GEMSTONE

HONORS COLLEGE
UNIVERSITY OF MARYLAND

14th Annual

Team Thesis Conference

Honors
Undergraduate
Multidisciplinary
Research

April 5-6, 2013
University of Maryland, College Park

Gemstone Staff

Faculty Director	**Dr. Frank Coale**
Associate Director	**Dr. Kristan Skendall**
Assistant Director for Operations	**Mrs. Vickie Hill**
Assistant Director for Student Engagement	**Ms. Leah Kreimer**
Graduate Assistant for Team Development	**Ms. Heather Creek**
Graduate Assistant for Student Development	**Mr. Mac Mathis**

Please join us….

You are cordially invited to attend

The Fourteenth Annual

Gemstone Citation Ceremony

Friday, May 17, 2013

University of Maryland Memorial Chapel

College Park, Maryland

From 4:30 p.m. to 6:00 p.m.

Reception immediately following Ceremony
6:00 pm to 7:00 pm
Adele H. Stamp Student Union

Team Thesis Conference Schedule-at-a-Glance

Friday, April 5, 2013, Plant Sciences Building

3:00 pm - 4:00 pm	Room 1130	Team DIET
	Room 1140	Team Gene Therapy
4:15 pm - 5:15 pm	Room 1130	Team MILK
	Room 1140	Team RODENT
5:30 pm - 6:30 pm	Room 1130	Team B^3
	Room 1140	Team IEDOB

Saturday, April 6, 2013, Plant Sciences Building

9:00 am - 10:00 am	Room 1130	Team ONLINE
	Room 1140	Team SWAMP
10:15 am - 11:15 am	Room 1130	Team MAGIC
	Room 1140	Team KERMIT
11:30 am - 12:30 pm	Room 1130	Team BIO-COUNTER
	Room 1140	Team FOOD DESERTS
12:45 pm-1:45 pm	Room 1130	Team SOLAR CAMPUS

Friday, April 5, 2013
3:00-4:00 pm
Room 1130

DIET: Dietary Information and Evaluation Technologies

Research Team

Britni A. Cunningham, History
Amanda L. Dols, Bioengineering
Emily S. Dumm, Material Science and Engineering
Angelica Ann Eng, Psychology and Criminology & Criminal Justice
Kate L. Franke, Physiology & Neurology and Psychology
Alison R. Gross, Operations Management and Criminology & Criminal Justice
Jonathan M. Helinek, Information Systems and Marketing
Jonathan Zvy Indig, Mechanical Engineering
Joshua I. Leibowitz, Physiology & Neurobiology
Alexander Sebastian O'Connor, Romance Languages and General Biology
Timothy J. Russell, Aerospace Engineering
Aroon Sharma, Electrical Engineering

Faculty Mentor

Dr. Nadine Sahyoun, Associate Professor, Nutrition Epidemiology and Graduate Director for Food Science and Nutrition

Librarian

Ms. Judy Markowitz, University Libraries, University of Maryland

Discussants

Dr. Essie Yamini, Nutritionist, Nutrition Program Staff, Food and Drug Administration
Dr. Uche Akobundu, Project Director, Hunger Free Communities, United Way of Passaic County
Dr. Jim Purtilo, Associate Professor**,** Computer Science
Ms. Colleen Wright-Riva, Director of Dining Services, Dining Services
Dr. Robert Post, Deputy Director, Center for Nutrition Policy and Promotion, USDA
Ms. Alana Moshfegh, Research Leader: Food Surveys research Group, USDA
Dr. Amy Anderson, Faculty Research Assistant, Nutrition and Food Science
Ms. Jane Jakubczak, Coordinator of Nutrition Services, University Health Center

Research Description

This study evaluated the effect of an online diet-tracking tool on college students' self-efficacy, specifically pertaining to their fruit and vegetable intake. A convenience sample of students was recruited and administered a self-efficacy survey online before and after an eight-week intervention in which participants were asked to track their dietary intake online. In both trials, participants were assigned to a control group and two experimental groups. Experimental group one (n = 22 for fall and n = 43 for spring) had access to the tracking tool without nutrition tips and experimental group two (n = 20 for fall and n = 33 for spring) had access to the website with weekly nutrition tips. The control group (n = 36 for fall and n = 60 for spring) had no access to the intervention website. For both semesters we did not find a statistically significant difference in change in self-efficacy scores. However, the change in self-efficacy was different in males and females for both trials ($p = 0.04$ and $p = 0.002$, respectively). In the fall semester, women had an overall increase in self-efficacy while men had an overall decrease, but the opposite trend was observed in the spring. We also observed a difference in tracking behaviors between women and men, with women creating more meals than men. Thus, our study contributes to the literature because it provides additional information as to the different ways in which men and women seek out nutritional information and how that information affects their behaviors.

