

Posters-at-the-Capitol

SUPPLEMENTAL BOOKLET

Project Lead the Way Display

February 24, 2016

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Schedule of Activities

11:00 a.m.Project Lead the Way Display Registration Opens (House-side Mezzanine)
11:00 a.m. to 12:00 p.m. Poster Setup and Legislative Visit Time
12:00 p.m.Lunch Provided for Participants and Mentors (Capitol Education Center)
1:00 p.m. to 3:00 p.m.General Poster Display Time
2:30 p.m.Group Photograph (House Staircase)
3:00 p.m.Conclusion

All times listed are Eastern Standard Time.



Welcome from Doug Klein Affiliate Director of Project Lead the Way Kentucky

Over the past decade, the network of schools participating in the Project Lead the Way's Biomedical and Pre-Engineering programs have expanded rapidly across the Commonwealth. Each day we are seeing students that are flourishing by the opportunity to be a driving force in their education. In our capstone courses Biomedical Innovations and Engineering Design and Development, we enable students to do that. The ownership of going above and beyond in conducting their research or developing their innovation is integral in pushing them to the next level in their development. In this environment we are seeing secondary students completing extraordinary achievements because they have taken ownership.

Project Lead the Way is the nation's leading provider of K-12 STEM programs. Our world-class curriculum and high-quality teacher professional development model, combined with an engaged network of educators and corporate and community partners, help students develop the skills necessary to succeed in our global economy. We currently work with over sixty school districts throughout Kentucky.

We are delighted to participate in the 15th annual *Posters-at-the-Capitol* and have our students display the application of skills they have gained through our pathway of courses. Congratulations to our mentors and scholars that have worked hard to get to this level. We look forward to the many successes they will experience as they continue their education and move forward to develop a stronger Commonwealth.

Welcome from the *Posters-at-the-Capitol* Organizing Committee

Since 2001, *Posters-at-the-Capitol* has helped increase understanding of the important role undergraduate research plays in the education of our students among those responsible for higher education funding in Kentucky. We are excited to partner with Project Lead the Way and raise awareness to the impact made on middle and high school students participating in project and problem-based contextual learning opportunities. We are excited to showcase the work of these high school students and know their experience will offer them a brighter tomorrow.

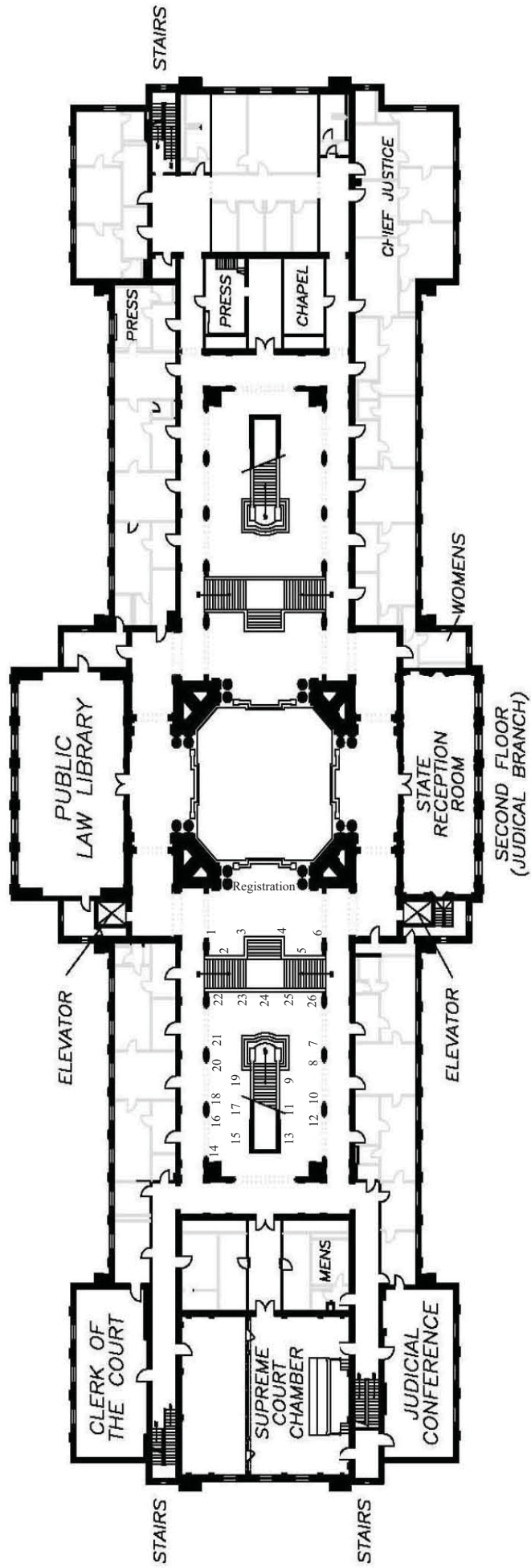
Organizing Committee:

