this study is to examine the anti-mutagenic effect of turmeric or Curcuma longa, a ubiquitous spice of the Indian sub-continent whose use is thought to be responsible for the low cancer rate in the region. Specifically, is the effect of a known mutagen (4-nitro-o-phenylenediamine or 4-NOPD) - as measured by the number of revertant colonies of Salmonella Typhimurium (Salmonella) - mitigated due to the presence of turmeric?

Methods/Materials

Materials: Incubator; Thermometer; 9 glucose-minimal salts agar plates; 10 top agar tubes; Histidine dependent Salmonella in gel form; Histidine; Tryptic soy broth; Sterile Water; Isopropyl Alcohol; Parafilm; 4-nitro-o-phenylenediamine - 100 micrograms/mL (4-NOPD 100) and 200 micrograms/mL (4-NOPD 200) concentrations; Turmeric extract in water; Turmeric extract in alcohol.
Adapted Ames test protocol: Melt top agar tube (3 mL), cool to 45° C, and pipette .3 mL of histidine and .15 mL of Salmonella culture (prepared earlier) into tube. Pipette 1 mL sterile water into tube and mix thoroughly. Pipette .2 mL of the mixture onto agar plate, making a small lake - repeat five times in separate areas. Seal plate and incubate for 48 hours at 37° C. Repeat preceding steps eight times, pipetting .2 mL each of the following into a top agar tube each time, in place of water: turmeric (water); turmeric (alcohol); 4-NOPD 100; 4-NOPD 200; 4-NOPD 100 and turmeric (water); 4-NOPD 100 and turmeric (alcohol); 4-NOPD 200 and turmeric (water); 4-NOPD 200 and turmeric (alcohol). After 48 hours, count the number of revertant colonies on plates.

Results

The number of revertant colonies due to 4-NOPD when either turmeric (water extract) or turmeric (alcohol extract) were present was much lower than with 4-NOPD alone. Further, the number of revertant colonies was almost zero for the negative controls while the positive controls showed many colonies, consistent with expectations.

Conclusions/Discussion

The data supported all four hypotheses. Turmeric appears to possess anti-mutagenic properties - we found that its presence mitigated the effect of a known mutagen. Turmeric (alcohol extract) had a stronger effect than turmeric (water extract) - the very small number of colonies indicate that the mutagen's effect was neutralized. The results indicate that turmeric has the potential to be used as a natural treatment for cancer or to prevent its onset.

Summary Statement

This project examined the anti-mutagenic effect of turmeric or Curcuma longa. Specifically, I studied whether the presence of turmeric mitigates the mutagenic effect of a known mutagen on Salmonella Typhimurium.

Help Received

Parents helped with transportation and with buying materials.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Genevieve Mount

Project Number

S1422

Project Title

A Forensic Study on the Effects of Seawater on the Growth Rate of Local Sarcophagid and Calliphorid Larvae

Abstract

Objectives/Goals

The object of my project is to determine, through laboratory experiments and field analysis, what effects seawater have on the growth of maggots feeding on a corpse. I tested if and how maggot growth is effected by seawater saturating the ground under the meat or by meat soaked in seawater. My hypothesis was that the seawater underneath the maggots and meat soaked in seawater will cause the maggots to develop more slowly than maggots raised on plain water or plain meat.

Methods/Materials

I conducted my test with wild fly eggs collected from a piece of beef liver left outside for a day. I then raised the maggots in shallow, round containers. Each container held 10 grams of beef liver and 20 maggots. There were four treatment groups: control, seawater under the meat, the meat soaked in seawater for one hour, and the meat soaked in seawater for four hours. The testing environment was controlled; leaving seawater as the only variable.

Results

The results of my experiment show that the treatments of seawater under the meat, and the meat saturated with seawater had no significant affect on the growth of the maggots. The trend lines for each treatment group have similar slopes, which proves that the seawater around or in the meat did not affect the maggots. A modified box plot of maggot growth rates showed no outliers, further supporting the conclusion.

Conclusions/Discussion

The results of my experiment show that saltwater under or in a corpse has no affect on the maggots after they hatch. This means that the forensic entomologists do not need to take the salty conditions into account after the maggots have hatched.