Friday, April 5, 2013
3:00-4:00 pm
Room 1140

Gene Therapy

Research Team

Daniel Scott Atlas, Environmental Science & Policy
Elizabeth Anne Buckshaw, Cell Biology & Genetics and Mathematics
David Nader Hanna, Physiology & Neurobiology and Religious Studies
Jennifer Nicole Lannon, Cell Biology & Genetics
Alia Mahmud, French Language & Literature
Mariya Mirvis, Cell Biology & Genetics
Anna Thuy Anh Pham, Cell Biology & Genetics
Nadira Bharati Ramnarain, Cell Biology & Genetics
Paul Anthony Randazzo, Biochemistry
Michelle Rose Safferman, Supply Chain Management
Jeremy Chaim Zuckerberg, Bioengineering

Faculty Mentor

Dr. Ioannis Bossis, Assistant Professor, Department of Veterinary Medicine

Librarians

Mr. Jim Miller, University Libraries, University of Maryland

Discussants

Mr. Yogendra Rajawat, PhD Candidate, Virginia-Maryland Regional College of Veterinary Medicine
Dr. Robert Kotin, Senior Investigator, NIH/NHLBI, National Heart Lung and Blood Institute
Dr. Douglas Powell, Attending Veterinarian, University of Maryland
Dr. David Straney, Associate Professor, Cell Biology & Molecular Genetics
Dr. Georgiv Belov, Assistant Professor of Virology, VA-MD Regional College of Veterinary Medicine

Research Description

Gene therapy is an up-and-coming technique with the potential to treat many genetic diseases. Familial hypercholesterolemia (FH), a genetic disorder in which low-density lipoprotein (LDL) bloodstream levels are dangerously elevated, is a good candidate for treatment with gene therapy. A common vector used in gene therapy is adeno-associated virus (AAV), of which there are many serotypes with different tissue specificities. The project's goal was to determine which AAV serotype is most effective in targeting the rabbit liver, where most LDL is cleared from the blood. Two serotypes that have been shown to transduce liver tissue, AAV6 and AAV8, were tested in healthy New Zealand White rabbits. After injecting both serotypes containing the LacZ marker gene into the rabbits, it was determined that AAV8 is more efficient at liver transduction. Future studies could include transducing AAV8 containing a functional LDL receptor gene into Watanabe heritable hyperlipidemic rabbits, which mimic human FH.

Friday, April 5, 2013
4:15-5:15 pm
Room 1130

MILK

Research Team

Tom M. Blackmon, Finance and Economics
Jonathan Chang, Bioengineering
Amy W. Cheng, General Biology and Human Development Minor
Tiffany Jen, Physiology & Neurobiology
Hannah Kravis, Finance and Japanese
Raishay J. Lin, English
Michael Lu, Finance
Erin S. Ong, Physiology & Neurobiology and Psychology
Tanya N. Pakzad, Nutritional Science and Physiology & Neurobiology
Nima Sarfaraz, Bioengineering
Yvonne Shiau, English and Finance
Jackly C. Wong, Marketing and Finance

Faculty Mentor

Dr. Nam Sun Wang, Associate Professor, Department of Chemical & Biomolecular Engineering, A. James Clark School of Engineering

Librarian

Ms. Lily Griner, University Libraries, University of Maryland

Discussants

Dr. Roxanne Lefkoff, Tyser Teaching Fellow, Marketing
Dr. David Kass, Senior Lecturer, Finance
Dr. Joonil Seog, Assistant Professor, Materials Science & Engineering
Dr. Abani Pradhan, Assistant Professor, Nutrition and Food Science
Mr. Joseph Mortati, Professor, Technology Enterprise Institute (Mtech)

Research Description

Ambiguous expiration dates on milk cartons can mislead consumers into prematurely disposing unspoiled milk and potentially drinking spoiled milk. These misconceptions can lead to wastage that harms the environment, or potential discomfort and illness. The incorporation of pH-sensitive indicators into plastic milk cartons has the potential to replace stamped expiration dates as the traditional method of milk spoilage indication. We studied the correlation between bacteria count and milk pH to establish pH measurement as an effective indicator of milk quality. We then developed a method for incorporating bromothymol blue, a pH-sensitive color-changing dye, into a hydrogel made of polyacrylamide. This hydrogel can be added to existing packaging for milk or other products with detectable pH changes. Additionally, we conducted a consumer survey and analyzed current food packaging trends in the market. Our research indicates that a spoilage-indicating milk carton could have strong market potential as food industries increasingly adopt intelligent packaging designs.

Friday, April 5, 2013
4:15-5:15 pm
Room 1140

RODENT: Reducing Obesity and Disease with Effective Nutritional Therapies

Research Team

Shelby Tyler Brumback, Psychology
Jamie Byun, Physiology & Neurology
Jacob A. Cohen, Mechanical Engineering
Feili Huang, Chemical Engineering
Ghazal H. Kango, Bioengineering
Anastasiya Latushko, Government & Politics
Michael Robert Lin, Physics and Mathematics minor
Alexander P. Mamunes, Physiology & Neurobiology
Marko Modric, Psychology
Kenneth Martin Rosenberg, Bioengineering
Oliver Sun, Family Science
Tina Thomas, Physiology & Neurology and Psychology