Jonathan Gore, Eastern Kentucky University
Mary Janssen, Kentucky Community and Technical College System
George Antonious, Kentucky State University
Michael Henson, Morehead State University
Jody Cofer Randall and David Pizzo, Murray State University
John Farrar, Northern Kentucky University
Diane Snow and Evie Russell, University of Kentucky
Pamela Feldhoff, University of Louisville
Cheryl Davis, Western Kentucky University

Project Lead The Way

Poster No.	Student		Mentor	Page No.	House No.	Senate No.
1	Akina	Jordan	Tim Oltman	6	58	20
	Cozzens	Paul				
	Goss	Clinton				
	Roberts	Mathew				
2	Alvarado	Alison	Sara Anderson	6	64	26
	Clarke	Mary				
3	Boden	Sarah	Angela Lewis	7	61	17
4	Bowers	Sylvia	Sara Anderson	7	64	26
	Sanders	Emma				
5	Bradshaw	Jared	Greg Conley	7	24	14
	Maupin	Daniel				
6	Cambron	Dylan	Greg Conley	8	24	14
	Mills	Rae				
7	Cecil	Makailah	Natalie Mountjoy	8	13	8
	Kurtz	Lucy				
	Linn	Emily				
8	Czarnecki	Taryn	Julye Adams	9	6	6
9	Ely	Sydney	Angela Lewis	9	61	17
10	Fielding	Carysanne	Tim Oltman	10	58	20
	Hood	Samuel				
	Overstreet	Jonathan				
	Suggs	Brianna				
11	Fryman	Jacob	Angela Lewis	10	61	17
12	Hall	Jacob	Sara Anderson	11	64	26
	Le	Duc				
13	Hall	Wade	Natalie Mountjoy	11	13	8
	Martin	Nate				
	Muthalali	Sonal				
14	Hobbs	Gracie	Natalie Mountjoy and Chandra Emani	12	13	8
	Millay	Rose				
	Miller	Annie				
15	Hunt	Dakota	Robert Bauer	12	23	9
	Spencer	Jacob				
	Zuccari	Zach				
16	Johnson	Braden	Natalie Mountjoy and Chad Wilkerson	13	13	8
	Kurtz	Lucy				
	Murtaza	Ibraheem				
	Muthalali	Sonal				
17	Logsdon	Kennedy	Robert Bauer	13	23	9
	Pedigo	Mckenzie				

Poster No.	Student		Mentor	Page No.	House No.	Senate No.
18	Lovell	Brandon	Angela Lewis	14	61	17
19	Marzian	Kayla	Sara Anderson	14	64	26
	Roberts	Erin				
20	McIntyre	Justice	Julye Adams	15	6	6
21	Murphy	Lauren	Jennifer Wilson	15	85	15
	Muse	Savannah				
22	Rice	Jamie	Julye Adams	15	6	6
23	Ridener	Alexis	Jennifer Wilson	16	85	15
	Scruggs	Josie				
24	Rookard	Alissa	Jennifer Wilson	16	85	15
	Wells	Allison				
25	Wahlbrink	Emma	Sara Anderson	16	64	26
	Wahlbrink	Lauren				
26	Woods	Sarah	Angela Lewis	17	61	17



STAIRS

PRESS

PRESS

CHAPEL

CHIEF JUSTICE

WOMENS

PUBLIC LAW LIBRARY

Registration

STATE RECEPTION ROOM

SECOND FLOOR (JUDICIAL BRANCH)