Summary Statement

The purpose of my project is to determine if and how seawater affects the growth rate of maggots.

Help Received

My father helped with the manual labor and emotional support.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Jeanna M. Peirano

Project Number

S1423

Project Title

The Effect of Different Hair Reparative Treatments on the Strength of Hairs Exposed to Various Amounts of Chlorine

Abstract

Objectives/Goals

The purpose was to find out what hair reparative treatment strengthened hair exposed to various amounts of chlorine the most.

Methods/Materials

The materials were 150 strands of hair, chlorine, electronic balance, rice, pan, glass cups, water, stickers, saran wrap, and a box.

Results

The results followed a trend of that the more chlorine the hair was exposed to, the weaker it became. Using no hair treatment strengthened the hair more than using one.

Conclusions/Discussion

Hair reparative treatments do not strengthen hair. Chlorine weakens hair, and in larger amounts it bleaches it.

Summary Statement

The purpose was to find out what hair reparative treatment used on hair exposed to various amounts of chlorine strengthened hair the most.

Help Received

No help was needed.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Katherine Shanks; Molly Shanks

Project Number

S1424

Project Title

Queasy Rider: An Investigation of the Efficacy of Non-pharmaceutical Methods of Motion Sickness Prevention

Abstract

Objectives/Goals

In today's modern world, transportation technology is growing by leaps and bounds. Unfortunately, even a short car ride can overstimulate the vestibular system, which will cause extreme disorientation, headache, dizziness, nausea, and overall discomfort. Although there are over-the-counter medications like Dramamine that will curb the symptoms of motion sickness, they have unpleasant side-effects and are not safe for everyone. This project was designed to test the effectiveness of alternative methods for preventing motion sickness without the risks and side-effects of the available pharmaceutical options.

Methods/Materials

The project began by constructing a homemade rotating Bárány chair from an office task chair, plywood base, and an automotive rear axle wheel bearing equipped with a safety belt. 30 subjects were tested in 3 separate timed trials. On each trial, the subjects were instructed to rate the severity of 8 common symptoms of motion sickness (dizziness, nausea, headache, pale face, sweating, disorientation, fatigue, and vomiting) both before and after rotating in the Bárány chair on a scale of 0 to 10. The subjects were instructed to report the initial onset of symptoms so that the trial would be stopped when the subject began to feel the effects, not when motion sickness had begun to progress in severity. The first trial was a control test without any remedy to test each subject's natural susceptibility to motion sickness. In the second trial, the subjects wore acupressure wristbands on the P6 pressure point; in the third trial, subjects ingested caramelized ginger candy 30 minutes prior to rotating in the Bárány chair.

Results

The collective group of 30 test subjects responded best to the ginger remedy. The ginger drastically decreased 8 out of 8 symptoms with about an 11% or greater decrease in severity with a 13.93% increase in time before the onset of symptoms. The acupressure wristbands showed a slight decrease in 2 out of the 8 symptoms, but they increased 6 out of the 8 symptoms by over 4%.

Conclusions/Discussion

Both ginger and acupressure wristbands alleviate some of the discomforts associated with motion sickness, but ginger demonstrated the most potential as a non-pharmaceutical alternative to medicinal remedies without the unpleasant side effects. Ginger is the most effective method to go from queasy rider to easy rider naturally.

Summary Statement

This project was designed to test the efficacy of ginger and acupressure as non-pharmaceutical methods of motion sickness prevention.

Help Received

Father helped assemble the pipe portion of the bearing mechanism in the Bárány chair.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
Barbara A. Shinaver

Project Number
S1425

Project Title
The Effects of Various Herbal Teas on the Longevity of Drosophila melanogaster

Abstract

Objectives/Goals
The purpose of my science project is to determine whether herbal teas will affect the longevity of Drosophila Melanogaster (the fruit fly).