Faculty Mentor

Dr. Brian Bequtte, Associate Professor, Department of Animal and Avian Sciences

Librarian

Mr. James Miller, University Libraries, University of Maryland

Discussants

Dr. Peter J. McGuire, Physician Scientist, National Human Genome Research Institute
Dr. Ransom L. Baldwin, Research Scientist, Bovine Functional Genomics Laboratory, USDA/ARS
Dr. Kiran S. Panickar, Research Scientist, Department of Pediatrics, UMD School of Medicine
Dr. Espen E. Spangenburg, Associate Professor, Department of Kinesiology
Dr. Cornelia C. Metges, Head of Research Unit Nutritional Physiology, Leibnez Institute for Farm Animal Biology

Research Description

Obesity is a difficult disease to combat because it is not only marked by a change in body weight but also an underlying dysregulation in metabolism. We sought to elucidate this metabolic change caused by diet-induced obesity (DIO) and subsequent food restricted dieting. We hypothesized that a cycle of weight gain and loss would impart a significant change in metabolism, and that this imprinting would display a change in the activity of the energy-sensing enzyme AMP-activated protein kinase (AMPK) in the liver. To test this hypothesis, two experiments with mice were conducted with the following objectives: Experiment 1) Determine that DIO and subsequent weight loss leads to a short-term nutritional perturbation in AMPK and metabolism, and Experiment 2) Determine whether the metabolic dysregulation caused by DIO can be reversed by activating AMPK by administering the activator of AMPK, 5-Aminoimidazole-4-carboxamide ribonucleotide (AICAR). Experiment 1 established that DIO mice had a higher proportion of body fat, higher levels of free fatty acids, higher food efficiency, and lower glucose clearance compared to mice fed a standard diet. However, we observed no correlation between liver AMPK levels and any measured parameters. Experiment 2 established that AICAR treatment induced fat loss and mimicked effects of food restriction (20% less energy), but activating AMPK with AICAR was not as effective as food restriction on improving glucose clearance. Future studies focusing on the connection between AMPK and DIO can serve to further elucidate the metabolic changes underlying obesity.

Friday, April 5, 2013
5:30-6:30 pm
Room 1130

B^3: Blood Brain Barrier

Research Team

Sakib Adnan, Physiology & Neurobiology and Psychology
Regina Anne Borsellino, English Language and Literature
Alice He, Physiology & Neurobiology and Economics
Somdutta Mukherjee, Cell Biology & Genetics
Victor T. Peng, Physiology & Neurobiology
Karthya Gopal Potti, Physiology & Neurobiology
Kelly Kai-Lih Shih, Government and Politics
Janina Aldona Vaitkus, Bioengineering
Victor G. Wang, Bioengineering
Rani Woo, Physiology & Neurobiology and Studio Art
Robert X. Zhang, Electrical Engineering

Faculty Mentor

Dr. J. Helim Aranda-Espinosa, Associate Professor, Fischell Department of Bioengineering

Librarian

Ms. Joscelyn Langholt, University Libraries, University of Maryland

Discussants

Dr. Zhihong Nie, Assistant Professor, Department of Chemistry
Dr. Avis Cohen, Professor, Department of Biology
Dr. Kimberly Stroka, Postdoctoral Fellow, Johns Hopkins University
Dr. Heather Hayenga, Postdoctoral Research Associate, Department of Engineering
Dr. Daniel Butts, Assistant Professor, Department of Biology

Research Description

The blood brain barrier (BBB) is a semi-permeable membrane that separates the brain from the bloodstream and prevents many drugs that treat neurological diseases, such as Alzheimer's and Parkinson's, from reaching the brain. Our project aims to create a novel drug delivery system to target the brain during neural inflammatory conditions. Specifically, we have developed a cationic solid lipid nanoparticle (CSLN) complex composed of a cationic nanoparticle, biotin, streptavidin, and a VCAM-1 antibody. The VCAM-1 antibody component is used to target VCAM-1, a cell adhesion protein found on the apical surface of the BBB endothelium. This VCAM-1 expression is elevated in the presence of inflammatory molecules, such as tumor necrosis factor alpha (TNF-a). Through the use of a simple human umbilical vein endothelial cell (HUVEC) BBB model, results show that increasing TNF-a concentrations (and correspondingly a greater VCAM-1 expression) allow for greater migration of our CSLN complex through the endothelial monolayer. This is especially promising in the field of drug delivery, as these results provide a solid foundation for further research with VCAM-1 targeting using more robust and complex BBB models.