ELEVATOR

ELEVATOR

STAIRS

STAIRS

CLERK OF THE COURT

SUPREME COURT CHAMBER

MENS

JUDICIAL CONFERENCE

1 2 3 4 5 6
7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22 23 24 25 26

1. Jordan Akina and Mathew Roberts

Martha Layne Collins High School

Mentor: Tim Oltman

Portable Disposal System

The problem, which we are trying to address with this product, is the problem of properly disposing of hazardous materials in the hospital or doctors' office environment. As many as 99,000 people die of nosocomial infections (or infections picked up in hospitals) across the world, and they result in as much as 20 billion dollars in healthcare costs. Much of this could be prevented with better hygiene, including better hazardous material disposal and transportation units. Current hazardous material disposal units are either not secured properly or can be dangerous for those handling the disposed material. Also, these disposal units are mounted on the walls of an office and cannot be taken into the field for medicine or to disaster relief areas when necessary. These disposal units are expensive along with not being portable. Our product would be inexpensive and be made of materials, which are easily accessed in plants across the country. This product would have a separate disposal area, which could be easily removed without any danger to the staff member removing the canisters. This would be not only effective and efficient in reducing contamination and smell, but it would also be much simpler and easier for those removing and disposing of hazardous medical materials. Also, this product would allow for larger materials to be disposed of properly, whereas current disposal units only allow for small items such as needles, gloves, and very small bandages to be disposed of properly. This product's completion could revolutionize the healthcare industry and could prevent thousands of diseases from being spread in hospitals each year.

2. Alison Alvarado and Mary Clarke

Dixie Heights High School

Mentor: Sara Anderson

Effects of Zinc vs. Antibiotics on Bacteria

Many infectious bacteria today are becoming resistant to commonly used antibiotics. Could zinc gluconate be just as or more effective at killing infectious bacteria than our regular antibiotics? A few studies have been done exploring zinc's ability to kill bacteria, but not many. We use zinc gluconate on some common bacteria, and compare that to ampicillin and bacitracin, two commonly used antibiotics. We also combine the three in various ways to see if they are stronger together. We hope the results of this experiment may reveal that zinc has more potential as an antibiotic and, if not, we hope that this will inspire further exploration into other elements helpful to our immune system.

3. Sarah Boden

Grant County High School

Mentor: Angela Lewis

Electrotherapy: A New Way To Defeat Cancer

Cancer treatment has always been limited to chemotherapy and radiation. Both treatment options have harmful effects on the body. How can an ill patient recover from this disease when they are subjected to more toxins as a form of treatment? Electrotherapy is a more practical treatment option. Based on a current research study, male mice who were injected with B16-BL6 melanoma, and were exposed to different levels of EMF showed tumor suppression after 38 days. In this experiment electrotherapy will be administered to yeast cells to test the longevity of the cell in correspondence to the level of electro radiation administered. This experiment will require YED agar plates and a plate with control yeast. The plates will be subjected to various amounts of electro therapy; results will be recorded on the effect on cell proliferation. In conclusion research needs to be pursued in this field to make this treatment available for humans.

4. Sylvia Bowers and Emma Sanders

Kenton County Academies of Innovation and Technology

Mentor: Sara Anderson

How Do Different Species of Bacillus Affect Plant Growth?

For our project we will be exploring the causes and effects of inserting *Bacillus licheniformis* and *Bacillus megaterium* into the soil on plant growth. We would like to find a more natural and efficient solution rather than the use of fertilizers, in order to help the agricultural community. Although previous research has been studied on *Bacillus licheniformis* and *Bacillus megaterium* individually, little has been performed comparing the two together. In order to perform this experiment, we have to study each species in depth and find why one may be more efficient than the other. To discover the answer to this question, we will colonize the bacteria, insert it into the soil, then record the plant growth through plant height, stem width, and number of leaves/flowers for one month. If one of the species of *Bacillus* promotes plant growth positively, then wherever the bacterium is abundant in the soil, agriculture can be planted there to prevent the overuse of harmful fertilizers.

5. Jared Bradshaw and Daniel Maupin

Marion County High School

Mentor: Greg Conley

One Crank

Ever since the first homemade crank baits were designed and used in the early 1900's, fishermen's tackle boxes have been cluttered with upwards of 20 different styles, depths, and movements. The reason they have an excess amount of crank baits is due to the way fish react to certain jerks and movements. Another cause is that fish tend to move up or down in sync with seasons and respond to different colors in different shades of water. While on the water, fisherman must make changes quickly while the fish are located in deep, medium, or shallow water. Every time he/she wants to change depths, they have to retrieve another crank bait. ONECRANK solves this problem by using an interchangeable bill system. This allows the fisherman to adjust to his fishing environment easier and quicker. Our locking system will organize tackle boxes and save space. Our solution will revolutionize the avid fisherman's world.