Methods/Materials
I will use five different herbal teas: St. John#s Wort, Chamomile Red, Echinacea, Green Tea, and Ginseng. Distilled water will be my control. I will test each tea on groups of fruit flies by mixing dry food with a different tea solution and the control. The tea solutions are prepared by steeping a single tea bag of each tea in three tablespoons of boiled distilled water for one hour. I will combine one teaspoon of dry fruit fly food (Formula 4-24, instant Drosophila medium) with one teaspoon of tea solution. Only distilled water added to the fruit fly food is my control. I will add a pinch of yeast on top of the food in each vial. To each of the vials I will then add ten fruit flies. Each population of ten fruit flies will contain both sexes so that they may reproduce and have a normal life cycle. I will monitor the number of fruit flies remaining alive in each vial on an every other day basis. Every two weeks I will remove only the living adult fruit flies from each vial and transfer them to a new vial with a fresh food mixture consisting of the identical tea solution. After collecting all data, I will perform a statistical analysis to eliminate possibilities that my results were not due to chance alone. In this manner I can compare how long each fruit fly was sustained on each of the teas.

Results
The result of my experiment showed the tea that most promoted the longevity of the fruit flies was Green Tea. When the flies# life was counted, I discovered the flies eating Green Tea lived longer than the others. Ginseng was a close second to Green Tea in its life-prolonging effects on the flies as well as St. John#s Wort. Echinacea and Chamomile Red were close to the lifespan of the Control flies. An interesting and unanticipated result that I found was that the second generation of flies, whose parents were raised on the tea-food formula, had a longer lifespan than the generation preceding them. My statistical analysis showed that there was a meaningful difference between some teas and the control.

Conclusions/Discussion
Certain types of herbal teas have an effect on the longevity of fruit flies. Green Tea and Ginseng had the greatest effect on increasing the life span of fruit flies.

Summary Statement
I used a variety of herbal teas to show that there are some teas that can have a life-prolonging effect on the Drosophila Melanogaster.

Help Received
Nathan Whittington gave advice

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Rachael Smith-Ferri; James Warner

Project Number

S1426

Project Title

Blood Grows?

Abstract

Objectives/Goals

We wanted to find out what happened to red blood cells when mixed with Isotonic, Hypotonic and Hypertonic solutions. We also wanted to find out why the cells reacted to the solutions the way that they do.

Methods/Materials

We did the experiment two different ways. The first time we did the experiment we made regular blood slides and put a few drops of solution on the slides. The second time that we did the experiment we put the blood slides that we made under the microscope before we added the solution.

Results

The first procedure was a failure at the time because we where not able to watch the cells react to the solutions. In both experiments however, the Isotonic solution did nothing to the blood. The Hypertonic solution caused the red blood cells to shrink, and the Hypotonic solution caused the red blood cells to expand and even explode.

Conclusions/Discussion

The reason that the Red blood cells reacted to the solutions the way that they do is because of diffusion and osmosis. Diffusion is the transference of molecules between cell membranes. Osmosis is a special kind of diffusion that has to do with larger molecules traveling between cell membranes. The reason that in the case ot the Hypotonic solution the red blood cells expand and is explode is because the solution has a lower salt content than the blood does. Because the solution has less salt in it than the blood, the water is entering the cell faster than it is exiting the cell.

Summary Statement

Testing the effect of Isotonic, Hypotonic and Hypertonic solutions on red blood cells.

Help Received

James Mom helped with project idea and second procedure. Zephye helped with making salmple blood slide and puting text on one paper.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Samuel C. Spevack

Project Number

S1427

Project Title

The Effects of Magnetic Pole Reversals on Mealworms

Abstract

Objectives/Goals

Every 100,000 years, the geomagnetic poles of the earth reverse polarities and may move as rapidly as six degrees per day. During the last twenty-five years scientists have found many animals that have the ability to sense a magnetic field. The experimenter tested to determine what effect short-term magnetic pole reversals would have on mealworms and believed that prolonged exposure of the mealworms to magnetic pole reversals would have a negative effect.