Friday, April 5, 2013
5:30-6:30 pm
Room 1140

IEDOB: Increasing Energy Density of Batteries

Research Team

Asif U. Ahmed, Chemical Engineering
Jan Krzysztof Babiuch-Hall, Physics
Taarika Babu, Biochemistry
Gary Kai-Juei Chen, Physics
Desiree Jasmine Devries, Accounting
Karen Akimi Dunford, Chemical Engineering
Madara Pasenadi Jayatilake, Chemical Engineering
Emily Yifan Li, Biochemistry
Scott Andrew Wingate, Aerospace Engineering
Joseph E. Yan, Computer Engineering

Faculty Mentor

Dr. Chunsheng Wang, Associate Professor, Department of Chemical and Biomolecular Engineering

Librarian

Ms. Nevenka Zdravkovska, University Libraries, University of Maryland

Discussants

Mr. Xinyi Chen, Ph.D. Candidate, Materials Science and Engineering
Mr. Alexander Kozen, Ph.D. Candidate, Materials Science and Engineering
Mr. Liangbing Hu, Assistant Professor, Materials and Science and Engineering
Dr. Yunhua Xu, Assistant Research Scientist, Chemical and Biomolecular Engineering
Mr. Ayyakkannu Manivannan, Researcher, US Department of Energy

Research Description

The advancement of rechargeable-lithium ion batteries is critical to the performance of portable electronic technologies, electric vehicles and renewable energy storage. Silicon anodes for lithium-ion batteries can dramatically improve charge capacity, but pure silicon has low cycle life due to pulverization. We attempted to use electrochemical deposition to deposit silicon particles onto graphene in an ordered fashion to create an anode with the benefits of silicon, held together with the strength of graphene. Electrochemical deposition was shown to consistently deposit onto graphene sheets at -2.7V. However, our experiments have shown that the process of electrochemical deposition degraded the anode material, severely reducing charge capacity.

Saturday, April 6, 2013
9:00-10:00 am
Room 1130

ONLINE: Observing the Nuances of Learning in Non-traditional Environments

Research Team

Maureen Bowers, Cell Biology & Genetics
Neal Freyman, History
Lizzy McLellan, Journalism
Jeremy Spiegel, Journalism and History
Brian Paxton, Journalism

Faculty Mentor

Dr. Michael Zachariah, Professor, Mechanical Engineering

Librarian

Mr. David Wilt, University Libraries, University of Maryland

Discussants

Mrs. Laura Seuscheck, Instructional Design Evaluator, K12 Online Courses, Research Assistant
Dr. Marcio Alves de Oliveira, Assistant Dean for Educational Innovation, Kinesiology
Dr. Doug Oard, Professor, College of Information Studies
Dr. Marybeth Brechsler Sharp, Executive Director, Council for the Advancement of Standards in Higher Education

Research Description

Online courses are rapidly replacing traditional, face-to-face lectures in American universities. As technology improves, class sizes grow, and tuition rises, we not only expect this trend to continue but accelerate. Considering the wide use of online lecture formats, researchers must evaluate their impact compared to their traditional counterparts. This two-part study quantifies the effect of two variables: social presence and learner control, on teacher immediacy students' cognitive and perceived learning in different video lecture formats in introductory college courses. Students at a four-year, public American university were randomly assigned into three groups to view three distinct lecture formats, one in a traditional classroom and two via the Internet. Upon viewing the single lecture, the students were asked to fill out a posttest and survey to quantify the teacher immediacy, cognitive learning, and perceived learning levels across the lecture formats. The study found that differences in the lecture environment affected students' perceived learning levels, but had an insignificant impact on the students' cognitive learning.

Saturday, April 6, 2013
9:00-10:00 am
Room 1140

SWAMP: Superior Wetlands Against Malicious Pollutants

Research Team

Arsh Agarwal, Cell Biology & Molecular Genetics
Allison E. Bardford, Physics
Kerry Cheng, Computer Science
Ramita Dewan, Physiology & Neurobiology
Enrique A. Disla, Aerospace Engineering
Addison S. Goodley, Bioengineering
Nathan I. Lim, General Biology and Psychology
Lisa J. Liu, Chemical and Biomolecular Engineering
Lucas Place, Nutrition
Raevathi A. Ramadorai, Physiology & Neurobiology
Jaishri Shankar, Physiology & Neurobiology
Michael P. Wellen, Chemical Engineering
Diane M. Ye, Civil Engineering
Edward Y. Yu, Bioengineering

Faculty Mentor

Dr. David Tilley, Associate Professor, Natural Resources Management Program, Department of Environmental Science and Technology

Librarian

Mr. Robert Kackley, University Libraries, University of Maryland
Ms. Lily Griner, University Libraries, University of Maryland

Discussants

Ms. Jennifer Brundage, ORISE Fellow, US EPA
Mr. F. Albert McCullough III, Principal Ecological Engineer, Sustainable Science LLC
Dr. Edward Landa, Adjunct Professor, Department of Environmental Science & Technology
Dr. Joseph Sullivan, Professor, Department of Plant Sciences and Landscape Architecture
Dr. Donald Cahoon, Research Ecologist, USGS Patuxent Wildlife Research Center

Research Description

Nitrates from agricultural runoff are a significant cause of algal blooms in estuarine ecosystems such as the Chesapeake Bay. These blooms block sunlight vital to submerged aquatic vegetation, leading to hypoxic areas. Natural and constructed wetlands have been shown to reduce the amount of nitrates flowing into adjacent bodies of water. We tested three wetland plant species native to Maryland, Typha latifolia (cattail), Panicum virgatum (switchgrass), and Schoenoplectus validus (soft-stem bulrush), in wetland microcosms to determine the effect of species combination and organic amendment (addition of carbon source) on nitrate removal. In the first phase of our study, we found that microcosms containing sawdust exhibited significantly greater nitrate removal than microcosms amended with glucose or straw at a low nitrate loading rate. In the second phase of our study, we confirmed that combining these plants removed nitrates, although no one combination was significantly better. Furthermore, the above-ground biomass of microcosms containing switchgrass had a significantly greater percentage of carbon than microcosms without switchgrass, which can be studied for potential biofuel use. Based on our data, future environmental groups can make a more informed decision when choosing biofuel-capable plant species for artificial wetlands native to the Chesapeake Bay Watershed.