6. Dylan Cambron and Rae Mills

Marion County High School

Mentor: Greg Conley

The Maneuverable Mirror

The first mirrors, from around 600 B.C., were very simple. They were polished surfaces from natural materials that could reflect an image. Glass mirrors like we have today were first made in the Middle Ages. The process for making modern mirrors was developed in 1835. Mirrors can come mounted to walls, pocket mirrors, hand held, etc. While mirrors are great, they have one problem. Mirrors only show the portion of your body that is faced to it. So to fix this problem you have to use multiple mirrors. After a little brainstorming we have developed a solution for this common problem. Our solution to this problem is a device that has two mirrors attached to each other to provide easier access for people to see the front and back of their heads simultaneously.

7. Makailah Cecil, Lucy Kurtz, and Emily Linn

Life Science Academy: Owensboro Catholic High School and Apollo High School

Mentor: Natalie Mountjoy

Keep It Clean, Bacteria's Mean: ATP Bioluminescence

Sanitation is an issue with very serious repercussions throughout the hospital, especially the Emergency Department. Five to ten percent of hospitalized patients will develop an infection they did not have before they entered the hospital, and many infectious agents are present in the area of primary contact- the emergency department. We aimed to analyze the benefits of using an ATP bioluminescence assay to detect the presence of harmful microorganisms on emergency room surfaces. Although the standard form of assay works well for identifying overall presence of microorganisms, it does not give differentiation between the various types of microbials present. This is important because a high proportion of one bacteria species may have different health repercussions than a high proportion of another species. Also, some gram-negative bacteria are completely unable to be detected due to their thick cell walls that cannot be broken down by the buffers in the assay. We investigated adding innovations to the current technology in order to improve detection, and ultimately extermination of, these microorganisms. Our proposed solution to these inhibiting factors is to equip individual assays with indicators to detect specific toxins produced by their respective bacteria. We aim to use a modified ATP bioluminescence assay to solve this matter.

8. Taryn Czarnecki

Elkhorn Crossing School

Mentor: Julye Adams

Effects of Vitamin E on the Accumulation of Lipofuscin

Lipofuscin is a byproduct of cell oxidation that accumulates around the nucleus of the body's cells causing advanced aging and the loss of cell efficiency. Because of this, lipofuscin has been attributed to age related neurodegenerative diseases such as Parkinson's disease, Alzheimer's disease, and macular degeneration. Preliminary experimentation showed evidence of lipofuscin in epithelial, cardiac, and neural tissue. The presence of an antioxidant, in this case vitamin E, was hypothesized to decrease the accumulation of lipofuscin. Six male Sprague-Dawley rats were gavaged daily, three with a liquid form of 400 IU of vitamin E and the remaining three with an equal amount of water in order to maintain the same stress levels across all of the test subjects. At the end of the experimentation, the rats were dissected for the brain, heart, liver, and kidneys and stained using a Ziehl-Neelsen stain to observe lipofuscin. On average, the rats given vitamin E had an average accumulation of 7.3% in the brain tissue sample, 8.6% in the heart tissue sample, 9% in the liver tissue sample, and 8.3% in the kidney tissue sample. The control rats, however, had an average accumulation of 14.3% in the brain tissue sample, 21.6% in the heart tissue sample, 13.6% in the liver tissue sample, and 32.3% in the kidney tissue sample. To further this research, the effects of vitamin E will be tested on transgenic animals with a gene for Alzheimer's (PSEN1) and animals with a combination of PSEN1 and a gene that codes for over production of lipofuscin (CLN6). These rats will be able to simulate the symptoms and effects of Alzheimer's disease to build a strong connection between the intake of vitamin e, decreased production of lipofuscin, and the progression of Alzheimer's.

9. Sydney Ely

Grant County High School

Mentor: Angela Lewis

Innovations for the Future: The Graphene Back Brace

In this day and age, the world is all about the latest and greatest. The best phone, the newest car, the strongest materials, and even the most efficient back brace. These back brace innovations began with the Flexion brace which would have been a large step up from current braces in all aspects. Unfortunately, research did not reveal whether or not the brace made it past the design stage, (Sflutfle). That piques the question; why not make the latest and greatest brace out of the newest, strongest material? This does not mean polyethylene, polypropylene, or aluminum, ("What Are Some Strong Yet Flexible Materials?"), the best material for the job would be graphene. The combination of two of the latest and greatest will ideally revolutionize the world of back braces. The experiment will include a product testing phase, which will be designed to compare the strength of various product including graphene, two types of plastics, and aluminum will be tested against torsion and head on strength. With further research, the intention of this innovation is to draft, design, and create a functioning prototype.