Methods/Materials

Mealworms are the larval stage of the Darkling Beetle (Tenebrio molitor). The experiment had two trial periods of four weeks and one (the second) extended for a period of 7 weeks. In each trial a total of 480 mealworms were divided into three groups - Group A (no change of magnetic fields), B (change magnetic field once per week) and C (change magnetic field once per day). Each group consisted of 16 plastic cups with ten mealworms a piece in each cup. Each group of 16 was placed on an individual tray and single magnets were placed under the trays at each cup position. Pole reversal was accomplished by flipping the magnets. The mass, death rate and pupation state were tracked on a weekly basis.

Results

The results showed no correlation between reversing magnetic poles and the growth or death of the mealworms. However, the reversing magnetic poles seem to hold back the rate of pupation. In three trial studies mealworms in the control group pupated at a faster rate than the other groups during the fourth week of the experiment. The second trial was extended for three more weeks and the rate of pupation for the control group continued to be faster than the rate for the two groups exposed to the reversing poles. There was no significant difference between daily and weekly reversal groups.

Conclusions/Discussion

The repeated pattern of higher pupation rates past the 3rd week in all three trials and statistical analysis using unpaired t-test lead the experimenter to conclude that it is likely that there was a real difference between mealworms that were exposed to reversing poles than those that were not. This study provides evidence that the larval stage of the Darkling Beetle can sense magnetic fields and magnetic pole reversals. Scientists have not yet determined the mechanism in animals for magnetoreception. The sensitivity to pole reversals would suggest a mechanism for magnetoreception involving single domain magnetite crystals.

Summary Statement

This experiment tested the sensitivity of mealworms to a reversing magnetic field and found that these reversals had an impact on their pupation rate.

Help Received

I would like to thank my parents for providing financial support for supplies and Mrs. Sniffen from Hillsdale Middle School for providing a scale for weighing the mealworms.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Isaac I. Su

Project Number

S1428

Project Title

Free Radicals and Aging

Abstract

Objectives/Goals

Does hydrogen peroxide, a free radical, cause flies to age faster? Will Vitamin C, an anti-oxidant, delay this aging process?

Methods/Materials

1. Separate 130 Drosophila wild-type flies into 13 vials with 10 flies each.
2. Prepare 20 mL solutions of hydrogen peroxide in the following concentrations: 0%,0.5%, 1.0%, 1.5%, 2.0%, 2.5%, 3.0% hydrogen peroxide.
3. Prepare 20 mL solutions of hydrogen peroxide and Vitamin C in the following concentrations: 0.5% with 0.724 g Vitamin C, 1.0% with 1.44 g, 1.5% with 2.17 g, 2.0% with 2.89 g, 2.5% with 3.6 g, 3% with 4.224 g. The amounts of Vitamin C were determined by calculating exactly how many moles of Vitamin C would be required to neutralize all the moles of hydrogen peroxide.
4. Place 10 flies into one of 13 vials containing all these different concentrations.
5. Note # of flies living in each vial every 8 hours.
6. Record results.

Results

The average lifespan of flies exposed to a controle nvironment was 14.3 days. The mean average of lifespan of flies exposed to solely hydrogen peroxide was 8.39 days. The mean average of lifespan of flies exposed to both hydrogen peroxide and Vitamin C was 6.48 days. The range of statistical deviation of each vial ranged from 0.42 to 3.3

Conclusions/Discussion

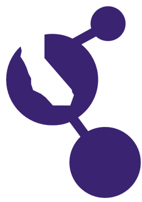
According to my data, hydrogen peroxide did prove to age flies faster. However, Vitamin C did not delay this aging process but rather seemed to facilitate it. This is probably so because I used a lethally high dose of Vitaminc C (the most I used ina vial was 4 grams) that was almost 66 times the RDA (recommended daily allowance) for a human. So obviously, a fly would be much more severely affected by this high concentration. The data itself was rather accurate and showed a relatively logical trend in which higher concentrations of hydrogen peroxide and/or Vitamin C killed flies faster than flies living in vials with lower conccentrations. The only case this didn't happen was in the 1.5% hydrogen peroxide and 1.0% hydrogen peroxide. 1.5% seemed to live longer than 1.0%. Flie lifespan also decreased significantly int he 2.5% and 3.0% solutions when compared to the 0.5% to the 2.0% solutions. Some factors I didn't consider when I designed this experiment that could've had an effect on the data were sex of the flies, generation of the flies, and fly food medium.