Saturday, April 6, 2013
10:15-11:15 am
Room 1130

MAGIC: Medical and Genetic Information Concerns

Research Team

Sathvik Balaram, Physiology & Neurobiology
Tyler Moran Dunn, Computer Science and Mathematics
Michael Alexander Harris, Chemical Engineering and Biochemistry
Joshua Benjamin Kohn, Computer Science
Hai Hoang Le, Physiology & Neurobiology
Christina Hyun-Jung Lee, Government and Politics
Ori Jacob Lieberman, Biochemistry
Tiffany Amanda Lin, Bioengineering
Aaron Matthew Sachs, Biology and Finance

Faculty Mentor

Dr. Ritu Agarwal, Professor and Dean's Chair of Information Systems; Director, Center for Health Information and Decision Systems; Robert H. Smith School of Business
Dr. Kislaya Prasad, Research Professor; Director, Center for International Business Education and Research; Robert H. Smith School of Business

Librarian

Ms. Nedelina Tchangalova, University Libraries, University of Maryland

Discussants

Dr. Gordon Gao, Associate Professor, Decision Operations & Information Technology
Dr. Louiqa Raschid, Professor, Decision Operations & Information Technology
Dr. Margrét Bjarnadóttir, Assistant Professor, Management Science and Statistics
Ms. Deven McGraw, Director of the Health Privacy Project, Center for Democracy and Technology

Research Description

While technologies for genetic sequencing have increased the promise of personalized medicine, they simultaneously pose threats to personal privacy. The public's desire to protect itself from unauthorized access to information may limit the uses of this valuable resource. To date, there is limited understanding about the public's attitudes toward the regulation and sharing of such information. We sought to understand the drivers of individuals' decisions to disclose genetic information to a third party in a setting where disclosure potentially creates both private and social benefits, but also carries the risk of potential misuse of private information. We conducted two separate but related studies. First, we administered surveys to college students and parents, to determine individual attitudes toward and inter-generational influences on the disclosure decision. Second, we conducted a game-theory based experiment that assessed how participants' decisions to disclose genetic information are influenced by societal and health factors. Key survey findings indicate that concerns about genetic information privacy negatively impact the likelihood of disclosure while the perceived benefits of disclosure and trust in the institution receiving the information have a positive influence. The experiment results also show that the risk of discrimination negatively affects the likelihood of disclosure, while the impact that disclosure has on the probability of finding a cure and the presence of a monetary incentive to disclose, increase the likelihood. We also study the determinants of individuals' decision to be informed of findings about their health, and how information about health status is used for financial decisions.

Saturday, April 6, 2013
10:15-11:15 am
Room 1140

KERMIT: Knowledge of Endocrine Reactions Manifesting from Intoxicants in Septic Tanks

Research Team

Amy X. Chen, Accounting
Alma C. Gonzalez, Animal Science and General Biology
David Hu, Cell Biology & Genetics
Richa Kalsi, Cell Biology & Genetics and Spanish Literature
Tanya S. Kapoor, Finance and Information Systems
Hae Min Park, Physiology & Neurobiology and Nutritional Science
Samuel C. Park, Civil Engineering
Alex M. Proctor, Anthropology and Linguistics
Alexander K. Ridgway, Mathematics, and Physics
Andrew M. Taverner, Cell Biology & Genetics and Mathematics
Nikola B. Vujcic, Architecture

Faculty Mentor

Mr. Steve Turley, Faculty Research Assistant, Wye Research and Education Center, College of Agriculture & Natural Resources

Librarian

Mr. Jim Miller, University Libraries, University of Maryland

Discussants

Dr. Dennis Burton, Senior Research Scientist, Wye Research and Education Center
Dr. Daniel Fisher, Senior Research Scientist, Wye Research and Education Center
Dr. Pam Lanford, Research Associate, Institute for Systems Research
Dr. Mary Ann Ottinger, Professor, Animal and Avian Sciences
Ms. Marybeth Shea, Lecturer, English
Dr. Lance Yonkos, Assistant Professor, Environmental Science & Technology

Research Description

Poultry litter contains high levels of natural sex hormones, nitrogen, phosphorous, and trace amounts of heavy metals. Poultry litter runoff from poultry and farming operations in the Delmarva region can have serious impacts on frog development in the Chesapeake Bay Watershed. In this study, we investigated potential effects of litter compounds on Xenopus laevis development when exposed to environmental levels (0.35 and 0.70 g/L) of litter solution. We found that despite rapid hormone degradation, poultry litter solution still affected X. laevis development. Hormones were also more persistent in the lower poultry litter concentration, leading to even greater effects. Slowed growth and increased female gonadal abnormalities were observed after exposure to 0.35 g/L but not to 0.70 g/L of litter solution, and increased male gonadal abnormalities were observed after treatment to both litter concentrations. The developmental impacts examined in this study may have greater environmental impacts on frog reproduction and survival.