**10. Carysanne Fielding, Samuel Hood, Jonathan Overstreet, and
Brianna Suggs**

Martha Layne Collins High School

Mentor: Tim Oltman

Low Cost Human Powered Stove

The members of this team have all researched the techniques used by the people of third world countries and have viewed how difficult it can be to properly cook and prepare meals. Meat and water seem to be the biggest problems, due to their relatively high minimal cooking temperature. Most meat needs to reach temperatures of 165 degrees Fahrenheit to be safely consumed. Without safe drinking water many people in third world countries succumb to illnesses that could be easily prevented with safe drinking water. If these people had a cooking device that was easy and self-sufficient, the number of deaths and illnesses would greatly diminish. The focus for this project is to create a small, portable stove that is capable of being its own power supply and is made of materials that are easily obtained. This would be a great breakthrough in technology and would have a large demand in the humanitarian market. The stove would essentially be cheaper to run and maintain compared to its propane powered counterparts. This would be a major selling point because the user only has to rely on his/herself to power the machine, not a gas tank that only hold a limited supply of propane.

11. Jacob Fryman

Grant County High School

Mentor: Angela Lewis

Eradication of Bluetongue Virus in Cattle by Increasing Awareness

The object of this study is to bring knowledge of bluetongue virus to local farmers and cattlemen alike, in an attempt to prevent spread of the virus. The vector for Bluetongue virus is the biting midge, who transfers the virus through a bite it delivers to the cattle. This virus causes ulcers of the mouth and muzzle, along with swollen lips and tongue of the cattle, and may cause death within a week in most severe cases. Should the virus be widespread and affect many cattle causing death in large numbers, Kentucky's economy will suffer. General understanding of the spread of the virus and of the vector will bring knowledge to those individuals whose income and livelihood depend on their cattle, and save Kentucky's livestock industry. The project will discuss current cattle mortalities in Northern Kentucky, sources of the virus, and ways in which the virus can be minimized in herds.

12. Jacob Hall and Duc Le

Kenton County Academies of Innovation and Technology

Mentor: Sara Anderson

Effects of Various Growth Modifiers on Bacteria

In today's medical field a huge problem is arising. That problem is antibiotic resistance. Bacteria is becoming more resistant to the effects of antibiotics. My partner and I have focused our project idea around this very problem. We are testing various growth modifiers on the growth of bacteria. The three growth modifiers are wedelolactone, saponins, and penicillin. We chose both wedelolactone and saponins because these chemical compounds have been tested very minimally so they can help counter antibiotic resistance. We chose penicillin to act as a positive control because it is the most commonly used antibiotic, so it is the most likely to experience antibiotic resistance. Once we apply these three growth modifiers, we will observe the zone of inhibition every 24 hours for a total of 72 hours. The results we observe throughout this experiment could potentially have a great impact on the medical field.

13. Wade Hall, Nate Martin, and Sonal Muthalali

Life Science Academy: Daviess County High School

Mentor: Natalie Mountjoy

Protect Your Blind Side: Or Suffer the Consequences

Most people know about the current lawsuit between the NFL and former players regarding the league's problematic concussion rate potentially leading to extreme changes in the memory/capacity of the brain. A concussion occurs when a person receives a blow to the head, causing damage to the brain cells. The cells usually take two weeks to heal, but continuing to be active or suffering another head injury can lead to permanent damage. We wanted to see if there was a similar trend in high school football. The purpose of our study was to determine whether the number of concussions suffered by a player has a significant impact on their GPA. We hypothesized that if a player suffers a single concussion, then they are more likely to have a lower GPA than a player who has not suffered a concussion. We surveyed high school football players (N=35) on their number of diagnosed concussions and their current high school GPA. Our hypothesis was supported; individuals who suffered a single concussion had a significantly lower GPA. Further, the data showed an additive effect; the more concussions athletes suffer, the lower their GPA. It's possible these results are due to the physiological effects of concussions or due to the time spent out of class in recovery. We also discuss the player positions that have the highest concussion rate, which means they may require additional protection. Additionally, we investigate the potential use cognitive tests pre- and post-football seasons to monitor the effects of concussions over time. Our study highlights the ease at which high schools could monitor the effects of concussions on their athletes. It is our hope that this study can push research further and make high school football safer.