Summary Statement

In my project I basically exposed flies to differing concentrations of hydrogen peroxide and hydrogen peroxide with Vitamin C. I then observed their lifespans to see if these chemicals had an effect on their lifespans.

Help Received

Dad bought materials. Dad helped transferred flies. Mom helped put together project board. Parents drove me places for research. Mrs. Corbett (chemistry teacher) helped make calculations and figure out other aspects of my proejct.



CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Sandra Velasquez

Project Number

S1429

Project Title

Round 1: Natural Hair vs. Dyed vs. Bleached. Round 2: Curly Hair vs. Wavy vs. Straight. Who Will Win?

Abstract

Objectives/Goals

The purpose of this experiment was to see if dyeing and bleaching hair affects the strength of hair. I also performed this experiment to conclude if different hair structures affect the hairs' strength. The reason I wanted to conduct my first experiment was because many people dye and bleach their hair without knowing the consequences it can cause. The reason I wanted to conduct my second experiment was because I wanted to know if the hair is natural and unharmed by hair coloring products, does structure really matter.

Methods/Materials

Materials: 30 hair samples 10natural/10dyed/10bleached; 30 hair samples 10curly/10wavy/10straight; 25 number 2 pencils; Scale(grams); 60 ziplock bags; Tape.

Methods: 1. Take each Pencil and using a nail and hammer make a small hole just under the metal band. 2. Collect ten natural 10ins. or longer hair samples from ten different people and do the same for the other different hair types. 3. Place each hair strand in a baggie and label the bag with necessary information. 4. Take out all hair strands and cut them all to be 10in. long. 5. Now take one hair strand cut a ½ in. piece of tape and tape the end of the hair to the edge of a smooth surface. 6. Begin to thread the pencils through the hair keeping the hair steady, until the hair rips. 7. Take the number of pencils the hair supported before it collapsed and weigh them on the scale. 8. Take the weight and record it on the hair strand#s corresponding baggie. 9. The weight the strand of hair held for example 100 grams is its strength, or capacity. 10. Now do the same for all other hair strands.

Results

I found out that Natural hair was much stronger than dyed and bleached hair. It resulted in being 16% stronger than dyed hair and 27% stronger than bleached hair. For my second experiment I found that there was barely any difference between the strengths. Straight hair was 0.5% stronger than curly hair and it was 1.5% stronger than wavy hair.

Conclusions/Discussion

The reason I got my results for my first experiment Natural Hair vs. Dyed vs. Bleached was because the acids and harmful chemical in coloring products had damaged the protein structure of the hair making it weaker and brittle. The reason I got my results for my second experiment was because all hair strands were natural. Another reason they all came out to about the same was because when I tested them I stretched the hair in return undoing the structure.

Summary Statement

The purpose of my experiment was to test if dyeing and bleaching hair weakens its strength and to see if different hair structures that were uncolored differed in strength.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Sarah R. Wadsworth

Project Number

S1430

Project Title

How Do the Physical Characteristics of Human Hair Vary After Immersion in a Variety of Readily Obtainable Substances?

Abstract

Objectives/Goals

The objective is to observe how different substances affect human hair after prolonged emersion. By doing so, I will determine which substances cause damage to human hair. I will observe the physical appearance, flexibility and investigate if sunlight plays a major role.

Methods/Materials

I gathered samples from a human, and tested the samples by emersing them in readily obtainable household substances. After emersion the samples were airdried, and then half of the samples were placed in the sunlight for a specified amount of time. I the observed all of the samples under a microscope for physical damage. I developed a tool that measured angles of bending to determine flexibility.

Results

During my observations I realized that basic substances were more harmful to human hair samples than acidic substances. Bleach caused extreme physical damage to the hair, even before exposure to sunlight. The majority of the substances did affect the appearaces but did not seem to affect the flexibility of the hair. Exposure to sunlight after emersion did not seem to greatly affect the appearance or flexibility, either.