BIO-COUNTER: Bioweapon Inhibition and Organized Containment Operating Unit for the Negation of Terrorist Entities and Radicals

Research Team

Kyle G. Jamolin, Government and Politics
Jonathan N. Saltzman, Government and Politics
Darrell E. Schaefer, English
Sebastian G. Serrano, Physics
Aaron Shim, Biology
Joshua B. Sloane, Aerospace Engineering

Faculty Mentor

Dr. Jefferey Herrmann, Associate Professor, Department of Mechanical Engineering and Institute for Systems Research; Associate Director, QUEST Honors Fellows Program; Department Editor, IIE Transactions Homeland Security Department

Librarian

Mr. James Miller, University Libraries, University of Maryland

Discussants

Mr. Christopher Geldart, Acting Director, D.C. Homeland Security & Emergency Management Agency
Mr. Jeffery Walker, Northern Region Emergency Planner, Northern Region office, Office of Emergency Preparedness, Virginia Department of Health
LCDR Skip Payne, US Public Health Service Commissioned Corps, Division of the Civilian Volunteer Medical Reserve Corps
Mr. Mike Sellitto, Intelligence Analyst and Fire Hazards & Assessments Analyst, Washington Regional Threat & Analysis Center
Captain Bob Mueck, Emergency Management, University of Maryland Department of Public Safety

Research Description

Our research was conducted to improve the timeliness, coordination, and communication during the investigation and decision-making phases of the response to an aerosolized anthrax attack in the metropolitan Washington, DC, area with the goal of reducing casualties. Our research gathered information of the current response protocols through an extensive literature review and interviews with relevant officials and experts in order to identify potential problems that may exist in various steps of the detection, investigation, and response. Interviewing officials from varying private and government sector agencies allowed the development of a set of models of interactions and a communication network to identify discrepancies and redundancies that would elongate the delay time in initiating a public health response. In addition, we created a computer simulation designed to model an aerosol spread using weather patterns and population density to identify an estimated population of infected individuals within a target region depending on the virulence and dimensions of the weaponized spores. We developed idealistic models of the conceptual models in order to design recommendations that would be presented to our collaborating contacts and agencies that would use such policy and analysis interventions to improve upon the overall response to an aerosolized anthrax attack, primarily through changes to emergency protocol functions and suggestions of technological detection and monitoring.

Food Deserts

Research Team

Carolina A. Aguiar, Community Health
Valerie Lynn Caplan, Government and Politics
Emily F. Chang, General Biology
Sophia Danielle Chang, Anthropology and Biology
Jennifer L. Kuo, Neurology & Physiology and Psychology
Moses O. Lahey, Information Systems and Operations Management
Rutvij Pranav Pandya, English
Kate Cassidy Richard, English and Environmental Science & Policy
Kelci Rose Schexnayer, Environmental Science & Policy
Monique A. Thornton, Community Health
Rachel Elizabeth White, Anthropology

Faculty Mentor

Dr. Stephanie Grutzmacher, Research Assistant Professor, School of Public Health, Extension Family Specialist, University of Maryland Extension

Librarian

Ms. Judy Markowitz, University Libraries, University of Maryland

Discussants

Dr. Sharon Desmond, Associate Professor, School of Public Health
Mr. Elliot Segal, Professor of the Practice, School of Public Health
Dr. Mia Smity Bynum, Associate Professor, School of Public Health
Ms. Lauren Messina, Instructor, School of Public Health
Ms. Ashley Munger, Doctoral Student, Department of Family Science

Research Description

Food insecurity affects 44 million Americans, 12 million of whom are children. The federal government has created programs like SNAP and WIC to help alleviate food insecurity among low-income families; however, some of these families continue to struggle with fresh fruit and vegetable access and affordability. Farmers' markets, as an alternative to other shopping options in food insecure areas, present an opportunity to close this gap. We surveyed 70 WIC and SNAP shoppers at three D.C. metropolitan farmers' markets to assess the correlation between parental self-efficacy and the home nutrition environment. A significant relationship existed between self-efficacy and each of the three variables that make up the home nutrition environment: family health behavior ($p = 0.000$, $r2 = 0.407$), perceived barriers ($p=0.007$, $r2 = 0.101$), and fruits and vegetables offerings in the home ($p = 0.008$, $r2 = 0.099$). Interviews with survey participants and with farmers' market coordinators were also used to evaluate topics such as accessibility of the markets for shoppers, redeeming SNAP/WIC benefits at the markets, and the feasibility of installing the equipment to accept these benefits for coordinators.