14. Gracie Hobbs, Rose Millay, and Annie Miller

Life Science Academy: Owensboro High School, Daviess County High School and Apollo High School

Mentor: Natalie Mountjoy and Chandra Emani

The Evolutionary Origins of Asthma

Globally, 18.7 million (8%) adults and 6.8 million (9.3%) children suffer from asthma. More than 3,500 people die annually due to complications of this chronic lung disease. In partnership with Western Kentucky University- Owensboro, we wanted to determine the evolutionary origins of asthma in the human genome using the principles of bioinformatics (i.e., the application of computer technology to the management of biological information). Interleukin 13 has been identified as one gene related to asthma. Using PubMed, a biomedical database maintained by the National Center for Biotechnology Information (NCBI), we identified the gene sequence of Interleukin 13. We investigated the origins of the gene using basic local alignment search tools (BLASTs), which use algorithms to compare DNA sequences, taxonomy reports and resulting distance trees to create an evolutionary diagram of the gene's existence in various species. We found evidence that Interleukin 13 may have originated in the platypus (*Ornithorhynchus anatinus*), an egg-laying mammal native to Australia. Understanding the evolutionary history of Interleukin 13 may aid in developing successful treatments for asthma.

15. Dakota Hunt, Jacob Spencer, and Zach Zuccari

Barren County High School

Mentor: Robert Bauer

Lucid Dreams

Getting a good night's sleep appears to be a lovely dream to many people, adolescents to older adults. These groups of people do not get adequate sleep for many reasons, such as: rigorous school or work schedules, exposure to blue light, and caffeinated drinks. Melatonin is a hormone naturally produced in the body by the pineal gland that regulates our circadian rhythm which controls our sleep schedule. Taking melatonin as a supplement has been used to improve sleep for around twenty years, but has never been tested to see if it will improve or increase the lucidity of dreams. Our experiment will test to see if taking melatonin increases the amount or lucidity of dreams that occur at night and thus improving sleep as well.

16. Braden Johnson, Lucy Kurtz, Ibraheem Murtaza, and Sonal Muthalali
Owensboro Catholic High School and Daviess County High School

Mentors: Natalie Mountjoy and Chad Wilkerson

Plant Extracts as Alternative Treatment Options for Cancer

Basil, ginger and Neem are full of plant-based pharmaceuticals that may provide alternatives to traditional cancer treatments. As part of a large, ongoing research project with the Owensboro Cancer Research Program and Western Kentucky University-Owensboro, we wanted to determine if extracts from these species would have any impact on cancer cells. We hypothesized that each plant extract (i.e., from basil, ginger and Neem) would have limiting effects on cancer cell life and growth. We exposed three different cancer cell lines (i.e., for colon, cervical and lung cancer) to each extract, individually and mixed. Following 48 hours of exposure, we conducted assays to determine the effects. Our data suggest that all plant extracts reduce cell growth in all cancer cell lines tested, with variability depending on the plant extract used and cancer cell line tested. The long term goal of the larger research study is to find the best plant species and the extract concentrations necessary to provide successful cancer treatment.

17. Kennedy Logsdon and Mckenzie Pedigo

Barren County High School

Mentor: Robert Bauer

Gait Analysis vs. Potential Sports Injuries

Gait analysis is an important component of competitive and recreational sports. However, it is often only analyzed after an injury takes place. Our study aims to perform preventative gait analysis. Doing this, we can correct form, efficiency, and increase performance with an ultimate goal of decreasing risk of injury. Our test will consist of slow-motion videos of ten athletes from several different sports. The videos will provide footage of athletes jumping off a two foot box, performing lateral slides, and running short distances. With the help of a Physical Therapist and Athletic Trainer, we will analyze these videos looking for signs of valgus, varus, pronation, and supination. We will categorize the athletes based on high and low risk of injuries. With the analyzations, we can decrease risk of injury by showing the athletes what they are doing that puts them at risk, allowing them to know what it is they need to correct.