Conclusions/Discussion

The higher pH substances damaged the hair samples more than the lower pH substances. Further damage is caused by exposure to sunlight.

Summary Statement

I tested how a variety of readily attainable household substances affect human hair after prolonged emersion and exposure to sunlight.

Help Received

Mr. Mike Wadsworth helped organize materials and data collection and microscope pictures.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Sarah Waliany

Project Number

S1431

Project Title

Effect of Selective vs. Nonselective COX Inhibitors on Mesothelial and Malignant Cells in Pleural and Ascitic Fluids

Abstract

Objectives/Goals

This study was undertaken to determine if application of non-steroidal inflammatory drugs (NSAIDs) and steroidal drugs to the pleural and ascitic fluids can cause cell death of viable malignant cells, mesothelial cells, and lymphocytes found in fluids.

Methods/Materials

Thirty-eight fluids were selected and spun down. The supernatant was discarded. Drugs (Celebrex, Bextra, Ibuprofen, and Prednisone) were added to the cell sediments except the control group. The smears were stained with a pap stain. During microscopic evaluation, the drugs' names were covered, and the cells were studied blindly.

Results

Bextra, Celebrex, and Ibuprofen caused cell death in 67%, 67%, and 53% of the malignant cases, respectively. Out of the 15 malignant cases, NSAIDS caused cell death in 100% of the breast carcinomas and 60% of the ovarian carcinomas. Celebrex and Ibuprofen caused cell death in 50% of adenocarcinomas. Prednisone was the most effective in causing cell death in the lymphoma case and the five cases diagnosed as lymphocytosis.

Conclusions/Discussion

This study showed that the direct application of NSAIDs (Bextra, Celebrex, and Ibuprofen) and Prednisone can cause cell death of viable malignant cells, mesothelial cells, and lymphocytes in the ascitic and pleural fluids. This is a new, simple, and inexpensive study testing the effectiveness of NSAIDs in treating different cancer types. This test has a significant prognostic value as to whether NSAID treatment is likely to be of value in specific cancer patients as an adjuvant to the presently accepted treatment protocols. In the future, other NSAIDs and steroids need to be tested for their cell death capabilities in a multitude of different cancer cells found in the Fine Needle Aspiration (FNA) for cytological evaluation. Further studies should also be conducted to elucidate the exact mechanisms of actions of NSAIDs and steroids as modes of treatment of cancer since these drugs can cause cell death and can prevent further proliferation of malignant cells.

Summary Statement

My project demonstrated that NSAIDs and steroids can cause cell death in malignant cells, mesothelial cells, and lymphocytes in pleural and ascitic fluids.

Help Received

Used lab equipment under the supervision of Dr. Shirley Shen in USC Pathology Lab.

CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

Elliot K. Wenska

Project Number

S1432

Project Title

Impact of Systemic Pesticides on Plant Growth

Abstract

Objectives/Goals

In this study, petunias (Petunia x hybrida) were treated with systemic and topical pesticides and their growth characteristics were measured and recorded. Our hypothesis is that the pesticides will have no effect on plant growth.

Methods/Materials

The experiment was carried out over a period of 66 days, beginning on 29 October 2005 and concluding on 4 January 2006. Samples were treated with a systemic fungicide with active ingredient 1-(4-chlorophenoxy)-3,3-dimethyl-1-(1H-1,2,4-triazol-1-yl)-2-butanone; a systemic insecticide containing active ingredients Acephate and Fenbutatin oxide; a topical insecticide containing active ingredients Cyfluthrin and Imidacloprid; or water as a control. At the end of the 66-day growth period, the plant samples in each group were weighed and measured and the number of blossoms was noted.

Results

The systemic fungicide retarded the growth of the petunias substantially and inhibited the plants from blossoming. The systemic insecticide and the topical insecticide had no observable impact on the growth characteristics compared with the untreated control samples.

Conclusions/Discussion

We conclude that the ingredients in some systemic pesticides may inhibit the growth and development of plants, which contradicts our original hypothesis.

Summary Statement

Systemic pesticides may inhibit the growth characteristics of the plants they are intended to protect.

Help Received

Father helped analyze data.