Solar Campus

Research Team

Sougata Biswas, Electrical Engineering
Jason Martin Connolly, Aerospace Engineering
Kevin John Fries, Civil and Environmental Engineering
Christopher Anthony Grant, Accounting and Operations Management
Kevin Hwang, Computer Engineering
Hoyoung Kang, Physics
Donna Motabar, Bioengineering

Faculty Mentor

Dr. Charlie Carr, Senior Technical Consultant, MTech

Librarian

Ms. Nevenka Zdravkovska, University Libraries, University of Maryland

Discussants

Mr. Tao Cao, PhD Candidate, Center for Environmental Energy Engineering
Dr. Nibir Dhar, Program Manager, Microsystems Technology Office, DARPA
Dr. Mario Dagenais, Professor, Electrical and Computer Engineering
Dr. Brian Dougherty, National Institute of Standards and Technology

Research Description

Current research in the field of concentrated photovoltaic energy investigates the effect of temperature under controlled lab conditions. This project uses field measurements to investigate the cooling of a triple junction, photovoltaic cell under natural convection when subjected to varying amounts of insolation. To conduct this research, the team built an experimental apparatus consisting of a mirror and Fresnel lens to concentrate light onto a triple-junction photovoltaic cell mounted vertically on a copper heat sink. Measurements were taken year-round to provide a wide-range of field conditions. MATLAB was used to plot the collected data as a function of the insolation, cell temperature, and ambient temperature. A surface was then generated using Sparrow's model for natural convection on a vertical plate under constant heat flux. The team hopes that this surface can used to find the expected operating temperature of a cell at any location, given the ambient temperature and insolation. This research is an important contribution to the field because it utilizes field data that is more representative of how a cell would react under normal operation. It also extends the use of a well-known model from a 1-sun environment to a multi-sun one.

Gemstone Teams would like to acknowledge these individuals for their encouragement and support:

Team B^3
We would like to thank our mentor, Dr. Helim Aranda-Espinoza for his guidance over the past three years along with all the members of his lab.

Team BIOCOUNTER
We'd like to thank our contacts and interviewees involved in the research, the Gemstone staff, Dr. Herrmann, and Mr. Miller.

Team DIET
Team DIET would like to thank our mentor, Dr. Nadine Sahyoun for her dedication and direction. We would also like to thank the Dining Services staff and the various experts who helped us find our way from authoring a proposal through completing a study and writing a thesis. We would like to thank our panel of discussants and our team librarian, Ms. Judy Markowitz, for their time and feedback. We thank the Gemstone staff, old and new, for their help and support over these past four years. Finally we would like to acknowledge Min Yan for her contributions to the early development of the project and writing of the thesis and Dr. Bruce Jacob for providing us with a server as well as his advice.

Team Food Deserts
We would like to thank our mentor, Dr. Stephanie Grutzmacher, who throughout this process has helped, guided, and supported us in all endeavors of our lives, not just our research. We would also like to thank Lauren Messina, Kate Speirs, Ash Munger, Stephen Fleg, Brian Schram, and Jessica DiBari, who helped with our recruitment and data collection at the markets. We also thank our Spanish translators: Meaghan Mallari, Rene Pizarro, and Elizabeth Rojas. Additional thanks go to our community partners, who helped us connect to our markets: Maryland Hunger Solutions and University of Maryland Extension. A special thanks is owed to the coordinators of our three market sites: Phil and Brad Miller, Jim Coleman, Kim Bryant. Thanks to the Gemstone staff, with a special thanks to Jim Wallace, Rebecca Thomas, Frank Coale, and Kristan Skendall. Thanks to our discussants, Sharon Desmond, Lauren Messina, Ashley Munger, Elliot Segal, and Mia Smith-Bynum.

Team Gene Therapy
Dr. Ioannis Bossis for his tremendous patience, insight, and guidance throughout the length of of our research. Mr. Yogendra Rajawat for his unwavering support and commitment to the successful completion of our project. Dr. Robert Kotin for his expertise and help in viral production. Dr. Douglas Powell. Mr. Yonas Araya . Mr. Jim Miller. Howard Hughes Medical Institute, the Atlantic Coast Conference Inter-institutional Academic Collaborative Fellows in Innovation and Creativity, the Foundation of the National Lipid Association, and the Gemstone Program for providing the funding that made our research possible. Dr. James Wallace, Dr. Rebecca Thomas, Dr. Frank Coale, Dr. Kristan Skendall, and the entire Gemstone staff for their unconditional support over the past four years.

Team IEDOB
We appreciate the Gemstone program in the Honors College at the University of Maryland, and the U.S. Department of Energy Materials Performance Division for supporting our research. We have immense gratitude to our mentor, Dr. Chunsheng Wang, our team librarian, Nevenka Zdravkovska, as well as Dr. Michael Fuhrer, and Dr. Ayyakkannu Manivannan for their continued guidance throughout the duration of this project. Finally, we wish to thank our discussants, Mr. Xinyi Chen, Mr. Alexander Kozen, Dr. Liangbing Hu, Dr. Yunhua Xu, and Dr. Ayyakkannu Manivannan for providing valuable critique of this thesis.