18. Brandon Lovell

Grant County High School

Mentor: Angela Lewis

Revolutionizing Hospitals Through The Use Of Oligodynamics

The CDC estimated that there were 722,000 healthcare-associated Infections (HAI's) and that 1 in 25 patients developed HAI's in 2011. Currently hospital surfaces and tools are made with stainless-steel which can build up bacteria over time and a new material is needed to reduce HAIs. oligodynamics might be a solution since due to the antibacterial effect exhibited by a few heavy metals. Researchers have known of the effects and use of oligodynamic materials in potting water with copper pots, coating the hulls of ships with copper to help cut down the formation of barnacles, and how silver spoons and brass doorknobs disinfect themselves. In the hospital setting metals that exhibit the oligodynamic effect to cover surfaces, replace stainless-steel doorknobs, and even develop new forms of stents and a new coating on scalpels would be useful due to their ability kill off bacteria. The experiment will attempt to improve the effects of decreasing HAI's by using oligodynamic metals. Surgical instruments will be modified by electroplating various oligodynamic metals onto normal stainless steel scalpels and then testing the reduction of bacterial growth. The results could affect the way hospitals and clinics go about conducting daily routines.

19. Kayla Marzian and Erin Roberts

Kenton County Academies of Innovation and Technology

Mentor: Sara Anderson

The Effect of Silver Nanoparticles on the Spread of Infection

For centuries, the spread of infection due to harmful bacteria has been catastrophic, causing over one billion deaths every year worldwide. Despite the numerous antibiotic medications and treatments already created and still being created around the world, there is currently no completely effective method of destroying bacteria and preventing bacterial spread that is readily available for the public. The reasons for this is that the majority of harmful bacteria will become resistant to antibiotic treatments, some antibiotic are not completely effective at destroying bacteria permanently, and most treatments are not easily accessible or safe for public use. A solution to this worldwide issue is the use of Silver Nanoparticles, which are incredibly small pieces of silver that can successfully kill several harmful bacteria cells, as an effortlessly obtained antibiotic treatment for the general public. In order to create this product, Silver Nanoparticles, mixed with an inert or neutral base, will be added to numerous samples of a common bacteria called E.coli, and the effect of the Silver Nanoparticle mixture on the bacteria will be analyzed specifically for the total death of the E.coli cells. Overall, Silver Nanoparticles can be utilized as an inexpensive, easily accessible antibiotic treatment for the bacteria in minor cuts, acne, and more that the general public can safely use in order to effectively reduce the spread of the harmful bacteria that causes several million deaths around the world.

20. Justice McIntyre

Elkhorn Crossing School

Mentor: Julye Adams

Anti-Angiogenic Food Fights Obesity

Our project tests the rate of weight gain when an anti-angiogenic food is added to a high fat diet. Weight is expected to be gained slower when this is applied to rats. If so, this method can be utilized by people with unhealthy diets. Obesity is an epidemic in America and needs to be resolved for the sake of public health. The rats were divided into 3 groups of diets, high fat, high fat with garlic and regular with garlic along with a control of just a regular diet. Rats were measured along with food and water intake regularly. Through this process, it was observed when garlic is added to a high fat diet, the rate of weight gain will not only significantly decrease but also develop as if it was not a high fat diet at all. This may be applicable to humans as needed.

21. Lauren Murphy and Savannah Muse

Pulaski County High School

Mentor: Jennifer Wilson

Comparing the Effectiveness of Hand Sanitizer and Antibacterial Hand Soap

Hand sanitizers have become a fixture in today's society, being found everywhere from hospital hallways to hanging from students' backpacks. It is a common belief that using hand sanitizer is just as effective as hand washing when it comes to personal hygiene. But is it really? This study investigates the effectiveness of hand sanitizer and antibacterial hand soap by evaluating the amount of bacteria left on gloved hands after handling a contaminated object and then using each product according to the manufacturer's directions. Swabs from the gloves were plated on nutrient agar, incubated for 24 hours, and then examined for amount of bacterial contamination. Percentage of plate covered by growth was used to provide results. The investigation has not concluded at this time to provide results.

22. Jamie Rice

Elkhorn Crossing School

Mentor: Julye Adams

The Effect of Soda and Exercise on the Fat Pads of Rats

It is inferred that diet soda is healthier than regular soda because of the decreased calories and sugar. However, this experiment is needed because everyone had conflicting views on which one is actually healthier. It is believed that when mixed with exercise, diet soda will cause more body fat to develop. This is because the artificial sugars in diet sodas disrupt the bacteria living in your intestines. This causes food to be metabolized way different than it should. In this experiment, nine rats will be obtained: three diet soda drinkers, three regular soda drinkers, and three water drinkers. The water drinkers are the controls and the amount of soda the other groups drink will be recorded. They will then exercise on a treadmill, for a time not yet determined, and will be weighed, in grams, once a week. At the end of the year, the rats will be dissected, and the fat pads of all three groups will be compared. The anticipated results are that the fat pads of the regular soda drinkers will weigh less than those of the diet soda drinkers, and the water drinker's fat pads will be a lot smaller than both of the soda drinker groups. If these anticipated results are correct, this will conclude that diet soda is actually more fattening than regular soda.

23. Alexis Ridener and Josie Scruggs

Pulaski County High School

Mentor: Jennifer Wilson

Comparing Bacterial Contamination of Cosmetics

Warnings to discontinue the use of cosmetics after a certain period of use are commonplace, due to the fact that over time, bacteria can contaminate and grow within the product. To what degree does bacterial contamination take place during the recommended timespan of use? Are some products, such as liquid lip glosses, more susceptible to bacterial contamination and growth than others, such as solid lipsticks? This investigation compares the amounts of bacterial growth in lip gloss and lipstick cosmetics during normal use over a four week period of time. Common brands of lip gloss and lipstick were chosen and used twice daily by the same researcher during the study period. Samples from the applicator of a lip gloss and the surface of a solid lipstick were plated on nutrient agar every 5 days, incubated for 24 hours, and then analyzed for amount of growth and number of different bacterial species. Gram staining, microscopic visual analysis, and colony counting were used to obtain the results. The investigation has not concluded at this time to provide results.

24. Alissa Rookard and Allison Wells

Pulaski County High School

Mentor: Jennifer Wilson

Exploring Immunotherapy as a Treatment for Cancer

Your body's immune system is the one and only defense against potential pathogens. It is a complex, elaborate mosaic of interactions designed to neutralize threats to your body's physiology. This study was conducted to investigate the emerging role of immunotherapy, which manipulates a patient's immune system to more effectively treat cancer. Cancer occurs when the body's own cells lose the regulatory controls responsible for normal division and functioning, therefore using one's own defensive mechanisms to treat a disease caused by one's body is an intriguing proposal. This study will address the newer technologies being developed in the field of immunotherapy, such as the use of monoclonal antibodies and immune checkpoint inhibitors.

25. Emma Wahlbrink and Lauren Wahlbrink

Kenton County Academies of Innovation and Technology

Mentor: Sarah Anderson

Does Storing Water Bottles in a Heated Environment Release the Chemical Bisphenol A into Water?

Bisphenol A is a highly controversial and dangerous chemical that humans come in contact with on a daily basis. The purpose of our experiment and research is to expose a possible source of daily exposure. We explored one source that has been previously unaddressed, that source being plastic water bottles, as well as contributed information to the argument about the safety of Bisphenol A. We posed the question, "Does leaving water bottles in a heated environment cause levels of Bisphenol A to rise?" We ran several trials of different brands of Water bottles for several weeks. We find our project to be of importance because of the growing controversy to why pediatric cancer rates are on the rise and what chemicals and daily products that we should be looking towards to blame, and furthermore to regulate to increase the overall safety of the average consumer.

26. Sarah Woods

Grant County High School

Mentor: Angela Lewis

Possible Correlation Between Saccharomyces Cerevisiae (yeast) and Cell Proliferation

Dieticians suggest that dark sodas may be a cause of cancer. There are several factors that can add to the possibility of this. One of these factors is caramel color, otherwise known as 4-MeI. For example, on the Consumer Reports website, it says, “In 2007, a federal government study concluded that 4-MeI caused cancer in mice and the International Agency for Research on Cancer determined the chemical to be “possibly carcinogenic to humans” in 2011” (Consumer Reports, Caramel color:...). This research continues on to explain how federal limits have been put on the levels of caramel color in foods and drinks. When the amount is exceeded, some states, such as California enforce a requirement in which the label must warn the consumer of the increased risk of cancer if the product is consumed in excess of twenty- nine micrograms of caramel color a day. In order to show the need for further labeling, this project may show a correlation of caramel coloring and increased cell growth in *Saccharomyces Cerevisiae*. To accomplish this, yeast cells can be grown on various agars to show the impact of caramel coloring on cell growth in when caramel coloring is added to growth. The results could be used to educate consumers on the need to reduce consumption of caramel color in dark soda.

Notes:

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