Team KERMIT
First and foremost, we would like to thank our mentor, Mr. Steve Turley for his guidance and unfaltering optimism. We would like to thank our discussants: Dr. Dennis Burton, Dr. Daniel Fisher, Dr. Pamela Lanford, Dr. Mary Ann Ottinger, Ms. Marybeth Shea, and Dr. Lance Yonkos. We would also like to thank Dr. Diana Aga for hormone quantification, the DNR Cooperative Oxford Lab for histology preparation, the ALS Environmental lab for water chemistry quantification, Dr. David Straney, Mr. Tom McMullen and Mrs. Linda Zappasodi for providing laboratory space, Dr. Amada Underwood and Dr. Douglass Powell from IACUC, and the Maryland Sea Grant Program. We are grateful for the assistance from our librarian Mr. Jim Miller. We would finally like to thank the Gemstone Program, Dr. Frank Coale, Dr. Kristan Skendall, Dr. James Wallace, and Dr. Rebecca Thomas for their support over the past four years.

Team MAGIC
We thank the following: Drs. Agarwal and Prasad for their invaluable guidance and support over the past four years, Dr. Anderson for her constructive feedback and assistance in constructing our survey, Drs. Bjarnadóttir, Gao, McGraw, and Raschid for serving as our thesis committee and providing expert feedback, Ms. Tchangalova for her assistance as our team librarian, Drs. Wallace, Thomas, Coale, and Skendall as well as the rest of the Gemstone staff who brought our team together and made our research possible, the NSF ADVANCE seed grant program for partial support of our research, and finally, our friends and family who willingly donated their time for our pilot survey and experiment.

Team Milk
Team Milk would like to thank all those who have supported and advised us throughout this project. In particular, we truly appreciate the help of our mentor Dr. Nam Sun Wang, who was not only a wise teacher, but also a demanding coach and an unflagging cheerleader. We would also like to extend great thanks to Dr. David Bigio of the Department of Mechanical Engineering, and Dr. Y. Martin Lo of the Department of Nutrition and Food Science, for sharing with us their invaluable expertise and resources. Last but certainly not least, we thank the staff of the Gemstone Program for keeping us on our toes and providing a solid support structure. Gemstone brought our team together to experience this one-of-a-kind journey and we look forward to seeing more exciting research from future teams.

Team ONLINE
We would like to thank the Gemstone staff both old and new. Dr. Wallace and Dr. Thomas were indispensible to our team while beginning our project, and Dr. Coale and Dr. Skendall were valuable resources while we finished. Our project would not have been possible without the cooperation and generosity of Drs. Schwab, Clement, Dixon, and Dooley. We thank them for opening their classrooms to us and allowing us to conduct our experiment with their students. Also, we would like to thank our librarian, Dr. David Wilt for helping us with our literature review. Finally, we would like to thank our mentor, Dr. Zachariah, whose wisdom and guidance kept us on a successful path in the program.

Team Rodent
We would like to extend our sincerest gratitude to Dr. Frank Coale, Dr. Kristan Skendall, and the Gemstone staff, for their guidance throughout the four-year process. We are also grateful to Dr. James Wallace and Dr. Rebecca Thomas who were crucial to the development of our project in its early stages. We would also like to thank our librarian, James Miller, for his invaluable feedback during the writing process. In addition, we thank ACCIAC and HHMI for providing the grants to fund our research. We would also like to thank Qiong Hu for working tirelessly to teach us the research techniques that were critical to our project. Last but certainly not least, we thank our mentor, Dr. Brian Bequette, for supporting us with endless encouragement, expertise, and guidance. Our project would not have been possible without Dr. Bequette, who kept us continually motivated with his patience and tough love.

Team Solar Campus
We would like to thank our mentor, Dr. Carr, for all of his teaching and support; without him whipping us into shape, this project would have never been completed. We would also like to thank our librarian, Nevenka Zdravkovska, for her help with the extensive literature search. We would like to thank the EMCORE Corporation for their generous donation of 20 multi-layer solar cells and ReflecTech for their donation of mirror film. Finally, we would like to thank the ACCIAC for their generous grant in support of our research.

Team SWAMP
We would like to acknowledge our mentor, Dr. Tilley, our librarians Mr. Kackley and Ms. Griner, Dr. Wallace, Dr. Thomas, Dr. Coale, Dr. Skendall, Ms. Hill, and the rest of the Gemstone staff. We thank our discussants Dr. Sullivan, Mr. McCullough, Dr. Landa, Ms. Brundage, and Dr. Cahoon for their detailed critiques. Thank you to Ms. Morgavan, Mr. Wallace, and the rest of the Greenhouse staff for their advice on our plant health. We would like to recognize the Appalachian Lab, the Water Quality Lab, and Mr. Schlosnagle for their assistance in data collection. We appreciate the guidance from Dr. James, Mr. Winfrey, and Jillian Chavis. Finally, we thank the Maryland Sea Grant Program and the Keeping Maryland Beautiful Grant for helping fund our project. Last, but certainly not least, we would like to thank our friends and family for their continued support.

Gemstone

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